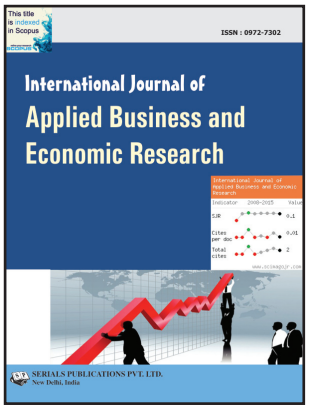

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Cost of Capital Model Based on Islamic Finance Principles

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ABSTRACT

Even though cost of capital models have evolved and have been developed through more sophisticated methods, there is still a big dilemma in the investing world about finding the right rate that reflect optimally the risk of the underlying asset. Our research focus on finding the cost of capital of equity by using Islamic and ethical principles in addition to economic foundations. This paper covers some asset pricing models and introduces sharia based factors which we include in the model resulting in a multi-factor cost of capital that does not involve interest rate. A brief presentation of the model results were discussed to analyze the robustness of the factors used. We conclude this paper with an inference showing that incorporating ethical principles, like using real economy factors instead of interest rate and using paid taxes in a cost of capital can help create a model for valuing risk of a company while excluding all non-fundamentals aspects. As a result we can test this model on larger sample in order to improve it. Furthermore; in response to investors' choice for ethical principles we can use it for stocks valuation and portfolio strategies.

Keywords: Cost of Capital, Asset Pricing, Socially Responsible Companies, Arbitrage Pricing Theory, and Islamic Finance.

1. INTRODUCTION

In finance, the use of cost of capital is crucial because of three reasons. First, cost of capital reflects the degree of risk associated with a company, therefore financial professionals allow great importance to the value and degree of impact of any factor whether endogenous or exogenous that can increase/decrease the risk of a company. Second, in capital budgeting and due to effect of cost of capital some projects could be rejected vs others accepted, and such financial decisions will affect the future performance of the

company hence the degree of details allowed to cost of capital. Third, in the world of stock market, many research worked on comparing the cost of capital (in this case cost of equity) with the actual realized rate of return. Investors require models that predict optimally the expected rate of return so they can make their investments moves.

In Islamic finance, as well, many research were developed to, on one hand incorporating Islamic values and principles in the cost of capital and on the hand dealing with the same challenging points discussed in the previous paragraph which are common problems in Islamic finance as well as in conventional finance. In fact most models in conventional finance rely on risk free interest rate to compute the expected cost of capital. In our model we rely on fundamentals factors affecting the risk of the company without using interest rates.

So to present the model and its results we start this paper in section one with a resume of mostly used models for cost of capital. In the second section we bring together principles and values that hold the foundations of Islamic finance. Then we discuss in the third section the importance of Islamic social responsibility and how it can affect the performance and the risk associated with businesses. In fourth and fifth section we introduce our model and the system used for its optimization, and then we analyze its results in section six and conclude the paper in section seven.

2. DIFFERENT MODELS OF COST OF CAPITAL

In order to find the appropriate discount rate used to discount the company's cash flows, many different models and methodologies are employed. Four most used models will be discussed, and then we will propose a multi-factor cost of capital.

(a) Implied Cost of Capital

Implied cost of capital "ICC" is the rate of return that investors are asking for in order to buy and hold some assets. In equity it represents the internal rate of return that equates the discounted future cash flow to the price of the security at time 0. And the most known model is the dividend capitalization model which is derived from the famous discounted dividend model "DDM ":

Cost of equity = (dividends per share/current market value of stocks) + growth rate of dividends

Underlying such model is the fact that all future cash flows are discounted at a constant discount rate, which could lead to significant valuation errors and poor decisions [1]. Many research studied ICC from different approaches and using different types of cash flows. Gebhardt, Lee and Swaminathan presented a market implied costs of capital generated from a discounted residual income of companies [2].

Other work focused on the firm level to deduct the implied cost of capital like the case of Lee, Ng and Swaminathan where they found that using such cost of capital can predict better expected returns compared to the realized returns that disguises such relations [3]. Other work used ICC to test the effect of dividend taxes on the cost of equity capital and hence on the cost of firm capital [4]. Another research studied whether tax policies can stimulate investment by using the implied cost of capital [5]. Dhaliwal, Heitzman and Zhen Li, worked on examining the relationship between leverage, corporate and individual taxes and the company's ICC [6]. Another paper showed how voluntary disclosure and earning quality are related to ICC [7].

(b) Equity Premium

Equity premium is another way of computing the cost of capital:

$$ERP_t(k) = E_t(R_{t+k}) - R^f_{t+k} \quad (42.1)$$

Where R^f_{t+k} is the net risk-free rate for investing from to (which, being risk-free, is known at time).

This is simply an empirically based method that relies on historical rate of return of different types of assets. Premiums are then calculated when moving from one category of asset to another hence to a different type of risk. Premiums in that matter are reflecting the value or the cost of undertaking more or less risky assets. Traditionally such premiums are computed from the difference between the rate of return of an asset and the risk-free rate. But in the case of Donaldson, Kamstra and Kramer other associations are explored like dividend yield, return volatility, and realized excess return [8]. When counting for dollar weighted return; Dichev found that the equity premium historically computed is higher than actual investors' returns. These results are explained to be due to differences of the timing and magnitude of investor capital flows into and out of stocks [9].

Nevertheless, Fama and French in their study found inverse results for the last half of the century where expected rate of return are lower than the average stock return. Their measures are based on the effect of dividend and earnings growth on the expected rate of capital return [10].

Other factors were also used to explain historical premium equity such that of Ibbotson and Chen where they presented forecasted equity premiums very close to that of the estimated historical return. Factors like inflation, earning, dividends, P/E, dividend payout ratio, book value, R/E, and GDP per capita were used in a forward-looking long-term equity risk premiums [11]. But many studies showed that such premiums should not be used in books or by financial managers as they rely on wrong inputs [12].

Other search for a simpler model that justifies the existence of such premium given the much lower volatility of aggregate economic data [13]. While others criticize equity premiums other studies worked to advocate the use of historical equity premiums in financial decisions. Campbell states that historical premiums of cross-section stock prices can be used along persistent valuation ratios can be used to reinforce the predictability of world equity premiums [14]. Goyal and Welch in their paper showed that dividend ratios predicts stocks return only in longer horizon while there is no associations to equity premiums in the short horizons [15].

(c) Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model or (CAPM) was developed by W.F. Sharpe in 1964 [16]:

$$\bar{r}_a = r_f + \beta_a(\bar{r}_m - r_f) \quad (42.2)$$

Where:

r_f = Risk free rate

β_a = Beta of the security

$\bar{r}_m$ = Expected market return

This model is used to calculate the expected return of a stock or a portfolio of stocks in relation to market return. Such relation is measured by beta which is the degree of association between the investment's return, mostly equity, and a proxy representing market return. You will find CAPM in every finance book as a representative model in computing expected rate of return for equity investments. While some books use other models for computing cost of equity other books rely solely on CAPM to cover all finance topics. In the professional world many survey showed that finance experts and managers uses to some extent CAPM in their financial decisions.

However while studying CAPM many scholars showed the shortness of such model to consistently predict equity's rate of return [17]. The critics argue that it is due to the underlying assumptions and to the inputs used in the model. The first assumption is that the absence of effect from taxes and transaction costs in the investment process. Second, that the market is efficient and all information is freely available to investors at zero costs. Third assumption, there many investors in the market so no one affect individually the market. Fourth, All investors are risk averse hence the relationship between risk and return. Fifth, "Asset returns are defined to be over the next period, and the investors are assumed to be maximizing their returns over a single period [18]. Sixth, the existence of a risk-free asset that investor can use in borrowing for their investments. Seventh, there is a one market representing all assets which are all marketable and perfectly divisible. And finally with all these previous assumptions investors will be having same expectation about future equity returns.

Arbitrage pricing theory APT is another famous model that estimates equity rate of return:

$$r_j = a_j + b_{j1}F_1 + b_{j2}F_2 + ... + b_{jn}F_n + \in_j \quad (42.3)$$

Where:

a_j is a constant for asset j

F_k is a systematic factor

b_{jk} is the sensitivity of the jth asset to factor k, also called factor loading,

$\in_j$ is the risky asset's idiosyncratic random shock with mean zero.

(d) Arbitrage Pricing Theory

Arbitrage Pricing Theory "APT" is similar to CAPM in the way it relate equity return to variation of other factors. Another similarity is that both models assume market efficiency. But APT can represent multi-periods return compared to CAPM which reflect a one-period return. Also while CAPM depend on existence of an equity market representing all available assets, APT uses only asset related factors. This multi-factor approach was supported by many researches pointing out that APT outperforms CAPM because the latter rely on a single factor model [19].

The assumptions of the APT are as follows [20]:

1. All investors exhibit homogeneous expectations that the stochastic properties of capital assets return are consistent with a linear structure of K factors.
2. Either there are no arbitrage opportunities in the capital markets or the capital markets are in

competitive equilibrium.

3. The number of securities in the economy is either infinite or so large that the theory of large numbers is applied.
4. The APT holds in both the multi-period and single period cases.

3. SHARIA PRINCIPLES

Many topics come to mind when discussing cost of capital, like time value and whether it is sharia based. Sharia Advisory Council (SAC) of BNM stated the permissibility of using time value in some finance-related operations "Sharia does allow the application of time value of money principle only for exchange contracts that involve deferred payment. However, it is strictly prohibited in debt-based transactions (i.e. qard) "[21].

Another topic is that stocks prices should be close and reflect more the true value of the underlying asset excluding any over/under surges of prices from their intrinsic values. Any small variances from intrinsic values can be attributed to trading effects of the market. Nevertheless it's rarely when the market reflect an efficient state; and if does it's with a weak correlation [22]. Research made by Suwailim in his paper showed that there are great differences between economic market valuation and financial market valuation [23]. Foerster and Sapp showed strong explanation of prices using fundamental analysis, even though the large part of the explained correlation was coming from lagged variables of prices one month before [24].

But market behavior shows that investors go back and forth from fundamentals to technical analysis to make profits, which historically translated into periodical bubbles [25]. In our research, we believe to focus on fundamentals factors to predict the cost of capital. We will focus on parameters affecting the real value of a company's quarterly stock prices. Such parameters will be based on economic, financial, as well as ethical principles using corporate social responsibility values.

4. ISLAMIC SOCIAL RESPONSIBILITY

Many corporate scandals and their effects on the society, the environment, and on the economic development showed the importance to analyze the role of corporation and businesses in the sustainability of a society. According to Tom Chappell: We are helping to create a new mind-set, those responsible practices and profitable practices are one and the same. It is more difficult to manage responsibly and profitably but it is within our human means. It just takes being intentional about being good as well as being successful [26].

From an ethical point of view companies should generate profits in a way to contribute to society's improvement through the incorporation of actions that follow the rules of good governance, transparency, customers' safety, environment, and employees' human right protection. The underlying principle is that goal, means, and the way to do business should all be serving shareholders as well as all other stakeholders. However, when it comes to business and making profit most of these principles for many reasons are ignored.

However, when it comes to business and making profit most, if not all, of these principles for many reasons are ignored. But with the latest financial crisis, research is more focused on the values business and investors should integrate in their strategies. Theories like stakeholder's concept, social responsibility and

ethical behavior are taking momentum in the economic and finance world: "The purpose of a business, in other words, is not to make a profit, full stop. It is to make a profit so that the business can do something more or better. That 'something' becomes the real justification for the business. Owners know this. Investors need not care" [27].

Being an Islamic socially responsible means it is a multi-objective function leading to many optimal solutions. On one hand the inter-relationship between profit and social improvement should lead to strategies profitable for all stakeholders, while in some cases being socially responsible means adding some expenditure that are uncorrelated directly with our business operations. These costs contrariwise affect our bottom line without generating extra revenues. However in the recent years many research proved that social responsibility is related to some variables that indirectly affect the cash flow of the company [28]. Parameters like brand name, reputation, employee satisfaction, customer's health and environment have being proven to affect the sales of a company in other cases it leads to reduced costs, hence improved profits. Companies from an Islamic point of view should generate halal profits and help society improve through the incorporation of actions that follow the rules of Quran, Hadith, and Sharia. The underlying principle is that goal, means, and the way to do business should all be halal, and aim at the wellbeing of the investors, their families, and the society as well. Of course, some of these values are not specific to Islam but are universal and are incorporated in most known religions.

On the hand Islamic finance reject the over reliance on liabilities in making business. In fact when a company is heavily in debt; it triggers extra risk for all its stakeholders. Such situation is called Rharar which means taking tremendous risks that can harm stakeholders.

In our research Islamic social responsibility is represented mainly by three factors, paid taxes, paid dividends, and leverage. We believe that a company is socially responsible when it pays all its stakeholders including shareholders and government. Our argument is that the company distributes some of its earnings to investors, government and other stakeholders and that each of the society members can help improve directly or indirectly the general public wealth with that earned money. That is the reason we will introduce paid taxes as a factor of firms being socially responsible. Nevertheless in practice managers uses tax planning techniques to pay less tax and hence increase the value for shareholders. Such misconception was proved by Shaipah, Wahab and Holland where they conclude that there is no value assigned by shareholders to tax planning and that the latter actually reduce the company value [29]. Unlike paid taxes and dividends that are positively valued in our model by reducing its cost of equity, leverage is viewed as a negative factor and can increase risk hence increasing the cost of equity.

5. MULTI-FACTOR COST OF CAPITAL MODEL

For the cost of capital, we suggest a multiple factors cost of equity rate that depend on economic, industry, and business specific factors. The reason behind our choice of such model is to show systematic as well unsystematic factor risk, so we will opt for an Arbitrage pricing model using multiple factors that are connected to real fundamentals opportunities and risks.

Following up the underlined objectives we will use real DGP growth for economic factor in addition to GINI factor as an assessor of a country's wealth disparity. GINI index is important in our model to weight the importance of paid taxes, dividends, and any socially responsible projects. The higher the GINI index the higher the risk for the economy and the higher the importance of such spending for the society

which should increase the intangible value of a company. For industry risk factors we will introduce a rating of the industry from less risky "3" to more risky "1". Finally, business specific factors like company asset size, percentage of fixed assets to total assets, operating cash flows variations, sales real growth rate, leverage ratio for the business, dividend payout ratio, effective tax rate, and rating of the entrepreneurship of the company:

$$k_t = f(\text{Economic Risk, Industry Risk, Specific Risk}) \tag{42.4}$$

$$\text{Economic Risk}_t = f(\text{GDP Real Growth, GINI Index}) \tag{42.5}$$

$$\text{Industry Risk}_t = f(\text{Product Concentration, Consumer Concentration, Industry Maturity}) \tag{42.6}$$

$$\text{Specific Risk}_t = f(\text{Sales Real Growth rate, Operating Risk, Leverage, Fixed Asset ratio, Tax rate, Dividend Payout ratio}) \tag{42.7}$$

$$k_t = \left[4\text{GDPRG}_t + (\text{GN}_t)(\alpha) + (\text{IC}_t)(\text{SRG}_t) + \frac{\text{PPP}_t}{\text{LV}_t} + \text{ET}_t + \text{DV}_t + \text{EP}_t + \frac{\text{AG}_t}{1 - \text{SI}_t} + \frac{|\text{OR}_t|}{25} + \frac{(\text{LV}_t - 33\%)}{10} \right]^{-1} \tag{42.8}$$

GDPRG_t	:	GDP Real Growth Rate
GN_t	:	GINI Index
α_t	:	Total Paid Taxes Plus Paid Dividends Margin of sales
IC_t	:	Industry Concentration of products, suppliers, consumers, and labor powers
SRG_t	:	Sales Real Growth Rate
LV_t	:	Leverage
PPE_t	:	Property Plants and Equipment Ratio
ET_t	:	Effective Tax Rate
DV_t	:	Dividend Payout Ratio
SI_t	:	Size of company's total assets to Industry
AG_t	:	Company's Age
EP_t	:	Entrepreneurship degree in management
OR_t	:	Operating Cash Flow Risk

In order to optimize the cost of capital we use a multi-objectives optimization using intrinsic valuation of equity as a second objective. And we propose a model inspired from the clean surplus equation from Peasnell [30] and Ohlson [31].

$$\text{P}_t = y_t + \sum_{i=1}^{\infty} ((1+r)^{-i})\,(\text{E}(x_{t+1})) \tag{42.9}$$

Where y_t is equity book value at date t and x_{t+1} earning for the period $(t, t+1)$. In fact residual income (RI) approach gained a tremendous attention lately in the area of asset valuation. Claus and Thomas proved in their research the superiority of forecasting equity premium using residual income method vs the dividend constant growth model [32]. Also Desroisier, Lemaire and Lher used RI methodology to deduct the induced expected ROR using a zero-investment portfolio [33].

In our research, we believe to focus on finding the fair value of the equity. And the model proposed in our research is inspired from ethical values as well as economic foundation like the uncertainty in valuing the terminal value as we go further in time. For such modification of the model we limit the expected terminal value at time $t+\mathrm{T}$, where T equal 20 quarters. As for the earnings, we will use income net of total costs, paid taxes, and paid dividends:

$$\mathrm{I}_t = \sum_{i=t}^{t+\mathrm{T}} \frac{(1-\mathrm{AT}_i-\alpha_i)\mathrm{S}_{\mathrm{med}}}{(1+k_{\mathrm{med}})^i} + \frac{\mathrm{E}(\mathrm{TV}_{t+\mathrm{T}})}{(1+k_{\mathrm{med}})^{\mathrm{T}}} \tag{42.10}$$

$$\mathrm{TV}_t = \left[\sum_{i=0}^{t} \alpha_i \mathrm{S}_i \left(1+k_i\right)^{t+\mathrm{T}-i}\right] + \mathrm{BV}_{t+\mathrm{T}} \tag{42.11}$$

I_t	:	Intrinsic Value of the equity
AT_i	:	Total Costs Margin
S_i	:	Total Sales
TV_t	:	Terminal Value
k_{med}	:	Median of Discount Rate
BV_t	:	Book Equity Value

The significance of the model when optimized will help in pricing fairly corporate equity. For that we had run some simulation using MATLAB to reach the optimization of the cost of capital through a two-objective model. First function is the cost of capital which supposed to be minimized, and second function which is the intrinsic value and it should be maximized.

A weighted total of both functions "J" is optimized through the use of "*a*" and "*b*" as weighting coefficients such that $a+b=1$.

$$\mathrm{J} = a \times \mathrm{K}_t - b \times \mathrm{I}_t \tag{42.12}$$

In the following we will present the optimization method used in order to optimize J and to obtain some important parameters of the considered model.

6. MULTI-OBJECTIVE OPTIMIZATION

The objective of this section is focused on optimizing the equity price under the MDCF model proposed by Aboulaich et. Boularhmane [34]. For this we have to optimize two functions: Intrinsic Price "I_t" and Cost of Capital "K_t".

This problem is a multi-objective one; to solve it we use the weighted sum method. The method transforms multiple objectives into an aggregated objective function by multiplying each objective function by a weighting factor and summing up all weighted objective functions. Each single objective optimization determines one particular optimal solution point on the Pareto front. The weighted sum method then changes weights systemically, and each different objective function determines a different optimal solution. The multi-objective problem is then transformed into a mono-objective one.

In the following we will recall briefly the Genetic Algorithm used for the solution of the obtained mono-objective problem.

Genetic Algorithm is a heuristic used for optimization according to Holland [35], where the extrema of the function (i.e., minima or maxima) cannot be established analytically. A population of potential solutions is refined iteratively by employing a strategy inspired by Darwinist evolution or natural selection. Genetic Algorithms promote "survival of the fittest". This type of heuristic has been applied in many different fields, including finance.

Generally, genetic operations include: "crossover", "mutation" and "selection".

"Crossover" operator. Suppose $S_1 = \{s_{11}, s_{12}, \ldots, s_{1n}\}$, $S_2 = \{s_{21}, s_{22}, \ldots, s_{2n}\}$, are two chromosomes, select a random integer number $0 \leq r \leq n$, S_3, S_4 are offspring of crossover (S_1, S_2),

$$S_3 = \{s_i \mid \text{if } I \leq r, s_i \in S_1, \text{ else } s_i \in S_2\},$$

$$S_4 = \{s_i \mid \text{if } i \leq r, s_i \in S_2, \text{ else } s_i \in S_1\}.$$

"Mutation" operator. Suppose a chromosome $S_1 = \{s_{11}, s_{12}, \ldots, s_{1n}\}$, select a random integer number 0d rd n, S_3 is a mutation of S_1, $S_3 = \{s_i \mid \text{if } i \neq r, s_i = s_{1i}, \text{ else } s_i = \text{random}(s_{1i})\}$.

"Selection" operator. Suppose there are m individuals, we select $[m/2]$ individuals but erase the others, the ones we selected are "more fitness" that means their profits are greater.

Genetic Algorithm "GA"

1. Initialize Population: Producing a number of individuals randomly, each individual is a chromosome which is a length array, n is the number of parameters.
2. Test if one of the stopping criteria (running time, fitness, generations, etc.) holds. If yes, stop the genetic procedure.
3. Selection: Select the better chromosomes. It means the profit under these parameters is greater.
4. Applying the genetic operators: such as "crossover" and "mutation" to the selected parents to generate an offspring.
5. Recombine the offspring and current population to form a new population with "selection" operator.
6. Repeat steps 2-5.

GA cansbe written as follow

P <= Initialize Population ();

While (not stop (P)) do

Parents [1..2] <= Select Parents (P);

Offspring [1] <= Crossover (Parents[1]);

Offspring [2] <= Mutation (Parents[2]);

P <= Selection (P, Parents [1..2], Offspring [1..2]);

Endwhile.

In our case, the initial population is a set of randomized vectors given by (alpha, LVs, AG, EP, RT) that satisfy the box constraint.

7. RESULTS AND DISCUSSION

Using MATLAB simulations on the model we used some variables as inputs and worked to optimize coefficients of other factors. As inputs for macroeconomic we used GDP real growth "$GDPRG_t$", and GINI index "GN_t", for industry factors "IC_t" we used industry concentration by combining rating for factors like clients and suppliers concentration, labor power in addition to product's utility and its life cycle level. Rating of each company is result of average rating of all the previous factors which rated on a scale 1, 2, or 3 from least to highest concentrated.

For the specific risk we used fixed assets/total assets ratio "PPE_t", sales growth rate "SRG_t", operating risk "OR_t", dividend payout ratio "DV_t", and size of company's total assets to industry "SI_t". Outputfactors are degree of leverage "LV_t", tax rate "ET_t", entrepreneurship "EP_t", and age of company "AG_t". All these last factors were optimized with the objective to minimize cost of capital "K_t" and maximize intrinsic value "I_t".

$$J = a \times K_t - b \times I_t \tag{42.13}$$

Publicly financial reported data is applied to the model, and results are shown in Table 42.1. For cost of capital we can infer that the minimum k of Biogen is 1.61%, 2.16% for Cisco, 2.45% for EBay, 1.17% for GM, and 1.71% for Kimberly-Clark "KC". These results reflect the degree of risk for each of the companies. In fact EBay and Cisco has the highest costs of capital because they are pure service companies with small fixed assets investments.

Table 42.1
Results from the Optimisation of Cost of Capital and Intrinsic Value

	Biogen	*Cisco*	*EBay*	*GM*	*Kimberly Clark*
I_t	49,907,000,000	107,970,000,000	11,866,000,000,000	16,766,000,000	17,231,000,000
K_t	1.61%	2.16%	2.45%	1.17%	1.71%
S_t	6,810,900,000	12,324,000,000	5,433,300,000	5,259,400,000	5,304,300,000
α_t	4.80%	3.05%	3.92%	2.70%	2.06%
LV_t	0.03%	0.01%	29.89%	6.03%	0.00%
AG_t	100	100	60.35	77	100
EP_t	3.49	1.14	1.78	5	2.15

One of the interesting results was the tax rate plus the dividend required to minimize the cost of capital which ranged from 2.06% for Kimberly-Clark to 4.80% for Biogen. Such finding can be compared to the percentage of required Zakat rate from companies increased by some dividend payout ratio. Also, we can use these results to create optimal tax rates tailored to each specific industry. As for leverage optimal level results show that all companies needs to reduce their debt margin to almost none except for Ebay. This is one of the most important pillars of Islamic finance which is avoiding leverage in business as much as possible, and if capital needed it should be through subvention, Sukuk, or equity capital.

For age we found that we can deduce that Biogen, Cisco, and Kimberly Clark need to reach 100 years before they can have a minimum cost of capital which means that KC which is 144 years old should already have reached its optimal cost of capital. As for EBay which is a 21 years old company, it will have an optimal k when it is 61 years old meaning in 2056. And finally, for the entrepreneurship, an interesting conclusion is that GM need management that mid-to-highly entrepreneurial, while other technology and

e-commerce companies like Cisco and EBay, don't need that because they already have entrepreneurship approach in their management.

8. CONCLUSION

Finding the right cost of capital was and still always crucial for financial decision making. In Islamic finance it is even more challenging since the underlying principles are different from those of conventional finance. We propose a new model of cost of capital that reflect major Islamic values and principles along with the inclusion of important economic and finance factor affecting the risk of a company. From the results we can deduct that such model can be developed into more standardized level. Also we can inspire for the model to develop further the principles of social responsibility rating and how can that help reduce the risk associated with the cost of capital for such companies.

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