Key Issues and Challenges in Estimating the Cost of Capital for Energy Network Utilities in Emerging Markets

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ABSTRACT

Estimating the cost of capital in emerging markets presents greater difficulties because these markets have relatively illiquid capital markets and higher levels of sovereign risk, economic uncertainties, and political risks. Experience shows that in estimating cost of capital, energy regulators in emerging countries usually depend on the work and recommendations of their staff and/or outside consultancy services. Since the ultimate decision is made by regulators, they need to understand the challenges and key issues in estimating a fair and reasonable cost of capital for energy utilities. The article introduces and discusses the key issues and challenges that regulators have to deal with when estimating cost of capital. Unfortunately, there is no agreement among academics, regulators, bankers, and other practitioners on how to address the key issues and challenges in determining the cost of capital in emerging economies. This makes capital cost estimation even more difficult in emerging economies.

Key Words: *Cost of capital, WACC, energy regulation*
JEL Classification: *G10, G12, G15, G18*

Gelişmekte Olan Ülkelerde Enerji Şebeke Şirketleri İçin Sermaye Maliyetinin Tahminindeki Ana Konu ve Sorunlar

ÖZET

Gelişmekte olan ülkeler göreceli olarak derinliği olmayan sermaye piyasasına, daha yüksek ülke riskine, ekonomik belirsizliklere ve siyasi riske sahip olduklarından bu ülkelerde sermaye maliyetinin tahmini daha zordur. Tecrübelere göre, gelişmekte olan ülkelerdeki enerji piyasası düzenleme kurumlarının sermaye maliyetinin tahmininde, genellikle kendi personelinin çalışma ve tavsiyelerine ve/veya danışmanlık hizmetlerine bağımlı oldukları görülmektedir. Enerji piyasası düzenleme kurumları bu konuda nihai karar verici durumunda olduğundan, enerji şirketleri için makul ve kabul edilebilir bir sermaye maliyetinin tahminindeki ana konu ve sorunları anlamaları gerekmektedir. Makale, düzenleme kurumlarının sermaye maliyeti tahmininde dikkate almaları gereken ana konu ve sorunları ortaya koymakta ve tartışmaktadır. Ancak gelişmekte olan ülkelerde sermaye maliyetinin belirlenmesinde ana konu ve sorunların nasıl dikkate alınacağına ilişkin olarak akademisyen, düzenleme kurumu, bankacı ve diğer uygulayıcılar arasında bir uzlaşma bulunmamaktadır. Bu durum, gelişmekte olan ülkelerde sermaye maliyeti tahminini daha da zorlaştırmaktadır.

Anahtar Kelimeler: *Sermaye maliyeti, WACC, enerji düzenlemesi*
JEL Sınıflaması: *G10, G12, G15, G18*

I. INTRODUCTION

In today's globalizing environment, more and more countries are regulating their energy markets. Network-based energy utilities, such as transmission and distribution activities are considered as natural monopolies in their designated regions. That is the main reason that regulatory agencies regulate

and monitor these businesses by allowing third party access to network services and ensuring a fair and reasonable return to these utilities. Setting the fair cost of capital is an important part of tariff regulation of network-based energy utilities in order to provide competition and ensure efficiency.

Energy regulators are authorized by national laws to estimate a fair and reasonable cost of capital for energy utilities. Experience shows that in estimating cost of capital, energy regulators in emerging countries usually depend on the work and recommendations of their staff and/or outside consultancy services. Moreover, as underlined by Alexander et al. (2000:1-13), regulatory agencies face significant information asymmetry when determining what the appropriate allowed rate of return should be when reviewing tariff proposals, establishing price limits, or handling conflicts. Obviously, the information deficiency forces regulators to depend more and more on outside services.

Even determining a fair rate of return in developed markets is subject to debate, it is much more difficult in emerging markets. However, the majority of the research in international business or finance is based on developed markets, especially the U.S. and Western European Countries. In addition, the research on emerging markets takes the perspective of a corporation or investor from a developed market entering an emerging market, rather than the perspective of similar economic units in the emerging market.

Since the ultimate decision is made by regulators, they need to understand the challenges and key issues in estimating the cost of capital. Moreover, they need assistance in better understanding and interpreting the estimation results, not only from the viewpoints of investment decision and portfolio management, but also from the perspective of effective regulation. Therefore, the main purpose of this article is to introduce and discuss the challenges and key issues in determining the cost of capital from the viewpoint of a regulatory agency in an emerging economy.

This article is structured as follows. First, emerging markets and their characteristics are discussed. Second, the article underlines key issues and challenges in setting the cost of capital to which energy regulators in emerging markets should pay particular attention during their decision making. The final section makes concluding remarks.

II. EMERGING MARKETS AND THEIR CHARACTERISTICS

In recent years emerging markets have attracted the interests of other markets and begun to have greater influence in the global economic system. Nevertheless, there is no generally accepted definition of the emerging market and the criteria that help to identify which markets can be classified as an emerging market. Emerging markets have uncertain economic conditions, illiquid capital markets, limits on the flow of capital in and out of the country, and relatively high levels of political risk (Copeland et al., 2005). Moreover, Keane (1993) describes emerging markets as markets that present excess return opportunities and have significant diversification advantages, but pose above

average risk, are subject to high transaction costs, and have inadequate market conditions. As underlined by Millar et al. (2000:1-17), culture, business climate, legal structure, consumer demand, and public policy in these markets are often very different from more mature economies and these differences have provided difficult dilemmas for developed markets.

On the other hand, Barry et al. (1997) and Millar et al. (2000) state that significant differences exist among emerging markets and even within emerging markets there can be substantial differences. For example, Barry et al. (1997) state that even equity portfolios from various emerging markets are not highly correlated among themselves. This makes it even harder to develop a general approach to understand these markets. However, all these characteristics would be considered as both major risks and challenges of emerging markets.

In practice, some organizations produce classification lists (Wikipedia, 2010). For example, as end of 2010, the Dow Jones classifies 35 countries, MSCI Barra classifies 21 countries, and The Economist classifies 24 countries as emerging markets. On the contrary, the FTSE Group distinguishes between advanced and secondary emerging markets on the basis of their national income and the development of their market infrastructure. According to the FTSE Group, 24 countries are classified as emerging countries, 6 countries as advanced and 18 countries as secondary emerging countries. On the other hand, S&P Emerging BMI index of Standard & Poor`s includes 19 emerging markets (Standard & Poor`s, 2010). The International Monetary Fund (IMF) classifies 25 countries as emerging economies (IMF, 2010).

As seen from the varying numbers for emerging countries, it is obvious that different institutions use different methodology as a requirement for their own businesses. Considering the unstable and uncertain economic conditions of emerging economies, a favorable definition comes from Pereiro (2002) who defines emerging markets as those that have been or are in the process of globalization. This definition would cover relatively a large number of markets and reflects the gradual integration of emerging markets to the world market, liberalizing flow of goods and capital.

As regards the specific circumstances of emerging markets, Bekaert and Harvey (2003) state that standard models in finance are often ill suited when applied to emerging markets. In addition, they underline that emerging markets require unique theories and empirical approaches. Unfortunately, there is no model related to the transition of an emerging market from a segmented to integrated state (Bekaert and Harvey, 2003:3-55).

The market integration of emerging markets to the world market is frequently measured by correlation coefficient among markets[1]. For example, due to low correlation of 0.2 between emerging market and the world market, Buckley

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[1] The degree of the market integration is measured in terms of correlation between market returns of two markets concerned. This measure would be a tool to monitor the developments in emerging markets. If the correlation coefficient is equal to 1, that means that the two markets are fully integrated and the price of an asset must be the same in these markets.

(2004) states that emerging markets are not integrated with developed markets and the global version of CAPM is not applicable. Correlation coefficients between some emerging countries and the U.S. are given in Table 1.

Table-1: Correlation coefficients[a]

Countries	Correlation Coefficient
Argentina	0.32
Brazil	0.64
China	0.02
Egypt	0.09
India	0.39
Indonesia	0.34
Mexico	0.68
Turkey	0.53

Source: Adapted from Brealey et al. (2008).
[a] Calculations based on monthly returns for Feb. 2002-Jan. 2007.

As seen from Table 1, there is a low correlation between the U.S. market and emerging markets, meaning that the markets in the concerned countries do not move equally in the same direction. Therefore, the models used to estimate the cost of capital in developed markets cannot be applied with confidence to emerging markets because these markets do not have efficient financial markets with the requisite long history of input data.

III. KEY ISSUES AND CHALLENGES

In addition to common issues, such as the selection of real or nominal, pre or post tax WACC[2,] the conversion method of unlevering and relevering betas, risk free rate etc., the followings are some of the critical issues and challenges that energy regulators in emerging markets should pay particular attention to when estimating the cost of capital, especially using CAPM and its versions:

- The selection of beta: U.S. beta versus local beta
- Which market index to use? Local CAPM versus global CAPM
- Harmonization of different return expectations of investors
- How to deal with country risk?
- Time-varying characteristic of market integration
- The perspective of globally diversified investor
- More than one regulated activity under the same utility
- The relation between regulatory asset base and rate of return
- The level of debt
- The cost of financing
- Anomalies: size effect and illiquidity

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[2] WACC refers to the weighted average cost of capital, which is, in practice, a standard approach used by regulatory agencies in tariff regulation, including the cost of debt and the cost of equity in proportion to their percentages in the capital structure of a utility.

A. The selection of beta: U.S. beta versus local beta

In some of the models developed for the international setting or, in practice in emerging countries, the U.S. beta is used as an input to calculate the cost of capital for utilities under incentive regulation. However, this beta data is based on the utilities under rate of return regulation in the U.S. However, utilities subject to incentive regulation are under more risk than those subject to rate of return regulation. In general, regulated utilities are relatively less risky than unregulated businesses (Whittington, 1998:91-113).

Furthermore, as underlined by Grout (1994), the cost of capital depends upon the nature of regulatory regime. For example, the costs of capital in the U.S. are lower than those in the UK because of the different regulatory infrastructure in the two countries. In addition, as explained by Lowry and Kaufmann (1995), price caps motivate utilities towards the market and break the link between the utility's costs and its prices. Thus, price cap plans may increase a utility's risk. Utilities would be exposed to more business risk than in the past, and earnings may be more variable. These possibilities would be aggravated if the price cap plan were poorly designed.

Therefore, if it is decided to use the U.S. beta, an additional adjustment should be applied to reflect the difference in the regulatory regime, in addition to the adjustments to remove the effect of gearing.

Another issue is that the comparator beta must represent the characteristics of the utility concerned in the emerging market. Whether the comparator utility or the industry operates only transmission or distribution activities, or both, or regulated and unregulated activities, together there are important points that require special attention.

B. Which market index to use? Local CAPM versus global CAPM

When estimating the cost of capital for energy utilities in emerging markets, which is more important? Investor diversification or market segmentation? Would it be possible to use different versions of the standard CAPM in the cases of different investor diversification and market segmentation? What market index should be used? The standard CAPM or the Global CAPM? For emerging markets, would it be right to say whether the investor in these markets is diversified or not is more important whether or not the subject emerging market is segmented to the world market? These are the main challenges energy regulators have to deal with.

There is a general agreement that the global CAPM could be the right index to use for fully integrated markets, and the standard CAPM for fully segmented markets (Stulz, 1999:8-25; Pereiro, 2001:330-370; Sabal, 2004:155-166). Nevertheless, the majority of emerging markets could be classified as partially integrated markets, in other words, partially segmented markets where, as clearly pointed out by Sabal (2004:155-166), there could be some investors with globally diversified portfolios, and therefore the global index is the right index to use for these investors, independent from the diversification status of the

emerging country. In addition, Stulz (1999:8-25) supports the use of global CAPM for companies with access to the global market.

As a supporting case to Sabal (2004:155-166), it is important to note that the Turkish government is now privatizing electricity distribution utilities. In two of the privatized electricity distribution utilities, local shareholders with 50% shares of the utility are globally diversified even though Turkey is listed as an emerging country (Wikipedia, 2010). Interestingly, there is one regional utility in which half of the shareholders are locally diversified while the other half are globally diversified (Privatization Administration of the Republic of Turkey, 2010)[3]. This heterogeneity of diversification status in the same utility would result in some challenges for regulators, which will be discussed later.

Table 2, developed by using the argument introduced by Sabal (2004:155-166), outlines the type of CAPM that could be used under different market integration for home and host investors in emerging markets, assuming that investors are either locally or globally diversified. Hence, Table 2 only reflects the ideal case from the theoretical point of view. It does not provide answers to other cases in which the market is partly integrated and investors either do not have diversified portfolios or are not able to diversify locally or globally.

Table-2: The type of CAPM to use under different market integration

Investor	Diversification	Degree of integration of home/emerging and host countries		
		Fully integrated	Partly integrated	Fully segmented
Home	Local	Global or Standard CAPM[a]	Standard CAPM	Standard CAPM
	Global	Global or Standard CAPM	Global CAPM[b]	Standard CAPM[c]
Host	Local	Global or Standard CAPM	Standard CAPM[d]	[d]
	Global	Global or Standard CAPM	Global CAPM[b]	[d]

[a] The standard CAPM refers to the use of local data or proxy data in the CAPM formula. [b] Assumed that home country has no restrictions for both home and host investors for capital inflows and outflows. [c] Due to full segmentation, global diversification is not possible. Therefore, the only choice would be the standard CAPM. [d] Not applicable for the investment of host investors.

As seen from Table 2, as long as home and host countries are fully integrated, the choice of which market index to use becomes unimportant because the same cost of capital values are expected whether the global CAPM or the standard CAPM indexes are used in the calculation. According to the Law of One Price in Theory, two identical assets should have the same value in fully integrated markets (Sercu and Uppal, 1995). In fully segmented or partly segmented markets, however, this is invalid.

In order to test whether the choice of using local CAPM or global CAPM matters for larger companies, a study by Harris et al. (2003:51-66) compares the rates of return from S&P 500 companies using a U.S. CAPM to rates of return for those same companies using a global CAPM model. They compare the two models to the implied cost of equity capital estimates for these large U.S.

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[3] In addition, see internet sites of the shareholders of the utilities concerned.

companies for the period 1983-1998. They find only a small difference between the two versions of the CAPM, though the domestic CAPM provided estimates of cost of equity capital more consistent with the implied cost of equity capital estimates.

In another study by Mishra and O'Brien (2001:27-48), the authors find that there is a relatively insignificant difference in cost of equity capital estimates between using a U.S. CAPM and global CAPM for larger U.S. companies, in contrast to the significant difference for smaller U.S. companies. Another study by the same authors finds that for stocks in nine developed economies, the differences in cost of equity capital estimates between a domestic CAPM model and a global CAPM model are not significant. Thus, they conclude that companies within a country, mostly, exhibit a joint exposure to international risk factors that is fully captured by their local currency domestic market index.

Assuming that the emerging country is partly integrated and home investors are not diversified or at most locally diversified, but host investor is globally diversified. This particular case, which reflects the situation currently in emerging countries, becomes a grey area that requires careful handling. Even though Pereiro (2001:330-370) suggests using the local CAPM if the integration degree is low and the global CAPM if the integration degree is high, this would involve subjectivity and lead to conflicts between regulator and market players.

On the other hand, as stated by Damodaran (2005), a diversified investor will always perceive less risk in the same investment than an undiversified one in the same company or for the same project. If an energy regulator estimates the cost of capital from the perspective of the host investor, who is globally diversified and therefore expects a relatively lower cost of capital for the investment in the utility, then this would be unjust for the home investor, who has no diversified portfolio.

C. Harmonization of different return expectations of investors

CAPM assumes that investors are rational and have diversified portfolios. In addition, CAPM assumes a homogenous shareholder structure with the same risk-return expectations. In reality, energy utilities have ownership structures of either wholly state, wholly local private investors, wholly host investors, or a combination. What if the shareholders of the energy utility in the emerging market are from different nationalities with different portfolio and risk-return expectations? Due to different risk-return relations, it could be possible that the cost of capital to a local investor could be relatively different from that to a global investor. How will the regulator estimate the cost of capital combining all different return expectations? As emphasized by Copeland et al. (2005) in this case there is no common framework for estimating the capital cost for local investors. None of CAPM models is able to answer these questions.

Because of existence of a lower correlation between home and host countries` markets and thus, enabling more stable cash flows for host investors, it could be said that diversified host investors will likely require less return compared with non diversified home investors, particularly if the domestic

investor is restricted from investing in foreign securities (Madura, 2008; Brealey et al., 2008; Barry et al., 1997; Sercu and Uppal, 1995). This would probably cause the share of energy utilities to be more valuable to host investors. Host investors would offer higher prices for the shares of domestic investors to have the full shares of the subject energy utility and control the management of the utility.

D. How to deal with country risk?

In dealing with country risk, many textbooks and articles do not take a firm perspective and propose to adjust either the firm's WACC for the risk differential or cash flow estimates. Nevertheless, some authors like Madura (2008) advocate the adjustment of the estimated cash flows as well. On the other hand, some authors are against the adjustment of WACC and suggest the adjustment of cash flow estimates instead (Sabal, 2004:155-166; Copeland et al., 2005; Brealey et al., 2008). For example, Shapiro (2003) clearly argues that the discount rate should not be adjusted even though the risks faced by companies are relatively high.

Since it is generally accepted that the country risk could be diversified, is it correct to give additional return for the country risk to the investor and adjust the cost of capital accordingly? Is the cost of capital the right parameter to reflect country risk? These questions are still the subject of debate. However, as stated earlier, the trend and general acceptance among academicians is to adjust the cash flows for incorporating country risk in financial decisions, and not to add a certain premium to the cost of capital. On the other hand, the addition of a country risk premium to calculations is still widespread.

E. Time-varying characteristic of market integration

Most emerging markets are partly integrated into the global market. If the emerging country is fully integrated or fully segmented, the energy regulator will be in relatively a comfortable situation to deal with cost of capital issues. However, most of emerging countries are partly integrated and their degrees of integration vary over time (Bekaert and Harvey, 2002:429-448). On the other hand, as stated earlier, emerging markets are not homogenous. Although certain emerging markets move backward and become more segmented, in general, the integration process is irreversible in nature (Wikipedia, 2010).

The question remains of how energy regulators will deal with the time-varying nature of the integration. In tariff implementation periods of up to 5 to 7 years, the cost of capital will be reduced when the home country is gradually integrated to the world market. Otherwise, the shareholders of regulated energy utilities will benefit more from the integration process. If there are strong signs of integration, regulators should lower the cost of capital gradually during the implementation period. It is obvious that the cost of capital should be reestimated when market conditions vary significantly from time to time, taking into account the degree of integration (Bruner et al., 2002:310-324).

In addition, there is another dimension of higher integration. Even if the trend is towards more integration among countries, increasing integration will lead to lower diversification benefits (Bekaert and Harvey, 2002:429-448). Therefore, regulators must be concerned that, as emphasized by Bekaert (1995:75-107), lower diversification benefits, in turn, might reduce the appetite of host investors for investments in emerging markets. This is especially important for countries that need financing from the global market to sustain the energy security.

F. The perspective of globally diversified investor

The standard, modified and adjusted CAPMs, all assume the perspective of the globally diversified host investor. If such an investor owns some shares in an energy utility in an emerging market and the energy regulator uses the CAPM models introduced earlier, the return expectations of home investors with either locally or no diversified portfolio would likely be disregarded and, in return for their risk-return expectations, allowed a relatively lower return, identical to the return allowed for the global investor. In such cases, Damodaran (2005) underlines the possible transfer of assets to diversified investors who perceive relatively less risk in the investment and are ready to pay higher price for the shares of the undiversified investors. This would lead to a change of management control in the company or the full control of the company being taken over by globally diversified investors.

G. More than one regulated activity under the same utility

A utility`s cost of capital should not be used for all new investments and unregulated activities as long as the new investment and unregulated activities have the same risk. In reality, risks differ and the risk-adjusted costs of capital will require being different (Franks, 2007:189-201). Therefore, each project or activity under the umbrella of regulated utility should, in principle, be evaluated at its own opportunity cost of capital (Pratt and Grabowski, 2008).

On the other hand, if the utility operates different activities in different locations, then as suggested and explained in detail by Alexander et al. (2000:1-13), the utility beta could be formulated as the weighted average of individual activity beta values (Copeland et al., 2000) and the weights could be based on the net assets allocated to each activity.

H. Relation between regulatory asset base and rate of return

Although regulatory asset base and rate of return issues are treated separately by regulators, inconsistency will occur if they are valued using different bases, such as regulatory asset base at book value and cost of equity at market value (Kahn 1989). However, in financing regulatory asset base, the larger the regulatory asset base, the more the utility is expected to obtain debt financing. If the debt capacity reaches a critical level, then the utility will be in a less advantageous position to find additional debt at cheaper costs in response to its increasing default risk.

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In addition, even if there is no supporting work, the relation between the size of the regulatory asset base and the allocated cost of capital should be empirically studied from the regulatory viewpoint in order to see whether any relation exists between two parameters. As stated earlier, one aspect of future research would be to study the size effect, i.e. the relation between the regulatory asset base and the return expectation of shareholders.

I. Level of debt

In tariff regulation, regulators do not regulate and monitor the existing leverage. They only assume a target leverage ratio to calculate the cost of capital using CAPM models. Increase in leverage up to a certain level would lower the cost of capital due to the tax benefits of debt. But, too much debt would pose additional risk to the utility.

Franks (2007) and Jenkinson (2006) discuss whether regulators should limit a regulated utility's gearing. By emphasizing the benefits of high leverage, such as lowering the cost of capital and forcing the management to focus more on the value of the company, Franks (2007) is of the opinion that regulators should not intervene in leverage as long as the utility has a large investment programme. Jenkinson (2006) shares the same opinion and argue that the choice of capital structure of the utility should be left to the management of the utility as long as regulators set the cost of capital at an appropriate level that would incentivize the management to optimize the gearing. In addition, Jenkinson (2006) states that it is not necessary for regulators to regulate measures for the financeability of utilities in order to allow the management to improve the credit rating of the utility and maintain a stable dividend payment.

Although regulators do not control the gearing, the level of debt in the utility's capital structure is one of the issues that regulators should monitor taking preventive measures, if necessary, before the utility faces any financial problems.

J. Cost of financing

Raising debt and equity capital for the utility have certain costs and these costs must also be compensated or by regulators by allowing additional premiums to the cost of capital. Depending on the size of the utility, the financing requirement, the banking infrastructure, and the availability of the debt, the cost of financing will vary from country to country. The continuous monitoring of the availability and conditions of financing for utilities would help regulators compensate for the premium of financing cost.

K. Anomalies: size effect and illiquidity

In the finance literature, some anomalies are also discussed among academicians and the consensus is that there may be a relation between the factors causing anomalies and the returns for shareholders. Most practitioners in their decisions (Pratt and Grabowski, 2008; Pereiro, 2006:160-183; Copeland et al., 2000) do not consider the anomalies.

One of these factors is the size of a company. The term 'size effect' suggests that a smaller firm deserves a higher rate of return when compared to a

larger company (Copeland et al., 2000) and there are several supporting empirical studies done in both developed and emerging markets (Pratt and Grabowski, 2008). For example, an international company that often borrows substantial amounts may receive preferential treatment from creditors, thus reducing its cost of capital. Furthermore, its large issues of stocks or bonds allow for reduced flotation costs as a percentage of the amount of financing.

For global companies, access to international capital markets is easy and they are normally able to obtain funds through international capital markets (Madura, 2008). But, there are some studies that find ignorance of size effect. For example, Besley and Bolten (1994)[4] investigate whether regulators consider the size of utility as an important factor when setting rate of return in the U.S. and find that the observed allowed rates of returns have been generally similar for both large and small utilities. This implies that regulators do not consider size effects of utilities. Similarly, a survey conducted by Pereiro (2006:160-183) in Argentina concludes that the effects of small size and illiquidity[5] are disregarded in estimating discount rate for valuation purposes. The other anomaly is the illiquidity of a share. The more liquid the share, the less the share has a risk regarding its saleability in the market.

Currently, there is no supporting evidence that these anomalies are reflected in the cost of capital estimations by regulators. Obviously, assuming there is a small size effect, the rates regulators set should be significantly higher for small utilities compared to large utilities. Otherwise, regulators will be transferring a certain wealth to the customers of small utilities from small utilities by rate setting. The same is true for other anomalies, but in practice, they are not generally accepted and implemented. However, Pratt and Grabowski (2008) expand the CAPM formula to add the risk premium associated with the size effect and other risk premiums associated with specific companies. However, such an expansion of the CAPM formula is not in compliance with the assumptions of the standard CAPM.

IV. CONCLUDING REMARKS

In theory, the cost of capital is not observable from the market as it is in the case of other parameters, such as risk free rate, inflation, and interest rate. It requires a forward-looking approach and estimation is the only tool as no other option exists. Thus, it is inappropriate to calculate a single rate of return value since the calculation process is not an exact science. The regulator should calculate a range of values with lower and upper bounds (Kahn 1989; Sabal 2004:155-166), and decide on the allowed rate of return within this range.

For emerging markets, estimation of the cost of capital presents greater difficulties because these countries have relatively illiquid capital markets and

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[4] This study covers 160 utilities from electricity, water, natural gas, and telecommunications (namely telephone) sectors. The study period covers 1970-1983. Utilities are ranked in terms of their annual sales.

[5] It is one of the anomalies and means lack of marketability of equity shares.

higher levels of sovereign risk, economic uncertainties, and political risks. There is no agreement among academics, regulators, bankers, and other practitioners on how to address the key issues and challenges in determining the cost of capital. This makes capital cost estimation even more difficult in emerging economies.

In addition, from the cost of capital viewpoint, each energy utility is not the same; even it operates the same activity, particularly if it has a different ownership structure with heterogeneous risk-return expectations. This requires that each utility should be analyzed differently from others when setting the cost of capital and then each utility should be allowed different cost of capital depending upon the shareholder structure and other circumstances. Whenever there is a change in the ownership of utilities, this will likely affect the cost of capital of the concerned utility due to the changing risk-return expectations of new equity holders. It is obvious that this requires a dynamic monitoring approach of the regulator.

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