

COST OF CAPITAL IN PRICE-REGULATED COMPANIES: THE CASE OF ESTONIA¹

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Abstract

In case of price-regulated companies it is the role of appropriate government agencies to introduce clear, internally consistent, theoretically sound, and unambiguous methodology for finding the regulative cost of capital. The aim of the paper is to describe and analyze the cost of capital estimation methodology for regulated companies in Estonia and discuss some issues arising in applying this methodology. The current paper focuses on two topical issues associated with the estimation of regulative cost of capital in Estonia: estimation of market risk premium and inclusion of currency risk premium into the cost of capital. Current turmoil in financial markets has increased investors' risk aversion as well as level of risks.

Keywords: price regulation, cost of capital, market risk, currency risk

Introduction

There are some industries that are said to be natural monopolies. In such industries one firm can produce a desired output at a lower social cost than two or more firms. Mostly these are the industries where business is based on transmission networks (railways, telecommunications, public utilities etc). As with other monopolies, a monopolist who has gained its position through natural monopoly effects may engage in behavior that abuses its market position (e.g. charge a far higher price than justified by the production costs and earn an excess profit on its capital). Therefore such industries are often subject to government price regulation.

The regulated price (plus possible subsidies from the government) should cover all the costs of necessary production inputs including the cost of capital. In case of monopolistic companies a target rate of return pricing is often used. In a competitive market most companies are not able to earn rate of return above their cost of capital continually. Therefore many regulators follow closely the cost of capital of regulated utilities in their price regulation activities.

The cost of capital can be defined as the minimum rate of return required by the investor on some specific investment. If the expected rate of return on the investment project is lower than the cost of capital, such a project should be rejected according to the value maximization principle. The latter is the cornerstone of modern financial theory (Jensen 2002)

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There are many different approaches how to estimate the cost of capital (especially ambiguous is the estimation of cost of equity) and while some methods are more “theoretically” sound than others, their implementation still raises many questions. In case of price regulation, any ambiguity can lead to a dispute between the regulator, the company and its customers. In order to reduce ambiguity, Ministry of Economy and Communication as well as Estonian Competition Authority have developed a methodology how to estimate the cost of capital in regulated companies. Despite their efforts some issues still remain open and forensic debates are not uncommon.

The aim of the paper is to describe and analyze the cost of capital estimation methodology for regulated companies in Estonia and discuss some issues arising in application of this methodology.

The paper is structured as follows. First section discusses main distinctive features of cost of capital estimation in regulated industries based on previous literature. Then, the methodology for estimating the cost of capital developed and used by Estonian regulators will be described. The last section analyzes some problems arising in applying this methodology in practice as well as proposes possible solutions to them.

The distinctive features of cost of capital estimation in regulated industries

Literature about cost of capital and rate regulation list many distinctive features of cost of capital estimation in regulated companies. The following summarizes only the most important ones.

The first distinctive feature of estimating the cost of capital in price regulated industries is that the cost of capital affects the price of the product and thereby also operating cash flows of the company and the actual rate of return. In a competitive market the market forces should bring the rate of return to its equilibrium, i.e. to the state where in the long run the rate of return equals the cost of capital. Most price regulated companies operate as natural monopolies, i.e. without any competition. Therefore the price regulators use the cost of capital figure as benchmark for accepted rate of return and set prices according to that. According to Pedell (2006) the assessment of cost of capital directly affects the cash flows of the regulated utility. The cash flows and their expected variability on the other hand influence market value and risk-adjusted cost of capital of the regulated utility, which introduces a specific circularity problem of rate regulation in the cost of capital assessment. Such circularity prevents of using market value of debt and equity as the regulatory rate bases and forces to rely on book values instead. Conventional regulatory “cost of capital” is therefore based on book value weights (Patterson 1995). Circularity issue also hinders the estimation of cost of equity by using Market-to-Book Ratios or DCF Models (*Ibid.*).

Next distinctive feature is that the regulatory commission has to take into account an appropriate risk-adjusted cost of capital when calculating prices, and, at the same

time, its directives are one of the major risk drivers or even the most important risk driver for the regulated firm (Robichek 1978; Pedell 2006). The appropriate estimate of cost of capital for regulated firm should take into account how the regulation affects the risk level of the company. In case of a perfect rate-of-return regulation that would guarantee the regulated firm a pre-specified rate of return on all investment at any moment of time all risks would vanish and the appropriate cost of capital would be risk-free interest rate (Patterson 1995). This, however, is hardly a case in practice as it would require perfect information as well as continuous adjustments in regulated prices (*Ibid.*). In practice, while through regulation the company is promised to earn the pre-specified rate of return, the regulation itself creates so-called asymmetric risks. If prices are fixed by the regulatory commission for a certain period, the regulated firm cannot adjust to (unexpected) changes on its selling market neither can it adjust its output prices flexibly to fluctuations in input prices (Pedell 2006). Partly this problem can be mitigated by pass-through clauses for certain (exogenous) cost elements or by indexation of rates (*Ibid.*). Pedell (2006) reviews in his book several previously published papers and concludes that empirical evidence is not unanimous, but tends to indicate that systematic risk is reduced by rate regulation and confirm the buffering hypothesis formulated by Peltman in 1976.

Another distinctive feature of estimating the cost of capital in price regulated industries is that the tax advantage of debt is usually not taken into the account when estimating the cost of capital (Patterson 1995; Armitage 2005). Under the classical corporate tax system, the interests on debt capital are viewed as business expenses and hence not taxed at corporate level, while payments to shareholders (i.e. dividends) are made from the after-tax profit. Therefore the use of debt capital reduces company's tax burden and increases the after-tax free cash flows as well as the value of the company (at least to some extent). In case of regulated industries any tax savings from the use of debt usually benefit the consumers instead of owners. Estonia introduced distributed corporate profit taxation system in 2000 and under such a system debt capital has no tax advantage in most cases². Therefore the further analysis of this feature in the context of current article is not necessary.

And the last distinctive feature is the fact that there is regulation for estimating the cost of capital *per se*. Modern finance theory provides many different approaches to estimate the cost of capital, which may also lead to rather different estimates of WACC. In case of price regulation, however, there should be unambiguous rules that must be followed when estimating the cost of capital. In the next section the methodology used by price regulators in Estonia (e.g. Estonian Competition Authority and Estonian Technical Surveillance Authority) will be described and analyzed.

²A more detailed treatment of this issue can be found in Sander (2005).

Regulation for estimation of the cost of capital in regulated companies in Estonia

This part of the article is mainly based on the regulative act formulated by the minister of economy and communication on how to calculate the charges for the use of railway infrastructure (RTL 2008, 36, 522)³. The current version of the regulation will be compared with the previous one (valid between June 14, 2004 and May 25, 2008) as well as usual practice in non-regulated companies.

The cost of capital for railway infrastructure should be calculated by the following formula (RTL 2008, 36, 522, § 7, lg.1):

$$(1) \quad WACC = r_e \times \frac{E}{D + E} + r_d \times \frac{D}{D + E},$$

where r_e denotes the cost of equity, r_d denotes the cost of debt, E denotes the amount of equity and D denotes the amount of interest-bearing liabilities. The proportion of debt capital of the railway infrastructure company should be at least 50%. If the actual share of debt capital is higher the actual proportions will be used (RTL 2008, 36, 522, § 7, lg. 4).

The formula for calculating the cost of capital in non-regulated companies is basically the same as formula (1), but may include also other sources of capital (e.g. preferred shares, convertible bonds etc) (Bruner *et al.* 1998). The question arises whether the price regulated company using also other sources of capital besides vanilla debt and common shares could take them into the account when estimating its cost of capital or not. The common sense suggests that this should be allowed; however the regulation does not provide model and methods to estimate the cost of hybrid instruments correctly. Fortunately, this problem is not very important in practice as Estonian companies usually rely on vanilla debt (mostly in form of bank loans or leasing) and equity in form of common shares. In countries with traditional taxation of corporate profit the cost of debt should be calculated on after-tax basis (Vernimmen *et al.* 2005). In regulated companies, however, the usual practice is to calculate the cost of debt on pre-tax basis (Patterson 1995; Armitage 2005) similar to formula (1). The cost of capital regulation specifies also the capital structure to be used in formula (1). In case of non-regulated companies usually the actual or target capital structure is used (Bruner *et al.* 1998). While the financial theory mostly

³ Very similar regulation, in respect of cost of capital estimation, is used for price regulation in electricity and oil shale production (Elektrienergia ja põlevkivi tootmise hinnaregulatsiooni põhimõtted 2008), to calculate electricity network charges (Elektrienergia võrgutasude arvutamise ühtne meetodika 2008), to calculate the ceiling price of central heating (Soojuse piirhinna kooskõlastamise põhimõtted 2008), to calculate the ceiling price of natural gas sold to home consumers (Kodutarbijatele müüdava gaasi piirhindade arvutamise ühtne meetodika 2006), to calculate gas distribution network charges (Gaasi võrguteenuste hindade arvutamise ühtne meetodika 2006).

suggests using proportions based on market values, book values are sometimes used in practice (Sander 2003).

There are several methods which can be used to estimate the cost of equity. Most often in financial literature we can find following approaches (Clayman *et al.* 2008; Vernimmen *et al.* 2005; Copeland *et al.* 2000):

- Capital Assets Pricing Model (CAPM) approach,
- Dividend Discount Model approach,
- Bond Yield Plus Risk Premium approach,
- Arbitrage Pricing Theory (APT) approach.

Of these four approaches financial advisors use most often the CAPM (Bruner *et al.* 1998; Pereiro 2002). However, the application of the plain CAPM to emerging markets is a controversial endeavour (Pereiro 2002). Therefore several CAPM-based variants have been emerged for those markets. The survey conducted six years ago among Estonian financial advisors and investment banks also confirmed the popularity of CAPM (Sander 2003). In Estonia, five analysts out of six claimed to use classical Capital Assets Pricing Model (*Ibid.*).

Both the current and previous version of regulation for estimation the cost of capital in regulated companies in Estonia, prescribe the use of CAPM for estimating the cost of equity (RTL 2008, 36, 522, § 7, lg. 2) as follows:

$$(2) \quad r_e = r_f + \beta \times r_m,$$

where r_f denotes the risk-free rate, β denotes the systematic risk of the company, and r_m denotes the market risk premium. This model is also used by regulatory bodies in other countries (e.g. in the UK, regulatory bodies have almost exclusively relied upon CAPM (Jenkinson 2008), in the U.S. the single-stage DCF method⁴ for estimating the cost of equity was replaced with multi-stage DCF and CAPM in 2008 (Surface Transportation Board ... 2009)). The same formula (2) is also used in non-regulated companies.

While both regulated and non-regulated companies use the same formula, the estimation of its components is rather different. The table 1 compares the current regulation with the previous regulation and with common practice in non-regulated companies.

⁴ This is in principle the same as Dividend Discount Model.

Table 1. Guidelines for estimating the CAPM components

	Current regulation	Previous regulation	Common practice in non-regulated companies
The risk-free rate of return.	The average yield of the 10-year government bond with the highest credit rating in Euro zone during the last five years should be used (RTL 2008, 36, 522, § 7, lg. 2).	The risk-free rate is estimated by adding to the average interest rate of the 10-year government bond with the highest credit rating in Euro zone during the last five years the country risk premium. In case Estonian government has issued long-term bonds, their interest rate can be used instead (RTL 2004, 74, 1213, § 7, lg. 2).	Usually the yield to maturity (YTM) of long-term government bond is used as the benchmark for risk-free rate of return (the use of 10-year government bond is often recommended). At any given point of time risk-free rates in different currencies may be different. One should match the currency of cash flows and discount rates (Damodaran 2008b)
The measure of systematic risk (beta)	The systematic risk of the railway company is estimated based on the arithmetic average beta of listed railways companies in a manner that reflects the risks associated with that particular railway company (RTL 2008, 36, 522, § 7, lg. 2).	The systematic risk of the railway company is estimated according to the betas of comparable companies that own railway infrastructure and have monopolistic power. The beta should reflect the risks associated with that particular railway company (RTL 2004, 74, 1213, § 7, lg. 2).	In case of listed companies, systematic risk can be estimated based on historical prices. Most practitioners use published sources (Bruner <i>et al.</i> 1998). In case of non-listed companies betas of comparable firms or bottom-up betas may be used.
The market risk premium	The market risk premium is estimated as the arithmetic average of long-term market risk premiums in U.S. and European markets (RTL 2008, 36, 522, § 7, lg. 2).	The market risk premium is estimated based on long-term market risk premiums in U.S. and European markets (RTL 2004, 74, 1213, § 7, lg. 2).	In theory, the market risk premium should be forward-looking (Damodaran 2008a). In practice most analysts use either historical mean or fixed rates (Bruner <i>et al.</i> 1998)

According to the current regulation the cost of debt (r_d) should be estimated as the weighted average interest rate of the interest-bearing debt of railway infrastructure company in previous fiscal year (RTL 2008, 36, 522, § 7, lg. 3). The previous regulation was rather different by stating that the cost of debt should be calculated by adding to the five year average interest rate of 10-year government bond with the highest credit rating in Euro zone, the risk premium for the country risk and for the company risk. The country risk premium had to be estimated based on credit rating of Estonia. If Estonia has issued long-term government bonds, one can add company risk premium to its interest rates to estimate the cost of debt (RTL 2004, 74, 1213, § 7, lg. 3). Financial theory on the other hand usually recommends of using interest rates at which the company is able to borrow the money at the moment (Pereiro 2002). Still, some analysts use historical costs of debt (Bruner *et al.* 1998).

When we compare the current regulation for the estimation of cost of capital with financial theory, we can conclude that in major part they coincide, but there are many differences in details and as one old saying state: “the devil lies in details”.

Some topical issues in estimating the regulatory cost of capital

The global financial and economic crisis has caused the premiums for bearing different kind of risks to jump to somewhat unprecedented heights. Historically, the market risk premium (calculated as the geometric average) has been around 3%-5% (Dimson *et al.* 2006). Currently, forward-looking risk premiums estimated by different sources are around 7.5-10% (see table 2), i.e. double of their historical averages.

Table 2. Forward-looking market risk premium in January 2009

Source	Estimated risk premium
Associés en Finance	9.60%
Bloomberg	7.46%
Factset	8.00%
Fairness Finance	8.15%

Source: The Vernimmen.Com Newsletter, January 2009.

The problem is that not only has the forward-looking market risk premium gone up, but historical market risk premium has decreased. The historical or *ex-post* risk premium is calculated as the difference between the actual return of a stock market index and actual return of risk-free instrument (usually government bond). The fundamental linkage between forward-looking and historical risk premiums is following. The uncertainty about future prospects of financial markets or investors’ risk aversion increases and that will lead to higher forward-looking risk premiums and discount rates. Higher discount rates cause share prices to drop and realized rates to decrease. This, in turn, means that historical risk premium, calculated as showed in the text above, decreases. The following table 3 shows that if we use a short estimation period, the *ex-post* risk premium might even turn out negative! By

accepting such result we are essentially saying that investors should be satisfied if the value of their risky assets decreases.

Table 3. Estimation of historical market risk premiums

The Estimation Period	Market Risk Premium	
	Arithmetic Average	Geometric Average
1928-2008	5.65%	3.88%
1959-2008	3.33%	2.29%
1999-2008	-6.26%	-7.96%

Source: Adopted from Damodaran 2009.

In his analysis Estonian Technical Surveillance Authority has used the estimation period of five years. This is clearly not long enough. While the longer estimation period does not eliminate the contradiction between forward-looking and *ex-post* risk premiums, it clearly reduces the problem.

Another issue, which topicality has recently increased, is whether the currency risk premium should be taken into the account when estimating the cost of capital for regulated companies. Currency risk premium affects both the cost of equity and cost of debt. According to Damodaran (2008b), it is quite common practice that when there are no long term government bonds in the local currency that are widely traded, analysts decide that is easier to estimate risk-free rates and risk premiums in a mature market currency. However currency mismatch (i.e. situation when cash flows and discount rates are not in the same currency) can lead to serious problems (*Ibid.*). Risk-free rates in different currencies can be rather different (see e.g. table 4).

Table 4. Risk-free rates in main currencies (as of February 10, 2009)

Maturity	Country (currency)			
	U.S. (\$)	Germany (€)	U.K. (£)	Japan (¥)
1 year	0.56%	1.08%	1.14%	0.32%
5 years	1.41%	2.41%	2.83%	0.76%
10 years	2.94%	3.37%	3.91%	1.31%

Source: www.bloomberg.com

During 2000-2006, the differences in interest rates of EEK and EUR denominated bank deposits were quite low. However, since the mid-year of 2007 the currency risk premium started to rise at fast pace and currently (i.e. beginning of 2009) interest rates of bank deposits denominated in EEK are approximately 300 basic points higher than similar deposits denominated in EUR (see figure 1).

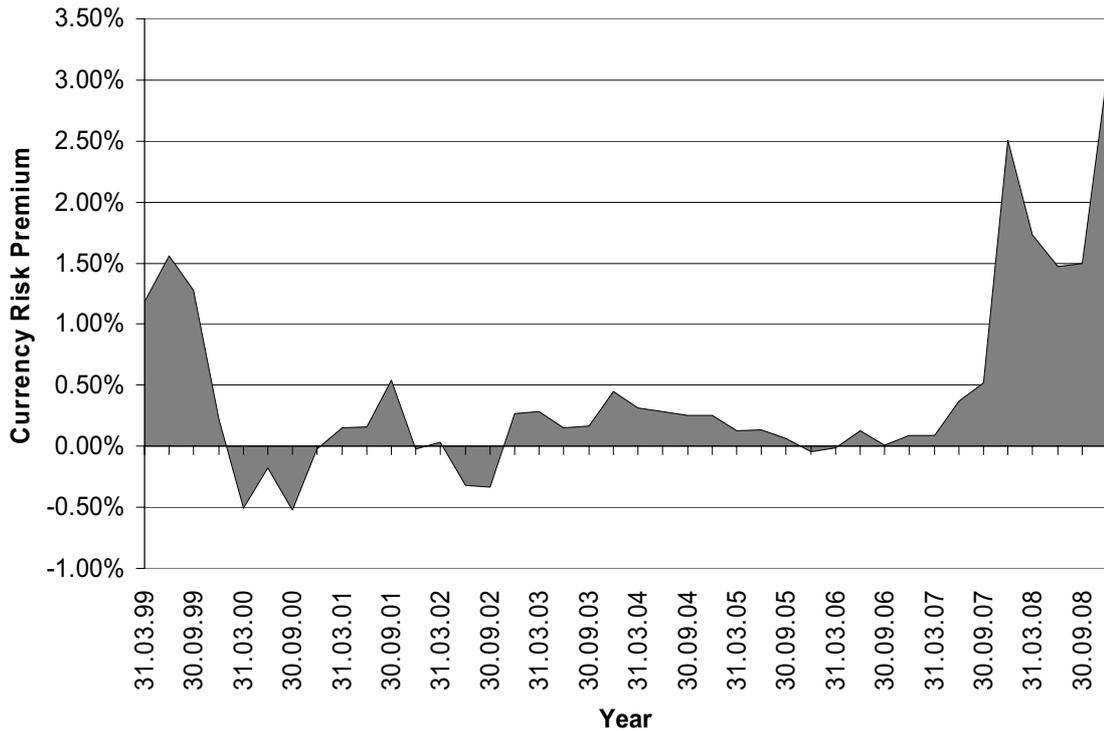


Figure. 1. Currency Risk Premium based on interest rate difference between EEK and EUR denominated deposits in Estonian commercial banks 1999-2008. (Bank of Estonia)

This is a sign that investors do not eliminate the possibility for devaluation of Estonian local currency, despite the fact that Estonia follows fixed exchange rate system with currency board. In the history, there have been occasions when even countries with currency board systems were forced to devalue their currencies (like Argentina in 2002).

Current regulation for estimation the cost of capital in regulated industries does not permit to take currency risk into account when estimating the cost of equity (see the rules for estimation of CAPM components in table 1). The previous regulation, however, did allow the premium for bearing country risk. One component of country risk is the possibility of currency devaluation – that is, currency risk (Pereiro 2002).

According to the current regulation, the currency risk premium gets reflected in the cost of debt only when company has taken loans denominated in local currency because the cost of debt is currently estimated for regulated companies as the weighted average interest rate of the interest-bearing debt in previous fiscal year (§ 7, lg. 3). Under the previous regulation, the currency risk could be considered as a part of country risk, for which specific risk premium was intended for.

It is a matter of discussion whether the investors or consumers of regulated companies should bear the currency risk. However, the current regulation encourage regulated companies to take loans nominated in local currency as this is the only way how the currency risk could be passed to consumers.

Conclusions

There are companies that operate as natural monopolies. For those companies the government usually creates such a regulation that tries to simulate the environment of competitive markets. In their price regulative activities authorities follow closely the cost of capital of regulated companies to ensure that natural monopolies have no opportunity to earn return in excess of that. The financial theory does not have fully unified methodology for estimating the cost of capital. Such ambiguity, however, is not possible in case of regulated industries. Therefore, appropriate government agencies should constitute clear, internally consistent, theoretically sound, and unambiguous methodology for finding the regulative cost of capital. The circularity problem, inherent to the estimation of cost of capital for regulated companies, is the main issue that restricts of using exactly the same methodology as for non-regulated companies.

In Estonia, new methodology for estimating the cost of capital in price regulated companies was introduced recently. While the main principles did not change and the models are basically the same as most popular ones for non-regulated companies, there had been some important changes in details. Changes affected the estimation of components of CAPM as well as the estimation of the cost of debt. While the changes, which were put into effect, increased the unambiguousness of the methodology, they also gave rise to some additional issues.

Under the current regulation, it is difficult for investors in price regulated companies to get fairly compensated for bearing currency risk. Financial theory suggests that both cash flows and cost of capital should be in the same currency. However, the current regulation does not permit to take currency risk into account when estimating the cost of equity. In case of debt capital, the currency mismatch remains if a company uses loans denominated in foreign currency. Lately, financial markets have become more concerned about possible devaluation of Estonian Kroon despite the fact that Estonia is following currency board system. The interest rate differences between EUR and EEK denominated deposits have increase up to 300 basic points.

Another topical issue stems from the fact while in theory market risk premium should be forward-looking in practice usually *ex-post* (i.e. historical) risk premiums are used. While under the normal circumstance, if the estimation horizon is long enough, such a contradiction does not create any problem; the same does not hold when investors became very risk averse. Under the latter scenario forward-looking and *ex-post* risk premiums move in opposite direction. In order to reduce possible problems the time horizon for estimating *ex-post* risk premiums should be long and the rules for estimating the cost of capital in regulated companies should not change over time. Frequent changes in regulations create additional systematic risk for price-regulated companies and could also increase the cost of capital in those companies.

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