REPUBLIC OF ESTONIA
COMPETITION AUTHORITY

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Estonian Competition Authority
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ANNEX

Estonian Competition Authority

Manual to Calculate Weighted Average Cost of Capital

(valid starting with 01.01.2020)

Tallinn, Estonia 2019

Introduction

Long-term practice of price regulation has resulted in an understanding that if an undertaking's justified profitability i.e. business profit does not exceed its Weighted Average Cost of Capital (hereinafter the WACC[1]), the undertaking is earning reasonable profit. Therefore, WACC is the rate on return permitted by the regulator, which is used to calculate the justified profitability to be included in the price of services/goods sold by an undertaking and listed in special legislation[2].

This Manual explains and defines the principles of forming the WACC. In a legal sense, it means preventive defining of the Competition Authority's discretionary power (clarifying the regulation methodology before the price regulation is implemented) and informing the price regulation's subjects, providing an opportunity for feedback and helping avoid all manners of misunderstanding already before the start of the specific price regulation's procedure. This Manual is not a piece of legislation but a document introducing the exercise of the discretionary power of the Competition Authority as an independent regulator, having an informative and not normative meaning outside the administrative realm. The norms of an administrative regulation acquire a factual external impact as a result of being implemented (Administrative Law Chamber of the Supreme Court, judgement in administrative case No. 3-3-1-81-07).

Compared with earlier Manuals, an important change is made in the applying of the WACC to district heating undertakings. Namely, this Manual calculates separate WACCs for heat producers and for district heating network operators. For heat undertakings active in heat production, distribution and sales, the WACC is applied separately for the regulated fixed assets used in heat production and for the regulated fixed assets used in heat distribution and sales. The difference in WACCs stems from the difference between the indicator of the debt capital risk premium (see clause 2.3.2) and the indicator of beta (see clause 3.3.2).

District heating is not widespread in Western Europe because their main type of heating fuel is gas and most of the EU countries do not include district heating in the field of energy regulators. Therefore, CEER[3] has no database of heat producers and district heating network operators. Similar to other networks, district heating networks are natural

[1] WACC is the total cost of all interest-bearing debt capital (foreign capital) and equity capital, taking into account the weights of debt capital and equity capital.
[2] Electricity Market Act, District Heating Act, Natural Gas Act, Public Water Supply and Sewage System Act and Postal Service Act.
[3] CEER – Council of European Energy Regulators

monopolies because without a district heating network, heat energy cannot be sold to consumers, and the similarity of the service provided makes the operating risk of district heating network operators comparable to that of electricity and gas network operators (they are also natural monopolies). The fact that there are no parallel district heating networks in Estonia indicates clearly that it is in reality not economically feasible to establish parallel networks. The Competition Act §t 15 also sets out that an undertaking is deemed to be in control of an essential facility or to have a natural monopoly if it owns, possesses or operates a network, infrastructure or any other essential facility which other persons cannot duplicate or for whom it is economically inexpedient to duplicate but without access to which or the existence of which it is impossible to operate in the goods market.

It is no more justified to handle heat production and network activities together when determining the WACC of district heating. Due to the changes occurred in practice, the risks of district heating network operators have become similar to those of other network operators active in the energy sector. For example, comparing other EU countries with Estonia, it is precisely gas that is similar to district heating as an energy source, because gas is widely used in EU countries to supply buildings with heat. The level of monopoly is even higher for district heating networks than for gas networks because in district heating regions, consumers have only limited options of using alternative heat sources, while a consumer can freely separate from a gas network. But heat producers have become subject to an additional obligation stemming from Estonia's ambitious climate goals, which can be met by using biomass as carbon neutral fuel in cogenerating plants and boiler plants. Other heating methods (e.g. local combustion technology, heat pump or solar panels) do not ensure sufficient achievement of the climate goals in terms of using carbon neutral fuel, compared with heat production for district heating. A carbon neutral fuel based on local combustion technology is wood, which cannot be effectively used in areas of high population density as it would mean constructing a separate biofuel combusting local boiler plant for each building. It would result in significantly worse air pollution and traffic situation (due to additional fuel trucks). A similar situation would arise if using stove heating. Based on economical and environmental aspects, a wider implementation of such local combustion technologies or a transition to those would classify as an irrational action, hostile to the environment. This is why district heating as a more environment-friendly heating method based on carbon neutral fuel and effective cogeneration is preferred in areas with high population density. The heating method using heat pumps consumes significant amounts of electricity. The implementation of a carbon neutral heat pump-based heating method would mean 100% of the electricity consumed for the method being produced from renewable energy sources. The report *Annual Report on Renewable Energy 2018* compiled by the Estonian Chamber of Renewable Energy[4]

[4] http://www.taastuvenergeetika.ee/wp-content/uploads/2019/06/ETEK-Taastuvenergia-aastaraamat-2018.pdf

indicates that in 2018, the share of electricity produced from renewable energy sources was 17.1% of all the electricity consumed in Estonia. Therefore, it is not possible to produce carbon neutral heat with a heat pump here, neither today nor in the near future. It is possible to produce carbon neutral heat with solar panels, but Estonia's geographic location and climate conditions mean that the main heat demand occurs in the cold season when solar based heat production is inefficient. Therefore, the use of solar energy would mean a wide scale construction of heat accumulators. First, such technology is not widespread, and second, the installation of solar panels is rather effective for electricity production. This means that if solar panels were to be installed for heat production only, the use of that technology would also mean the use of an additional heating technology. In that case, the only carbon neutral heating method worth mentioning would be district heating. Therefore, there is an even higher need for sustainable district heating, which is today the only possible heating method to ensure carbon neutral heat supply. It is also important to note that the heating energy produced will also make a contribution to the achievement of the goal of electricity production from renewable energy sources, necessary for statistical transfer.[5] Changing the practice pertaining to the aforementioned energy sector would also lead to an additional need to account for the specificities concerning heat production when approving the limit price of heat energy under the District Heating Act .

Based on the foregoing, there is no need for differentiated risk assessment of different network operators in the energy sector (electricity, gas and district heating).

Unlike district heating network operators, the operating risk of heat producers is affected by the competition principles set out in the District Heating Act, § 14^1 concerning the need to install new production capacities. In that, the Competition Authority is in certain circumstances entitled to demand that inefficient production capacities be replaced and a procurement be arranged for purchasing heat. Moreover, it is important to note that in order to ensure heat supply for a reasonable price and according to the consumers' needs, a heat producer must procure its fuel for the most favourable price possible[6] . Unlike district heating network operators, heat producers are subject to fuel price risk, due to which it is justified to assess the operating risk of heat producers as higher than that of district heating network operators.[7]

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[5] Government of the Republic 7 November 2019 Regulation No. 86 The conditions and procedure for minimum bid competitions arranged for the production of energy from renewable energy sources and in effective cogeneration mode, specification, pages 3-5, available under "Procedural records": https://www.riigiteataja.ee/eelnoud/menetluskaik/MKM/19-0402

[6] The more favorable the price of the procured fuel, the lower the heat price, and vice versa.

[7] Although the Competition Authority adopts an opinion in this manual that the operating risk of heat producers is somewhat different from that of network operators, the foregoing does not provide for a conclusion that a heat producer has no market power, primarily in the meaning of the Competition Act, § 13 (1).

Based on the foregoing, it is justified to subject district heating networks to debt capital risk premium and asset beta indicators calculated as averages of the debt capital risk premium indicators (see this Manual, clause 2.3.2) and asset beta indicators (see this Manual, clause 3.3.2) of all electricity and gas network operators.

Upon preparing this Manual, the Competition Authority was guided by the *ERRA*[8] handbook *Price Regulation and Tariffs,* the analysis *Cost of Capital and Financeability at PR09, Report by Europe Economics*[9]*,* the World Bank's handbook[10] *Resetting Price Controls for Privatized Utilities. A Manual for Regulators*, and CEER's database of countries.

In addition to the foregoing, the Competition Authority is guided by the *Analyses of WACC calculations by Estonian Competition Authority* [11] prepared by Priit Sander, PhD, a lecturer of the Faculty of Economy at the University of Tartu (hereinafter the expert) (hereinafter the analysis) and by the *Input Data used for calculation of WACC for 2017* (hereinafter the expert opinion). In the analysis, the expert has evaluated the methodology and inputs used in calculating the Weighted Average Cost of Capital in the Competition Authority's manual – *Manual to Calculate WACC in 2014.* The analysis indicates that in summary, the formulas used by the Competition Authority for calculating WACC and its components are based on well-known financial theory models and are widely implemented in practice. For the sake of stability of the regulative framework, the expert recommends continuing with the current methodology for assessing the cost of both loan capital and equity capital and to modify it only if additional empirical studies indicate a significant and systematic difference between the factual circumstances and the regulative cost of capital.[12] In the analysis, the expert has recommended[13] "*to conduct an additional empirical analysis to assess on what conditions the undertakings subjected to price regulation in Estonia are able to involve dept capital. It would enable to attain certainty about whether the current state risk and debt capital risk premiums are adequate.*" In order to provide a justified assessment to the aforementioned opinion, the Competition Authority conducted an empirical study[14] based on the information[15] provided

[8] Energy Regulators Regional Association (ERRA). Price Regulation and Tariffs. June 2006.

[9] This analysis was prepared by Europe Economics Chancery House, 53-64 Chancery Lane, London WC2A 1QU, 21 July 2009.

[10] Green, Richard; Pardina, Martin Rodriguez. Resetting Price Controls for Privatized Utilities. A Manual for Regulators. Washington, D.C.: The World Bank 1999

[11] https://www.konkurentsiamet.ee

[12] P. Sander. Analyses of WACC calculations by Estonian Competition Authority.Tartu 2014, page 20.

[13] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, page 11.

[14] The costs of dept capital and financial gearings (weights of dept capital) of the undertakings in the regulated sector. , https://www.konkurentsiamet.ee

[15] Long-term loan obligations carried in the 2014 financial statements, having their maturity date before 01.01.2016, were not taken into account by the study. The final deadlines for repayment of the long-term loan obligations are in the range of 2016- 2043.

in the 2014 financial statements of the 111 undertakings active in the regulated sector. Based on the data collected, the actual costs of debt capital and financial gearings (weights of dept capital) were determined. The results were compared with the indicators used in the *Manual to Calculate WACC in 2014* (the 2014 WACC Manual), reflected by Figure 1 and Table 1 in clause 1 and Figure 3 and Table 5 in clause 2.3.

In the expert opinion, the expert has assessed the indicators included in the Weighted Average Cost of Capital calculated and their calculation/assessment methodology pursuant to the Competition Authority's draft *Manual to Calculate WACC in 2017*, and has focused mostly on those aspects that have caused debates among undertakings. The expert concludes that upon determining the values of inputs, the methodology currently used by the Competition Authority overstates the cost rate of both loan capital and equity capital in the conditions of decreasing interest rates and understates the same in the conditions of increasing interest rates but this approach can be considered adequate and justified in the long-term view because of the intent to level out the price changes of regulated services. For the sake of increasing the loan capability of undertakings subject to price regulation, the regulation may be extended by provisions eliminating the risk stemming from a fast increase of the risk-free rate of return.[16]

The following is an overview of the general formula for calculating the WACC.

1. General formula for calculating the WACC

Pursuant to the methodology manuals developed by the Competition Authority to be used in assessing the justifiability of energy and water prices, as well as the Minister of Economic Affairs and Communications Regulations No. 51 *Procedure to set the temporary price for heat*, § 12 and No. 95 *Procedure and conditions to set the temporary price for a water service*, § 9, an undertaking's justified profitability i.e. its operating profit is formed by a multiplication of the cost of its regulated assets used for the provision of the relevant service on the one hand and its WACC on the other hand.

The WACC is calculated from the following formula (see Formula 1):

Formula 1. $WACC = c_e*[E/(D+E)] + c_d* [D/(D+E)]$,
where:
c_e – is the cost of equity capital (%);
c_d – is the cost of debt capital (%);
E – is the weight of equity capital set by the regulator (%);
D – is the weight of debt capital set by the regulator (%);
D+E – is the sum of the weights of debt capital and equity capital (%).

[16] P. Sander. Input Data used for calculation of WACC for 2017. Tartu 2017, page 13.

Formula 1 does not include a tax shield because pursuant to Estonian Income Tax Act, no tax shield is formed (income tax is incurred only on dividends paid out). The expert has also confirmed in its analysis that no tax shield is used[17].

The actual weights of the long-term debt obligations presented in the WACC can be clarified with the empirical study conducted by the Competition Authority[18], the results of which are presented in the following table (see Table 1) and figure (see Figure 1).

Table 1. Factual arithmetic average weights of long-term debt obligations included in debt capital, compared with the indicator in WACC Manual, percent

Row No.	Samples	Total number of undertakings	Arithmetic average weights of debt capital	
			Based on 2014 WACC Manual	Based on 2014 financial statements
A	**B**	**1**	**2**	**3**
1	**Heat undertakings**	**51**	**50**	**38.95**
1.1	Annual sales below 10,000 MWh	29	50	36.62
1.2	Annual sales 10,000 to 100,000 MWh	11	50	35.10
1.3	Annual sales above 100,000 MWh	11	50	48.96
2	**Electricity transmission network and distribution network operators**	**14**	**50**	**15.03**
2.1	Annual sales below 10,000 MWh	9	50	8.97
2.2	Annual sales 10,000 to 100,000 MWh	2	50	30.94
2.3	Annual sales above 100,000 MWh	3	50	22.58
3	**Natural gas distribution network operators**	**8**	**50**	**16.32**
3.1	Annual sales below 1,000 th m3	2	50	4.84
3.2	Annual sales 1,000 to 2,000 th m3	3	50	32.98
3.3	Annual sales above 2,000 th m3	3	50	7.32
4	**Water undertakings**	**38**	**50**	**37.92**
4.1	Annual sales below 1,000 th m3	28	50	41.17
4.2	Annual sales 1,000 - 5,000 th m3	7	50	26.29
4.3	Annual sales above 5,000 th m3	3	50	34.80
5	**TOTAL**	**111**	**50**	**33.95**

[17] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, page 3.
[18] The costs of dept capital and financial gearings (weights of dept capital) of the undertakings in the regulated sector. https://www.konkurentsiamet.ee

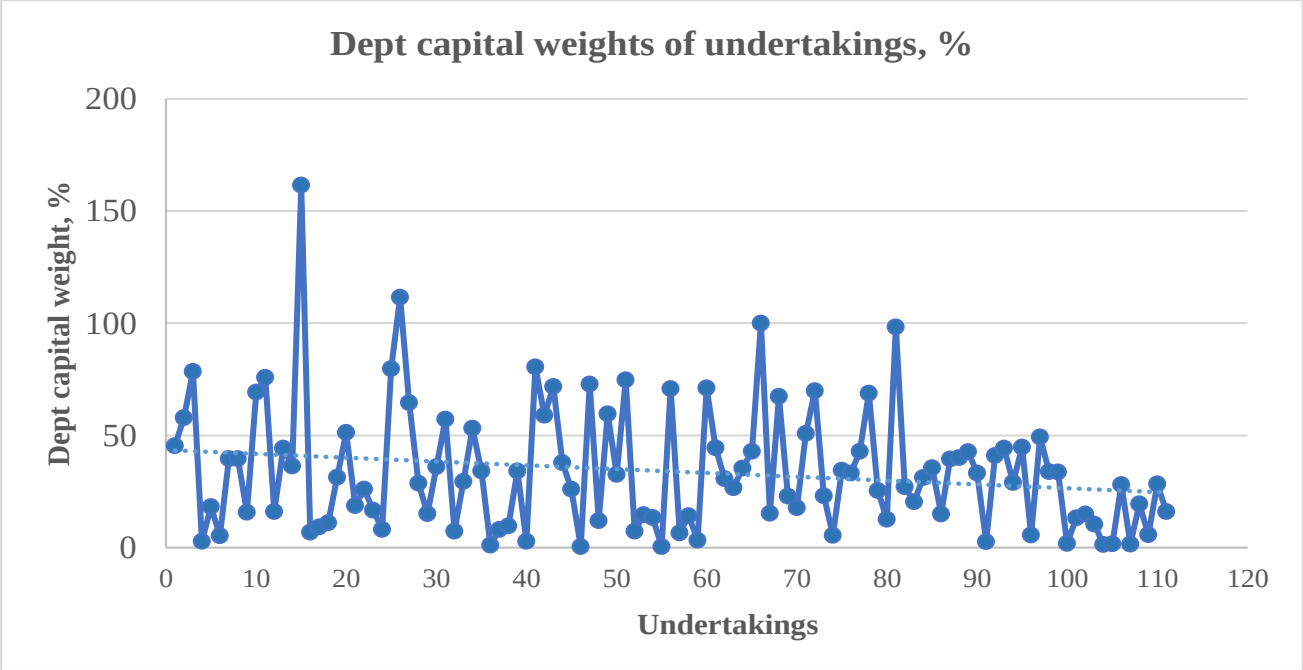

Figure 1. Debt capital weights of undertakings involved in the study

Table 1 indicates that the arithmetic average debt capital weights of the 111 undertakings of the regulated sector, involved in the study, were lower than the sector averages set out in the WACC Manual, across all sales volume groups.

Figure 1 indicates that the debt capital weights of the 111 undertakings involved in the study were distributed as follows:
• 43 undertakings (38.7%) had it below 20%,
• 13 undertakings (11.7%) had it in the range of 20-30%,
• 19 undertakings (17.1%) had it in the range of 30-40%,
• 11 undertakings (9.9%) had it in the range of 40-50%;
• 7 undertakings (6.3%) had it in the range of 50-60%;
• 5 undertakings (4.5%) had it in the range of 60-70%;
• 8 undertakings (7.2%) had it in the range of 70-80%;
• 5 undertakings (4.5%) had it above 80%, 1 of them 100% and 2 above 100% due to negative equity capital.
Therefore, 25 undertakings have debt capital weight above 50%, the rest have it lower.

In the situation of price regulation, the regulator may intervene in an undertaking's funding decisions and dictate a certain capital structure or calculate service prices with a certain capital structure that may differ from the undertaking's actual capital structure. (Pedell 2006: 52[19]).

[19] B. Pedell. Regulatory Risk and the Cost of Capital. Springer, 2006.

Capital structure (50% debt capital and 50% equity capital) has very little effect on WACC because the ratio of debt capital to equity capital does not affect the size of WACC in any significant way.[20]

To calculate WACC, the Competition Authority uses the capital structure of 50% debt capital and 50% equity capital (the same structure as e.g. the electricity transmission and/or distribution networks of the Netherlands, Luxembourg, Latvia, Poland, Finland and Denmark as well as the gas transmission and distribution networks of the Netherlands, Croatia, Luxembourg, Latvia, France, Portugal and Romania).

The components in formula 1, e.g. VK/VK+OK and OK/VK+OK reflect the capital structure i.e. the ratio of debt capital and equity capital to total capital, where the total capital is the sum of the weights of debt capital and equity capital. For example, of the weights of debt capital and equity capital are both 50%, the total weights are 100% and both the debt capital and the equity capital have the ratio of 0.5 (50%/100%=0.5) i.e. 50% to total capital.

The following describes the basis for the formation of the WACC components reflected in Formula 1.

2. Cost of debt capital

The cost of debt capital is formed as the sum of risk-free rate of return, Estonian country risk premium and the undertaking's debt capital risk premium (its credit rating plus additional expenditure treated to the involvement of dept capital).

It is important to note that undertakings under regulation are low risk undertakings because their guaranteed market means no risk on sales volume. In case of a justified decrease of sales volumes, regulated undertakings can always apply for a price of the service being sold, based on the lower sales volume.

2.1 Risk-free rate of return

Risk-free rate of return is the rate of return that carries no risk and concerning which the investor expects a risk-free return on investment. Risk-free rate of return is calculated on the basis of the rate of return of government bonds.

Estonia has not arranged emissions of long-term bonds, which is why the Competition Authority is using the German 10-year bond as the risk-free rate of return (see Figure 2), increased by Estonian country risk premium. The German bond is suitable because Germany is one of the largest countries in the euro zone and until 1 January 2011, the Estonian kroon was coupled to German mark. Also, by its nature, a 10-year bond is much

[20] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, page 4.

closer to a share than a 1-year bond is. The expert's analysis also indicates (page 5) that a risk-free instrument must be euro-based and free of payment risk, which the German bond complies with.

Figure 2. German 10-year government bond's average rates of return
(Source: http://data.oecd.org/interest/long-term-interest-rates.htm)

The data presented in Figure 2 provide for a conclusion that:

1. The average rate of return of the German 10-year government bond for the past five years (2014-2018) is 0.5% [(1.16+0.50+0.09+0.32+0.41)/5 = 0.5%], which is significantly lower than the average rate of return for the past 10 years (2009-2018) i.e. 1.41% [(3.22+2.74+2.61+1.50+1.57+1.16+0.5+0.09+0.32+0.41)/10 = 1.41%].
2. The average rate of return of the German 10-year government bond for the first 9 months of the year 2019 was -0.21%, which is a negative indicator compared with the indicators set out in the previous conclusion. If presuming the continuation of the negative indicator in the 4th quarter of the year, the presumed average rate of return of the new five-year period (2015-2019) would be 0.22% [(0.50+0.09+0.32+0.41+(- 0.21))/5 = 0.22%], which is also lower than the average rate of return of the period of 2014-2018 (0.5%).
3. By continuing to determine the bond's rate of return on the basis of the German 10-year government bond's average rate of return for the past five years, low indicators of the cost of debt capital and the WACC would be formed for all sectors.

Based on the foregoing, on the explanation provided in the Eesti Pank's 3 October 2019 publication *Financial Policy and Economy 3/2019*[21] (the loan interest rates of undertakings

[21] https://www.eestipank.ee/publikatsioon/rahapoliitika-ja-majandus/2019/rahapoliitika-ja-majandus-32019 page 14.

are higher and the loan environment as estimated by the undertakings themselves is less favourable than a year ago), and on the condition of positive influence on undertakings' capability to involve dept capital and a reduction of dept capital related risk, the Competition Authority uses the German 10-year bond's average of return for the past 10 years (2009-2018) as the basis for calculating the risk-free rate of return[22]. The rate of return of a 10-year government bond for the past ten years is also used in the WACC calculations of e.g. Belgium (Walloon and Brussels regions), Lithuania, Germany and Czech Republic[23].

The German 10-year government bond's average rate of return of the past ten years i.e. 2009-2018 was 1.41%, which the Competition Authority is using for calculating the cost of debt capital and equity capital in 2020. The expert has noted in its analysis that for the sake of increasing the loan capability of the undertakings subject to price regulation, the regulation may be supplemented by provisions[24][24] eliminating the risk stemming from the quick increase of risk-free rate of return. Therefore, the Competition Authority follows the changes of the German 10-year bond's rate of return, in order to implement the relevant adjustments to the WACC calculation manual.

As the German bond's annual rates of return change over time, the costs of debt capital and equity capital and the WACC also change over time.

2.2 Estonian country risk premium

According to Eesti Pank's assessment, country risk is determined by the amount of money that Estonia must pay more when borrowing money from the international market than does a country with a better solvency rating (e.g. Germany). The easiest way to measure that is by comparing the differences of interest rates of government bonds. In 2019, Estonia continues to have no secondary market-traded bonds, so it is not possible to provide a direct quantitative assessment to Estonia's country risk.

In the previous years, the assessment of country risk was based on country credit ratings published by rating agencies (S&P/Moody's); following the recommendation by the Ministry of Finance, a presumption has been made that the country ratings issued by rating agencies differ from Estonia's country rating by maximum one step. As of the end of 2018, these criteria were met in the EU by Czech Republic, Belgium and Slovakia. The credit ratings of the aforementioned countries as of the end of 2018 were as follows:

[22] The source of the risk-free rate of return is the data from OECD's website: http://data.oecd.org/interest/long-term-interest-rates.htm

[23] CEER. Report on Regulatory Frameworks for European Energy Networks: November 29, 2018.

[24] P. Sander. Input Data used for calculation of WACC for 2017. Tartu 2017, page 13.

Estonia (S&P/ Moody's): AA-/ A1;
Czech Republic (S&P/ Moody's): AA-/ A1;
Belgium (S&P/ Moody's): AA/ Aa3;
Slovakia (S&P/ Moody's): A+/ A2.

Based on an explanation by the Ministry of Finance[25]: *In order to calculate the indicative figure of Estonian country risk, the German 10-year bond is used, which is nominated in euros, therefore any compared bonds should be nominated in the same currency. Czech Republic has no 10-year bond nominated in euros (there is only a bond nominated in Czech korunas) and the nearest one would be a 7- year bond, so only Slovakia and Belgium remain in the comparison.* Based on the indicators published on the OECD website[26] (24 October 2019), the average rates of return of the long-term government bonds as of 2018 were 0.795% for Belgium and 0.886% for Slovakia, making the average rate of return be 0.84% [(0.795+0.,886)/2 = 0.84%]. By subtracting the German 10-year bond's average rate of return 2018 (0.41%) from the 0.84%, the result is 0.43% (0.84 – 0.41 = 0.43%).

The expert's assessment is that as an alternative approach, a wider-based risk premium assessment based on country ratings or the Estonian country risk premium formed on the CDS[27] market can be used, but the latter case involves the problem of the CDS market's high volatility and the absence of underlying assets (Estonian government bond)[28].

According to the Moody's database data collected by A. Damodaran, a wider-based country risk premium based on country ratings and corresponding to Estonia's country risk rating AA-/A1 (depending on the rating agency of S&P/Moody's) as of the beginning of 2019 (on 5 January 2019) was 79 base points i.e. 0.79 percentage points (see Table 2).

Table 2. Country risk premium's dependence on the country risk rating (in base points) according to Moody's

Risk rating	**Aaa**	**Aa1**	**Aa2**	**A1**	**A2**	**A3**	**Baa2**	**Ba1**	**Ba2**	**B1**	**B2**	**B3**	**Caa1**	**Caa2**	**Caa3**
Credit risk premium (bp)	0	45	56	**79**	96	135	215	282	339	508	621	734	846	1,016	1,128

Source: Damodaran 2019[29]

[25] A. Damodaran is of the same opinion – bonds in different currencies cannot be compared.
[26] http://data.oecd.org/interest/long-term-interest-rates.htm
[27] Credit Default Swap (CDS) – an agreement to insure against insolvency.
[28] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, pages 7-8.
[29] http://pages.stern.nyu.edu/~adamodar/pc/datasets/ctryprem.xls *Risk Premiums for Other Markets*.

The expert opinion states that the country risk premiums set out in Table 2 are calculated accounting for the data of all the countries in the world and are therefore only partially affected by the quantitative easing[30] (QE) taking place in the euro zone[31]. As the Competition Authority has used a five-year period and a country risk premium based on the data of not only euro zone countries when assessing the risk-free rate of return[31] (which overstates the risk-free rate of return at the current moment), the QE's effects are estimated to be compensated.[32]

As a result of the foregoing, the Competition Authority does not use the lower figure of Estonian country risk premium i.e. 0.43% and uses the higher value of 0.79% instead, based on the country risk premium corresponding to Estonia's country risk rating AA-/A1 (see Table 2). Therefore, the indicator of Estonian country risk premium (0.79%) is 0.36 percentage points higher than the lower indicator (0.43%), calculated as the difference between the average rate of return of the 2018 government bonds of Belgium and Slovakia on the one hand and the rate of return of 2018 government bond of Germany rate of return on the other hand (0.79-0.43 = 0.36%).
As the risk ratings of countries change in time, the costs of debt capital and equity capital and the WACC also change in time.

2.3 Undertaking's debt capital risk premium

An undertaking's debt capital risk premium is the expected risk rate exceeding the risk-free rate of return.

2.3.1 Debt capital risk premium for electricity and gas network operators

In order to ensure equal treatment of undertakings, the Competition Authority has used the arithmetic average indicators of the CEER[33] database of countries (see Table 3) for electricity and gas networks. The countries consider this indicator confidential[34], which is why the Table 3 does not include the debt capital risk premium indicators by countries. Based on the latest data presented by the CEER, the arithmetic averages of debt capital risk premium are as follows:

[30] A financial policy measure used by central banks to stimulate the economy in cases where the classic financial policy has become ineffective.
[31] The same can be said about the 10-year period when assessing the risk-free rate of return.
[32] P. Sander. Input Data used for calculation of WACC for 2017. Tartu 2017, page 6.
[33] CEER. *Report on Regulatory Frameworks for European Energy Networks: November 29, 2018.*
[34] As a result of a letter sent net to the CEER on 16 February 2012, asking the authority to not disclose those indicators.

Table 3. Average risk premiums of the debt capital of CEER countries

	Debt capital risk premium			
	electricity transmission network operator	electricity distribution network operators	gas transmission network operator	gas distribution network operators
Arithmetic average	**1.18%**	**1.28%**	**1.11%**	**1,08%**
Average of electricity and gas network undertakings	**1.16%**			

Based on the indicators in Table 3, the **debt capital risk premiums are formed as follows:**
for the electricity transmission network operator: **1.18%**;
for electricity distribution network operators: **1.28%**;
for the gas transmission network operator: **1.11%**;
for gas distribution network operators: **1.08%**.

2.3.2 Debt capital risk premium for heat producers and district heating network operators

As the introductory part of this Manual explained why the operating risks of district heating network operators and heat producers are different, these reasons shall not be repeated here. Based on the explanation given in this Manual's introductory part, it is justified:

a) to implement the debt capital risk premium of district heating networks in an amount corresponding to the average debt capital risk premium of electricity and gas network operators. Although the monopoly level of district heating networks is comparable to gas networks, the Competition Authority still bases the district heating network operators on the **debt capital risk premium of 1.16%** calculated on the basis of the latest sectoral average indicators of the electricity- and gas network operators of CEER countries (see Table 3) [(1.18+1.28+1.11+1.08)/4 = 1.16%];
b) to implement a higher debt capital risk premium for heat producers. In that, the data collected by A. Damodaran from Moody's database can be used for heat producers. The debt capital risk premium corresponding to Estonian country risk rating AA-/A1 (determined by the rating agency *S&P/Moody's*) was 125 base points i.e. 1.25 percentage points based on the data collected by A. Damodaran from Moody's database (see Table 4).

Tabel 4. Debt capital risk premium's dependence on the undertaking's credit rating (in base points), based on Moody's data from 2019

Risk rating	**Aaa**	**Aa2**	**A1**	**A2**	**A3**	**Baa2**	**Ba1**	**Ba2**	**B1**	**B2**	**B3**	**Caa**	**Ca2**	**C2**	**D2**
Credit risk premium (bp)	75	100	**125**	138	156	200	300	360	450	540	660	900	1108	1454	1938

Source: Damodaran 2019[35]

In its analysis, the expert has recommended that upon determining the debt capital risk premium, the dept capital should be based on the undertaking's credit rating as well as the additional expenses (contractual fees, bond emission arrangement fees) incurred by the undertaking due to involving dept capital and not covered by the risk-free rate of return and the country risk premium component. The expert has assessed that the additional expenses related to the involvement of dept capital may be in the range of 10-20 base points i.e. 0.1-0.2 percentage points.[36]

As the CEER database does not include the indicators of heat producers, the Competition Authority shall follow the expert's recommendation and shall take their **debt capital risk premium to be 1.45%,** formed on the basis of the 125 base points i.e. 1.25 percentage points (see table 4) corresponding to the A1 credit rating listed in A. Damodaran's database (as of the beginning of 2019) and the 20 base points i.e. 0.2 percentage points of additional costs related to the involvement of dept capital.

2.3.3 Debt capital risk premium for water undertakings

In Estonia, an undertaking providing the public water supply and sewerage service also has a market dominant position. In an area where the public water supply and sewerage service is provided, a customer would have extreme difficulties in obtaining the local government's permission to establish a personal water point (the possibility of taking water form a public water supply is considered first) and to treat its waste water pursuant to requirements (waste water collection areas are established by the Minister of the Environment with a decree). In waste water collection areas with a pollution load above 2,000 population equivalent, a public sewerage is mandatory (§ 24^1 (4) of the Water Act), except where the establishment of public sewerage would entail unjustifiably high expenses. Therefore, if public sewerage has been established and the consumer is in an area with pollution load above 2,000 PE, the new consumer is not permitted to supply its

[35] http://pages.stern.nyu.edu/~adamodar/ , *Ratings, Spreads and Interest Coverage Ratios.*

[36] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, page 9.

own water and to treat its waste water on its own.

Upon determining the debt capital risk premium of water undertakings, the data collected by A. Damodaran from the Moody's database can be used.

The debt capital risk premium corresponding to Estonian country risk rating AA-/A1 (determined by the rating agency *S&P/Moody's*) was 125 base points i.e. 1.25 percentage points based on the data collected by A. Damodaran from Moody's database, as of the beginning of 2019 (5 January 2019) (see Table 4).

In its analysis, the expert has recommended that upon determining the debt capital risk premium, the dept capital should be based on the undertaking's credit rating as well as the additional expenses (contractual fees, bond emission arrangement fees) incurred by the undertaking due to involving dept capital and not covered by the risk-free rate of return and the country risk premium component. The expert has assessed that the additional expenses related to the involvement of dept capital may be in the range of 10-20 base points i.e. 0.1-0.2 percentage points.[37]

As the CEER database does not include the indicators of water undertakings, the Competition Authority shall follow the expert's recommendation and shall take their **debt capital risk premium to be 1.45%,** formed on the basis of the 125 base points i.e. 1.25 percentage points (see table 4) corresponding to the A1 credit rating listed in A. Damodaran's database (as of the beginning of 2019) and the 20 base points i.e. 0.2 percentage points of additional costs related to the involvement of dept capital.

2.3.4 Debt capital risk premium for Universal Postal Service (UPS) undertakings

UPS is the consistent, high-quality and affordable provision of the universal postal services in the entire territory of the Republic of Estonia. Although the provision of UPS is a field subject to price regulation in several countries, the list of services included in the notion of universal postal service differs across countries. Another problem is that UPS is usually subject to the price cap methodology and/or direct subsidies from the state budget.[38]

As the CEER database does not include the indicators of UPS service providers, the Competition Authority shall follow the expert's recommendation and shall take their **debt capital risk premium to be 1.45%,** formed on the basis of the 125 base points i.e. 1.25 percentage points (see table 4) corresponding to the A1 credit rating listed in A. Damodaran's database (as of the beginning of 2019) and the 20 base points i.e. 0.2 percentage points of additional costs related to the involvement of dept capital.

[37] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, page 9.

[38] P. Sander, J. Masso. Assessment of the justified profitability of undertakings with a low capital intensity in a monopoly or dominant position.. Tartu 2016, page 47

2.4 Summary of cost of debt capital

The cost of debt capital indicators presented in the WACC can be explained with an empirical study[39]. Based on the data collected from the empirical study[40], the actual debt capital costs and weights of the undertakings were determined. The results were compared with the indicators used in the methodical manual – *Manual to Calculate WACC in 2014* (the 2014 WACC Manual). The results are reflected in the following figure (see Figure 3) and table (see Table 5).

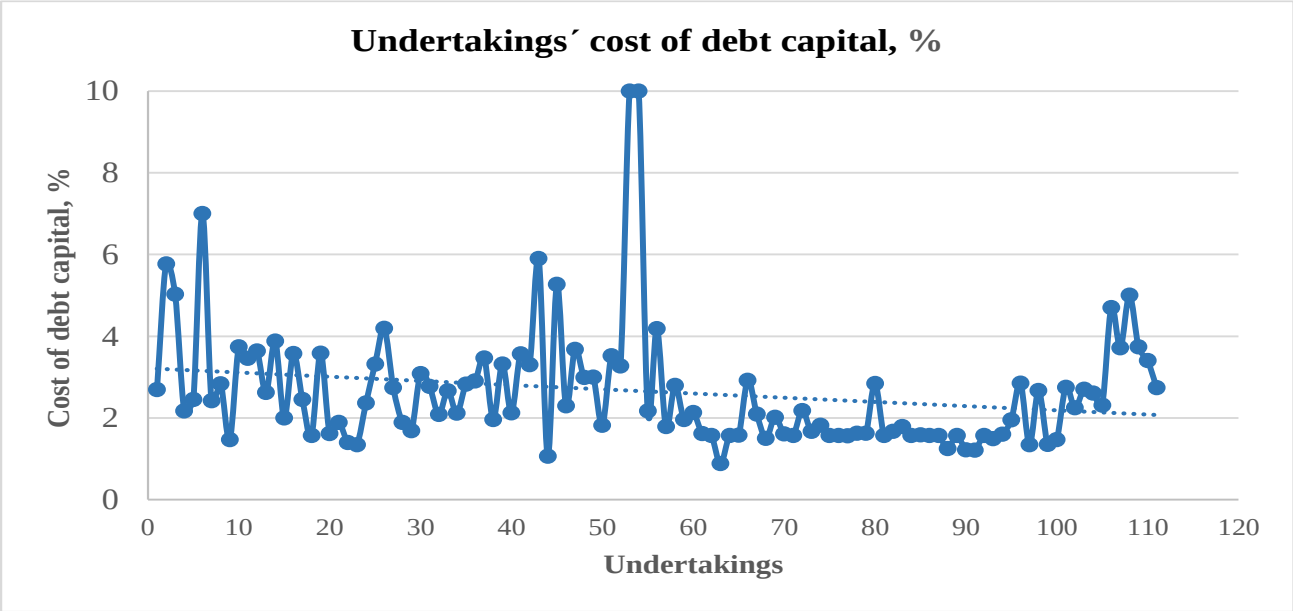

Figure 3. The actual costs of debt capital of undertakings

Figure 3 indicates that the costs of debt capital of the 111 undertakings involved in the study were distributed as follows:

- 82 undertakings had it below 3%, including 12 undertakings having received long-term loans from related parties with the cost of debt capital in the range of 1.06-3.00%;
- 8 undertakings had it in the range of 3.1-3.5%, including 2 undertakings having received long-term loans from related parties with the cost of debt capital in the range of 3.30-3.46%;

[39] The costs of dept capital and financial gearings (weights of dept capital) of the undertakings in the regulated sector. https://www.konkurentsiamet.ee

[40] Long-term loan obligations carried in the 2014 financial statements, having their maturity date before 01.01.2016, were not taken into account by the study. The final deadlines for repayment of the long-term loan obligations are in the range of 2016- 2043.

- 10 undertakings had it in the range of 3.5-4%, including 3 undertakings having received long-term loans from related parties with the cost of debt capital in the range of 3.57-3.74%;
- 2 undertakings had it in the range of 4-4.5%, both undertakings having received long-term loans from related parties with the cost of debt capital of 4.19%;
- 9 undertakings had it in the range of 4.7-10%, including 8 undertakings having received long-term loans from related parties with the cost of debt capital in the range of 4.7-10%.

As indicated by the foregoing, in most cases the related parties have applied higher interest rates than the average market interest when granting long-term loans. Similarly, to the principle of applying a transfer price[41], inter-person loans should also be verified to have interest rates corresponding to the market interest (market value).

Table 5. Actual average costs of debt capital

Row No.	Samples	Number of undertakings	Arithmetic average weights of debt capital	
			Based on 2014 WACC Manual	Based on 2014 financial statements
A	**B**	**1**	**2**	**3**
1	**Heat undertakings**	**51**	**4,35**	**2,95**
1.1	Annual sales below 10,000 MWh	29	4.35	3.05
1.2	Annual sales 10,000 to 100,000 MWh	11	4.35	2.41
1.3	Annual sales above 100,000 MWh	11	4.35	3.22
2	**Electricity transmission network and distribution network operators**	**14**	**4.24/4.40**	**2.96**
2.1	Annual sales below 10,000 MWh	9	4.24/4.40	2.84
2.2	Annual sales 10,000 to 100,000 MWh	2	4.24/4.40	3.69
2.3	Annual sales above 100,000 MWh	3	4.24/4.40	2.83
3	**Natural gas distribution network operators**	**8**	**4.34**	**4.52**
3.1	Annual sales below 1,000 th m3	2	4.34	1.87
3.2	Annual sales 1,000 to 2,000 th m3	3	4.34	8.06
3.3	Annual sales above 2,000 th m3	3	4.34	2.74
4	**Water undertakings**	**38**	**4.35**	**1.71**
4.1	Annual sales below 1,000 th m3	28	3.55	1.73
4.2	Annual sales 1,000 - 5,000 th m3	7	3.55	1.72
4.3	Annual sales above 5,000 th m3	3	3.55	1.43
5	**TOTAL**	**111**	**4.34**	**2.64**

Table 5 indicates that in 2014, the average cost of debt capital of 111 undertakings was 2.64% compared with the average indicator calculated from the data provided in the 2014 WACC Manual (4.34%). Alone in the sales volume group of 1,000 – 2,000 th m^3 per year among natural gas distribution network operators, the cost of debt capital turned out

[41] Transfer price is the price of a transaction between related parties and its market value is the value of a similar transaction between non-related persons (Income Tax Act, § 8 (2)).

significantly higher i.e. 8.06% (see line 3.2, column 3) for the reason that related parties have granted a long-term loan to two undertakings with the interest rate of 10% and to one undertaking with the interest rate of 5%. The costs of debt capital for water undertakings turned out significantly lower than other sectors because 73.7% of their long-term debt obligations are loans received from the Environmental Investment Centre[42], with their average cost of debt capital being 1.54%.

The results of the empirical study provide for a conclusion that if the higher interest rates applied by related parties are not taken into account then it cannot be claimed that the costs of debt capital of small undertakings are always higher than those of larger undertakings. Additionally, 76 undertakings out of 111 (68.5%) have their long-term loans linked to 1, 3, 6 or 12 month EURIBOR. Therefore, when comparing the actual costs of debt capital with those set out in the WACC Manual, the fact needs to be accounted for that the EURIBOR indicators have been negative for more than a year now. Negative Euribor decreased both the interest rates of euro zone's money market and the costs of the EURIBOR-based long-term loans of undertakings in Estonian government-regulated sectors. With zero EURIBOR, the average costs of debt capital would decrease as follows:

• for heat undertakings: from 2.95% to 2.75%,
• for electricity transmission network and distribution network operators: from 2.96% to 2.81%,
• for natural gas distribution network operators: from 4.52% to 4.42%;
• for water undertakings: from 1.71% to 1.43%.

In summary, the Competition Authority's analysis indicates that the actual costs of debt capital for 2014 in regulated sectors were not higher than the regulative calculated costs of debt capital, being rather lower.

Eesti Pank's 26 February 2019 publication *Overview of Funding the Economy*[43] provides information and figures (see this Manual's Annexes 1 and 2), pursuant to which the changes in the banking sector's structure brought about somewhat higher interest payments. Corresponding to the slight changes in the average funding conditions, the structural changes of the banking market are accompanied by at least temporary weakening of the competition, although not in all loan segments. As a summary of the year, the average interest margin of corporate loans is higher than a year ago, **reaching as high as 2.4%** (see the figure in Annex 1). Besides banking statistics, a survey of banking activities also indicates that loan conditions have become stricter. Although the interest margins of large transactions have increased on average, the margin always depends on the specific project and the undertaking's applying for the loan. This is why

[42] It is a public institution that provides both non-repayable assistance and loans.

[43] https://www.eestipank.ee/publikatsioon/majanduse-rahastamise-ulevaade/2019/majanduse-rahastamise- ulevaade-veebruar-2019 , pages 24 and 26.

loan margins may be largely different across sectors or also within a sector (see the figure and explanation in Annex 2). It is still possible to fund low-risk projects for very favourable prices.

Eesti Pank's 3 October 2019 publication *Overview of Funding the Economy*[44] provides information and figures (see this Manual's Annexes 3 and 4), pursuant to which the loan interest rates of undertakings are higher (the average for 2019 does not exceed 3%) and the loan environment as estimated by the undertakings themselves is less favourable than a year ago (see the figure in Annex 3). Yet, the funding options of undertakings can still be considered rather good. The decrease of competition has primarily increased the costs of loans but the access to bank loans remains good, which is also reflected in the relatively fast loan growth. Moreover, the real interest rate of more favourable corporate loans is still negative because the base interest rate is very low.

Upon calculating the WACC, the costs of debt capital by sectors (the risk-free rate of return + the country risk + the undertaking's risk) turns out higher than the average indicator posted by Eesti Pank for 2019 (does not exceed 3%), **being in the range of 3.28% - 3.65%** (see Table 11). Additionally, the figure provided this Manual's Annex 4 indicates that the money market's interest rate in the euro zone remains negative in 2019.

Based on the foregoing indicators and the position expressed in the expert's opinion[45], it can be stated that the regulative cost of debt capital established by the Competition Authority is sufficient to ensure that have justified profitability to cover the expenses related to the involvement of dept capital.

3. Cost of equity capital

The cost of equity capital can be found by using either historical data or financial theory models. Most regulators are using the Capital Assets Pricing Model (CAPM) to find the cost of equity capital, i.e. assessing the financial assets of undertakings. To use the CAPM model to find the cost of equity capital of undertakings not quoted on the stock market, the beta coefficients of similar undertakings quoted on the stock market must be used. The cost of equity capital determined from the CAPM is expressed as the following formula (see Formula 2).

Formula 2. $c_e = R_f + R_c + (ß * R_m)$

where:

c_e – is the cost of equity capital;

R_f – is the risk-free rate;

[44] https://www.eestipank.ee/publikatsioon/rahapoliitika-ja-majandus/2019/rahapoliitika-ja-majandus-32019 , page 14.

[45] P. Sander. Input Data used for calculation of WACC for 2017. . Tartu 2017, page 7.

R_c – is the country's risk premium;
R_m – is the market risk premium i.e. the market's rate of return;
ß – is the beta coefficient.

3.1 Risk-free rate of return and Estonian country risk premium

The formation of the risk-free rate of return and Estonian country risk premium is discussed in clauses 2.1 and 2.2 of this Manual.

3.2 Market risk premium

Market risk premium (R_m) shows how much investors can earn in addition to the risk-free rate of return. Thus, the market risk premium is the compensation for systematic risk-taking. Two approaches can be used to find the market risk premium: determining the risk premium on the basis of historical data or determining the expected risk premium. Shorter or longer historical periods can be used when calculating the market risk premium. The energy market regulator of Great Britain has also referred to this in its analysis[46].

The expert's analysis indicates that the difference of geometric average rate of return and the rate of return of the long-term government bonds is recommended to be used as the market risk premium[47]. *Credit Suisse Global Investment Returns Yearbook 2018* provides historical geometric average market risk premiums for the period of 1900-2017 (see Table 6).

Table 6. Geometric average market risk premiums in the period of 1900-2017

Region	Market risk premium
Europe	3.00
Global	3.20

Source: *Credit Suisse Global Investment Returns Yearbook 2018*

The indicators in Table 6 show that the long-term average market risk premiums of European countries, calculated on the basis of geometric averages, are lower than the arithmetic average market risk premium used by the Competition Authority.

As a comparison, Table 7 below shows the arithmetic average indicator formed on the

[46] A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K. Stephen Wright Birkbeck College and Smithers & Co, Robin Mason, University of Southampton and CEPR, David Miles, Imperial College and CEPR On Behalf Of: Smithers & Co Ltd, 20 St Dunstan's Hill London EC3R 8HY February 13, 2003. www.ofgem.gov.uk.
[47] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, pages 16-17.

basis of the market risk premiums of CEER countries. The countries consider the aforementioned indicator confidential[48], which is why Table 7 lacks the market risk premium indicators by countries.

Table 7. The average market risk premium of CEER countries

	Market risk premium
Arithmetic average	**5.03%**

Table 7 indicates that the arithmetic average of the market risk premiums of CEER countries as implemented by EU regulators is 5.03%.

The Competition Authority has based its long-term regulation practice on the market risk premium of 5%, guided by the recommendations in McKinsey's 2000[49] publication (in the range of 4.5- 5%) and 2010[50] publication (in the range of 4.5% to 5.5%). The latest i.e. 2015[51] publication recommends using a market risk premium in the range of 4.7% to 5.4%, based on which the average indicator also turns out as 5.0% ((4.7+5.4)/2) = 5.0%), which also corresponds to the average indicator of CEER countries (5.03%).

The expert has explained in the expert opinion that the study "*Review of approaches to estimate a reasonable rate of return for investments in telecoms networks in regulatory proceedings and options for EU harmonization*" ordered by European Commission also found that a market risk premium in the range of 5%-5.5% is very much suitable for an undertaking subject to European price regulation (page 82). The 5% market risk premium used by the Competition Authority offers adequate compensation for the carrying of a systematic risk and is sufficient in long term to the justified profitability of undertakings subject to price regulation.[52]

Due to the aforementioned circumstances, the Competition Authority uses the market risk premium of 5%.

3.3 Beta coefficient

The beta coefficient (*β*; hereinafter the beta) shows whether an undertaking is more risky i.e. has a higher risk level than the average undertaking in the market. The beta of the

[48] As a result of a letter sent net to the CEER on 16 February 2012, asking the authority to not disclose those indicators.

[49] McKinsey&Company,Inc.; Copeland, Tom; Koller, Tim; Murrin, Jack (2000). Valuation: Measuring and Managing the Values of Companies. 3rd Ed. John Wiley & Sons, Inc., page 216.

[50] McKinsey&Company; Koller, Tim; Goedhart, Marc; Wessels, David (2010) Valuation: Measuring and Managing the Value of Companies, 5th Edition. John Wiley & Sons, Inc., New Jersey, page 242.

[51] McKinsey&Company; Koller, Tim; Goedhart, Marc; Wessels, David. (2015). *Valuation: Measuring and Managing the Values of Companies. 6th Edition*. John Wiley & Sons, Inc., New Jersey, page 274.

[52] P. Sander. Input Data used for calculation of WACC for 2017. Tartu 2017, page 9.

market index is 1. (Kõomägi 2006: 153[53]). If a share's beta is below 1, that share's risk is below the market's average. If a share's beta is above 1, that share's risk exceeds the market's average.

Beta is a relative measure of a share's systematic risk. Systematic risk is the part of the risk entailed in a security that cannot be hedged with a portfolio. There are no comparable energy undertakings in Estonia that are quoted on the stock market and the data of which could be used. For undertakings not quoted, the solution is to use a comparison method where the assessed beta is taken to be the average beta of quoted undertakings in the same field of activity. (Kõomägi 2006: 154[54]).

To find the beta, the equity capital's beta must be found, whereas this is either asset beta (β_a) where the debt capital is zero, or equity beta (β_e). The asset betas of specific sectors are taken as a basis, multiplied by the relevant sectors average equity beta. To do so, Miller's formula is used (most of the CEER regulators use it), which presumes that an increase of the debt capital's weight also increases the undertaking's risk. Therefore, the more loan capital an undertaking uses, the higher the systematic risk related to its shares.

Miller's formula is expressed as follows (see Formula 3).

Formula 3[55]**.** $\beta e = \beta a * (1+D/E)$

where:
β_e – is the undertaking's equity beta,
β_a – is the economic field's asset beta,
D/E – is the regulator-set debt capital weight divided by the equity capital weight.

Formula 3 indicates that the Competition Authority does not use the undertaking's balance sheet data in the calculation. As the Competition Authority calculates the WACC on the basis of the capital structure of 50% debt capital and 50% equity capital (the same structure as e.g. the electricity transmission and/or distribution networks of the Netherlands, Luxembourg, Latvia, Poland, Finland and Denmark as well as the gas transmission and distribution networks of the Netherlands, Croatia, Luxembourg, Latvia, France, Portugal and Romania), the foregoing Miller's formula is simplified as follows (see Formula 4).

[53] M. Kõomägi. *Ärirahandus*. Tartu Ülikooli Kirjastus, 2006.
[54] M. Kõomägi. *Ärirahandus*. Tartu Ülikooli Kirjastus, 2006.
[55] This formula does not include a tax shield because pursuant to Estonian Income Tax Act, no tax shield is formed.

Formula 4. $\beta_e = \beta_a * 2.$

Similar to the risk-free rate and with the purpose of reducing dependence on the volatility of market-based indicators, resulting in the ensuring of stability upon calculating the WACC and in levelling the price changes of regulated services, the use of average betas of longer periods is also justified. The Competition Authority bases its use of betas on the past 10 year arithmetic average betas for electricity, gas and district heating network operators and on the past 8 year arithmetic average betas for heat producers, water undertakings and UPS undertakings. The use of the past 8 year betas stems from the fact that the database of A. Damodaran has no betas for the years 2010 and 2011.

3.3.1 The beta of electricity and gas network operators

For example, Estonian regulator is in the same situation as the Finnish energy regulator where there are over one hundred undertakings to be regulated and most of them are not quoted on the stock market i.e. there are no statistical data about them. Based on that, the Finnish energy regulator has analysed the indicators of similar undertakings in both the USA and Europe, in order to determine a beta for Finnish undertakings[56]. A similar approach has been used by the Great Britain's energy regulator – it observed the energy undertakings quoted on the stock market, but also analysed the statistical data of the betas of other infrastructure undertakings and undertakings in other fields of activity when determining the beta for energy undertakings not quoted on the stock market [57]. In that, both regulators have stated the range for the betas of undertakings regulated on the basis of statistical data. The final decision also takes into account the risks of the specific sector. In the table below (see Table 8), the Competition Authority shows the arithmetic average indicators formed on the basis of arithmetic average asset betas of electricity and gas networks of CEER countries for the past 10 years (2010-2019)[58]. The Competition Authority uses the database of CEER countries for electricity and gas networks, because there are very few network-service-only undertakings quoted on the stock market; most of them belong to large consolidated groups.

[56] Electricity Distribution Price Control Review Background information on the cost of capital March 2004 www.ofgem.gov.uk .

[57] A Study into Certain Aspects of the Cost of Capital for Regulated Utilities in the U.K.Stephen Wright Birkbeck College and Smithers & Co, Robin Mason, University of Southampton and CEPR, David Miles, Imperial College and CEPR On Behalf Of: Smithers & Co Ltd 20 St Dunstan's Hill London EC3R 8HY February 13, 2003. www.ofgem.gov.uk.

[58] The betas are shifted by one year because the indicators taken from the previous year's CEER report are implemented in the subsequent year.

Table 8. Average asset betas of electricity and gas networks in CEER countries

Betas	electricity transmission network operator	electricity distribution network operators	gas transmission network operator	gas distribution network operators
Jan. 2010	0.341	0.367	0.366	0.407
Jan. 2011	0.365	0.376	0.447	0.441
Jan. 2012	0.329	0.339	0.388	0.389
Jan. 2013	0.349	0.344	0.364	0.371
Jan. 2014	0.337	0.340	0.329	0.344
Jan. 2015	0.351	0.364	0.348	0.374
Jan. 2016	0.335	0.334	0.334	0.348
Jan. 2017	0.338	0.348	0.347	0.349
Jan. 2018	0.346	0.357	0.371	0.360
Jan. 2019	0.357	0.358	0.348	0.335
10-year average beta (asset beta)	**0.345**	**0.353**	**0.364**	**0.372**
Average beta for electricity and gas (asset beta)	**0.359**			

Following the capital structure accepted by the Competition Authority (where 50% is debt capital and 50% is equity capital and using Formula 4: $\beta e = \beta a * 2$, the following **equity betas (βe)** are formed:

for an electricity transmission network operator: **0.690;**
for electricity distribution network operators: **0.706;**
for a gas transmission network operator: **0.728;**
for gas distribution network operators: **0.744.**

3.3.2 The beta of heat producers and district heating network operators

As the introductory part of this Manual explained why the operating risks of district heating network operators and heat producers are different, these reasons shall not be repeated here. Based on the explanation given in this Manual's introductory part, it is justified:
a) to apply the average asset beta of 0.359 to district heating networks, as calculated on the basis of the average asset betas of electricity and gas network operators set out in Table 8. Following the capital structure accepted by the Competition Authority (where 50% is debt capital and 50% is equity capital and using Formula 4: $\beta e = \beta a * 2$, the **equity beta (βe) of 0.718** is formed for district heating network operators (βe = 0.359*2 = 0.718);
b) to apply a beta to heat producers, the calculation of which is based on the average

arithmetic asset betas calculated on the basis of the past 8 years' (2012- 2019)[59] data[60] from the database of New York University's Professor of Finance A. Damodaran about European energy producing undertakings (it is difficult to find district heating undertakings quoted on the stock market because district heating is widespread only in Nordic countries and in Central and Eastern Europe) (see Table 9). The expert has also recommended to follow the asset betas of energy producers as set out in A. Damodaran's database and, following the regulative target structure of capital, i.e. 50% foreign capital and 50% equity capital, to calculate equity capital betas for those sectors.[61]

Table 9. The average asset betas of European energy producers (as of the start of the year)

	Betas
Jan. 2012	0.418
Jan. 2013	0.487
Jan. 2014	0.605
Jan. 2015	0.571
Jan. 2016	0.528
Jan. 2017	0.596
Jan. 2018	0.719
Jan. 2019	0.606
8-y average beta (asset beta)	**0.566**

Source: A. Damodaran's database

Based on the expert's recommendation, the asset beta βa = 0.566 is converted into equity beta (βe) using Formula 4: $\beta e = \beta a * 2$. Using Formula 4, the capital structure accepted by the Competition Authority (being 50% debt capital and 50% equity capital), and the past 8 year average asset beta 0.566 of European energy producers, the undertakings active in heat production get the average **equity beta of 1.132,** because (βe = 0.566*2 = 1.132).

3.3.3 The beta of water undertakings

The Competition Authority has based its calculations of the beta of water undertakings on the average arithmetic asset betas calculated from the past 8 years' (2012- 2019)[62] data[63]

[59] The database lacks the betas for the years 2010 and 2011, therefore it was not possible to calculate the 10 year average betas.
[60] Database: Levered and Unlevered Beta by Industry (2. Europe), http://pages.stern.nyu.edu/~adamodar/
[61] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, pages 14-15.
[62] The database lacks the betas for the years 2010 and 2011, therefore it was not possible to calculate the 10 year average betas.
[63] Database: Levered and Unlevered Beta by Industry (2. Europe), http://pages.stern.nyu.edu/~adamodar/

from the database of New York University's Professor of Finance A. Damodaran about European water undertakings (see Table 10). The expert has also recommended to follow the asset betas of energy producers as set out in A. Damodaran's database and, following the regulative target structure of capital, i.e. 50% foreign capital and 50% equity capital, to calculate equity capital betas for those sectors.[64]

Table 10. The average asset betas of European water undertakings (as of the start of the year)

	Betas
Jan. 2012	0.228
Jan. 2013	0.315
Jan. 2014	0.311
Jan. 2015	0.394
Jan. 2016	0.511
Jan. 2017	0.445
Jan. 2018	0.425
Jan. 2019	0.380
8-y average beta (asset beta)	**0.376**

Source: A. Damodaran's database

Based on the expert's recommendation, the asset beta βa = 0.376 is converted into equity beta (βe) using Formula 4: $\beta e = \beta a * 2$. Using Formula 4, the capital structure accepted by the Competition Authority (being 50% debt capital and 50% equity capital, similar to energy undertakings), and the past 8 year average asset beta 0.376 of European water sector undertakings, the water undertakings get the average **equity beta of 0.752**, because (βe = 0.376*2 = 0.752).

3.3.4 The beta of UPS undertakings

The provision of the UPS service includes the network (infrastructure) service only, therefore the risks are lower and this fact must be reflected in the beta. Although the provision of UPS is an activity subject to price regulation in several countries, the list of services included in the notion of universal postal service differs across countries. Another problem is that UPS is usually subject to the price cap methodology and/or direct subsidies from the state budget.[65]

[64] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, pages 14-15.

[65] P. Sander, J. Masso. Assessment of the justified profitability of undertakings with a low capital intensity in a monopoly or dominant position. Tartu 2016, page 47

By the nature of the service provided to the consumers, an UPS undertaking's risk can be considered comparable with that of network operators. The database of New York University's Professor of Finance A. Damodaran lacks data the betas of the postage sector.

Similar to the electricity and gas networks, the provision of the UPS service is the service of an undertaking in control of an essential facility. Therefore, it is justified to apply the average asset beta of 0.359 to an UPS undertaking, being calculated on the basis of the past 10 year average asset betas of electricity and gas network operators of CEER countries, provided in Table 8. Using the capital structure accepted by the Competition Authority (being 50% debt capital and 50% equity capital) and Formula 4: $\beta_e = \beta_a * 2$, the UPS undertakings get the **equity beta (βe) of 0.718,** because (βe = 0.359*2 = 0.718).

4. Income tax rate

Formula 1 set out in this Manual, clause 1 foes not include a tax shield (1-income tax rate) because pursuant to Estonian Income Tax Act, no tax shield is formed (income tax is incurred only on dividends paid out). The expert has also confirmed in its analysis that no tax shield is used[66]. Also, the income tax component on dividends paid out is not applied. It is not justified to include the income tax calculated from dividends paid out into the price of services sold to consumers, because:

1) Regulation considers justified profitability to be operating profit. The income tax on dividends is incurred after operating profit, so dividends are paid from the earned operating profit, whereas the undertaking has to assess beforehand the income tax amount resulting from the payout of dividends and has to deduct that amount from the operating profit being paid out as dividends.

2) The equal treatment principle. The payout of dividends is a voluntary action – there are undertakings not paying dividends at all and instead reinvesting their entire profit. Therefore, applying the income tax expense would cause a situation of inequality.

3) Dividend income tax expense is not an expense needed for the provision of the regulated services. In its 12 December 2017 judgement (court case No. 3-11-1355), clause 40 on page 15, the Administrative Law Chamber of the Supreme Court (hereinafter the Administrative Law Chamber) has adopted the opinion that although the complainant wished to also add the income tax payable from dividends into the costs being the basis for calculating the water price, the Administrative Law Chamber sides with the respondent (the Competition Authority) this time, as the latter finds that dividend income tax expenses are not expenses needed for the provision of a water service, which is why the Public Water Supply and Sewerage Act, § 14 (2) does not

[66] P. Sander. Analyses of WACC calculations by Estonian Competition Authority. Tartu 2014, page 3.

enable to count those expenses in. The Competition Authority has the opinion that as subsection 2 of that section is further divided into clauses 1-6, the Administrative Law Chamber's opinion extends to all the listed clauses (not only the operating expenses named in clause 1). Pursuant to the aforementioned subsection's clause 5, justified profitability (business profit) shall be calculated on the undertaking's invested capital, using the WACC indicator. Therefore, the Administrative Law Chamber's opinion extends also to the size of the WACC being a basis for calculating the justified profitability because, if the income tax rate is applied, the WACC will be higher and therefore the size of the justified profitability to be included in the service price as well as the consumer price for the service being provided will be higher. In addition to the wafer sector, the Administrative Law Chamber's opinion has to be followed in other sectors dealing with the provision of regulated services (electricity transmission and distribution, gas transmission and distribution, heat production and distribution, and UPS).

4) The Ministry of Finance did not want to express an opinion about income tax in its reply[67] to Estonian Power and Heat Association. The Ministry of Finance explained in its reply that the Competition Authority's Manual and the calculation method contained in it are an independent regulator's methodology taking into account the principles of regulation and that the formula should be assessed as a whole, taking into account the regulation's goal.

5. The formation of WACC

To calculate the WACC, the Competition Authority is using Formula 1 set out in the introduction of this manual, expressed as follows:

$WACC = c_e*[E/(D+E)] + c_d* [D/(D+E)]$, where:
c_e – is the cost of equity capital (%);
c_d – is the cost of debt capital (also called loan capital or foreign capital) (%);
E – is the weight of equity capital set by the regulator (%);
D – is the weight of debt capital set by the regulator (%);
D+E – is the sum of weights of debt capital and equity capital (%).

The formation of WACC across sectors is shown by Table 11.

[67] 8 October 2019 letter No. 5-1/5573-2.

Table 11. The formation of WACC

WACC's components (%)	District heating		Electricity		Gas		UPS	Water undertakings
	heat producers	network operators	transmission network operator	distribution network operators	transmission network operator	distribution network operators		
German 10y bond's nominal risk-free rate of return, ($R_{f,\ 10y\ average}$	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41
Estonian country risk premium, (R_c)	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
The undertaking's debt capital risk premium	1.45	1.16	1.18	1.28	1.11	1.08	1.45	1.45
Cost of debt capital, (k_d)	**3.65**	**3.36**	**3.38**	**3.48**	**3.31**	**3.28**	**3.65**	**3.65**
German 10y bond's nominal risk-free rate of return, (R_f)	1.41	1.41	1.41	1.41	1.41	1.41	1.41	1.41
Estonian country risk premium, (R_c)	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Market risk premium (McKinsey), (R_m)	5.00	5.00	5.00	5,000	5.00	5.00	5.00	5.00
Beta (asset beta; $ß_a$), 8y and 10y average	0.566	0.359	0.345	0.353	0.364	0.372	0.359	0.376
Beta (equity beta; $ß_e$), 8y and 10y average	1.132	0.718	0.690	0.706	0.728	0.744	0.718	0.752
Cost of equity capitald, (k_e)	**7.86**	**5.79**	**5.65**	**5.73**	**5.84**	**5.92**	**5.79**	**5.96**
Income tax rate (t=0%)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Weight of debt capital (wd)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Weight of equity capital (we)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
WACC	**5.76%**	**4.58%**	**4.51%**	**4.61%**	**4.58%**	**4.60%**	**4.72%**	**4.81%**

The Competition Authority is applying the WACC indicators presented in Table 11 **starting with 1 January 2020.** Considering the related circumstances and justified interests, the Competition Authority grants the district heating sector's network operators a transition period for implementing the planned WACC, i.e. they are subject to **the heat producers' WACC of 5.76% until 31 December 2020. Stating with 1 January 2021, separate WACC's shall apply to heat producers and network operators in the district heating sector**, using the indicators provided in Table 11[68].

[68] If this Manual is still valid in 2021. If this Manual is changed, the relevant indicators shall be taken from the 2021 Manual.

ANNEX 1. An excerpt from Eesti Pank's February 2019 publication *Overview of Funding the Economy*, page 24 (https://www.eestipank.ee/publikatsioon/majanduse-rahastamise-ulevaade/2019/majanduse-rahastamise-ulevaade-veebruar-2019)

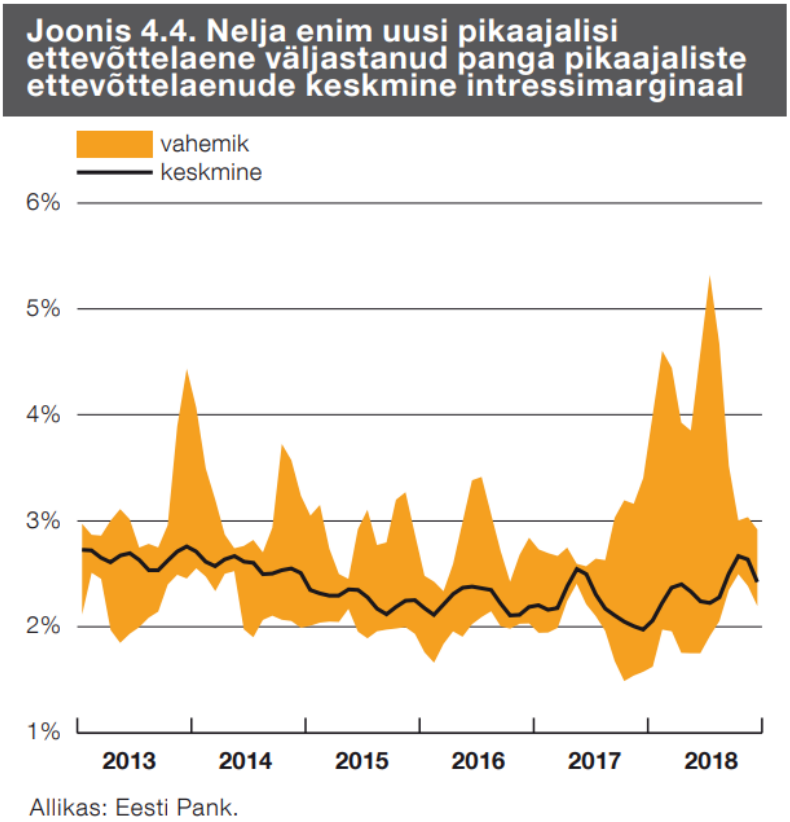

Figure 4.4. The average interest margin of long-term corporate loans in four banks having granted the most new long-term corporate loans interest margin
Source: Eesti Pank

ANNEX 2. An excerpt from Eesti Pank's February 2019 publication *Overview of Funding the Economy*, page 26: (*https://www.eestipank.ee/publikatsioon/majanduse-rahastamise-ulevaade/2019/majanduse-rahastamise-ulevaade-veebruar-2019*)

"...Although the interest margins of large transactions have increased on average, the margin always depends on the specific project and the undertaking's applying for the loan. This is why loan margins may be largely different across sectors or also within a sector (see Figure 4.10). It is still possible to fund low-risk projects for very favourable prices. ***An overall increase of the cost of corporate loans is also indicated by changes in the interest rates of smaller loans.*** *The interest margin of loans up to 250,000 euros increased to 3.8% in 2018. Like with several other developments taking place in Estonian banking sector in 2018, the cause for this increase should certainly be searched from the banking sector's structural changes. Although the pricing criteria of smaller loans in most banks have not changed much, the interest of some banks in this loan segment waned in 2018 and therefore the loan conditions became stricter. Together with the leaving of banks from the market, which had offered more favourable interest margins earlier, this meant an increase of the average interest margin of smaller loans. ..."*

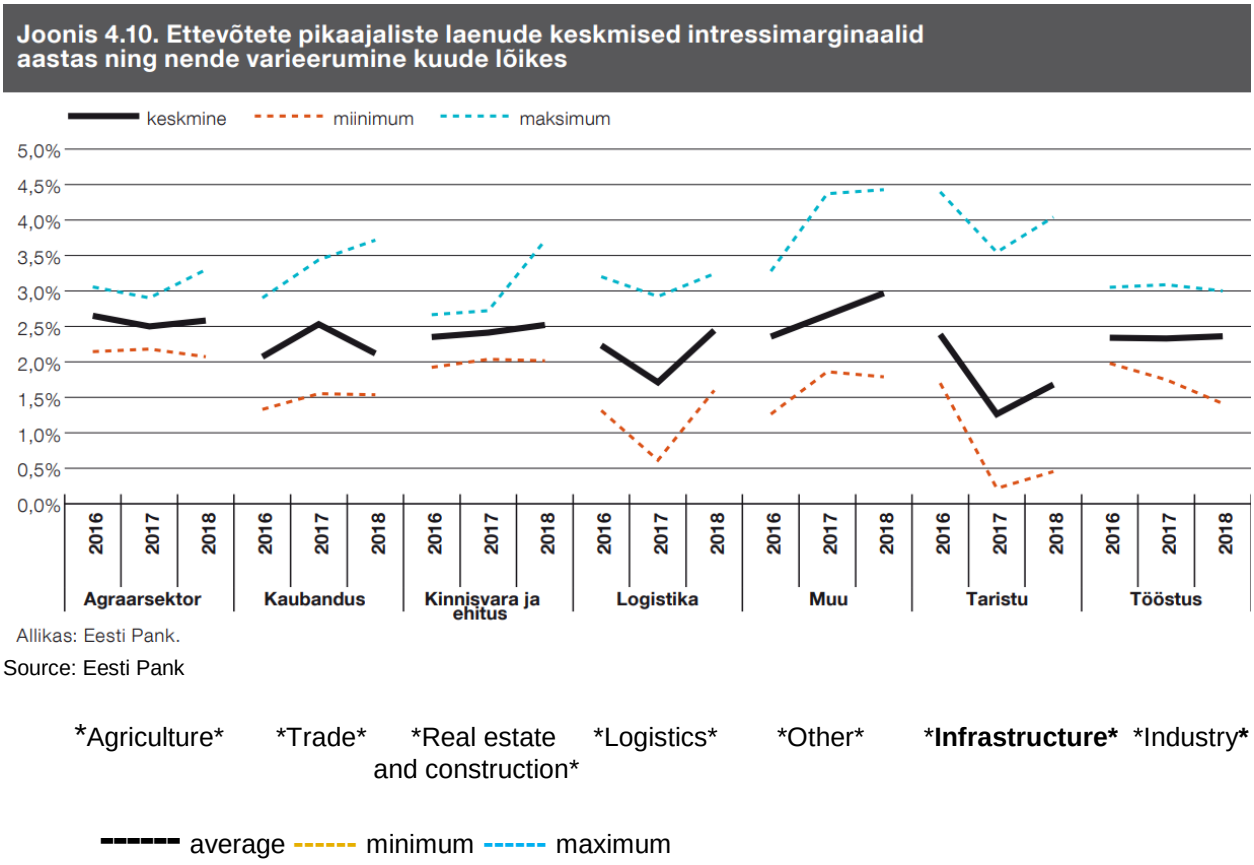

Figure 4.10 Average annual interest margins of long-term corporate loans and their variations across months

ANNEX 3. An excerpt from Eesti Pank's publication *Financial Policy and Economy 3/2019*, page 13-14 (*https://www.eestipank.ee/publikatsioon/rahapoliitika-ja-majandus/2019/rahapoliitika-ja-majandus-32019*)

"... Nearly half the investment growth of undertakings in the second quarter came from investments into buildings and facilities. The growth was contributed to by almost all fields of activity, mostly industry, energy and trade sectors. The loan interest rates of undertakings are higher and the loan environment as estimated by the undertakings themselves is less favourable than a year ago (see Figure 18). Yet, the funding options of undertakings can still be considered rather good. The decrease of competition has primarily increased the costs of loans but the access to bank loans remains good, which is also reflected in the relatively fast loan growth. Moreover, the real interest rate of more favourable corporate loans is still negative because the base interest rate is very low. Besides banks, other domestic loan providers are becoming more active, but their share in the funding of undertakings is still modest. Additionally, loans taken from abroad have shown a growth trend in 2019. The debt growth of undertakings has quickened, reflecting also the increase of loan demand resulting from investments. ..."

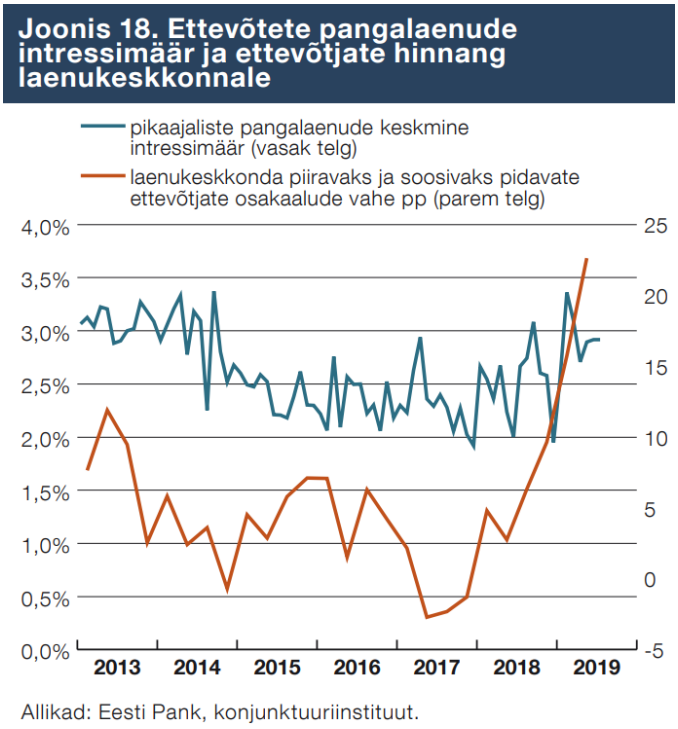

Figure 18. The interest rate of corporate loans and the undertaking's assessment of the loan environment

- the average interest rate of long-term bank loans (left axis)
- the difference between the weights of undertakings considering the loan environment restrictive or favourable, pp (right axis)

Sources: Eesti Pank, Estonian Institute of Economic Research

ANNEX 4. An excerpt from Eesti Pank's publication *Financial Policy and Economy 3/2019*, page 9

(*https://www.eestipank.ee/publikatsioon/rahapoliitika-ja-majandus/2019/rahapoliitika-ja-majandus-32019*)

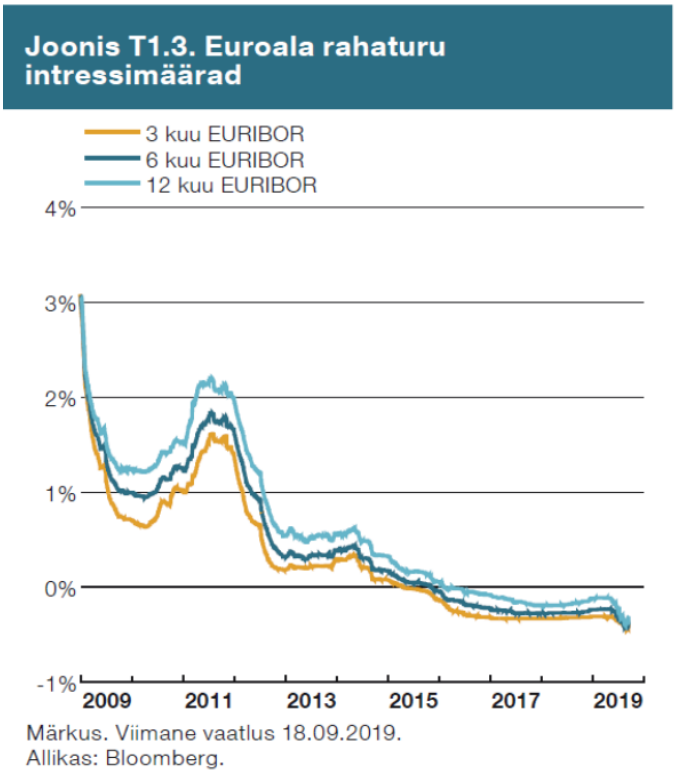

Figure T1.3. The interest rates of euro zone's money market

3 month EURIBOR

6 month EURIBOR

12 month EURIBOR

Note: Last observed on 18 September 2019

Source: Bloomberg