PREMIUM FOR GUARANTEES GRANTED TO ORKUVEITA REYKJAVÍKUR

REPORT MADE FOR THE FOR THE CITY OF REYKJAVÍK

BY SUMMA RÁÐGJÖF SLF – FEBRUARY 2019

Contents

1 Introduction

This report is an update of a report that was made in February 2018 on premium for guarantees at Orkuveita Reykjavíkur. Previous reports contain more detailed descriptions of the methodology that is applied and should therefore also be taken into consideration.

1.1 About Orkuveita Reykjavíkur

Orkuveita Reykjavíkur provides electricity, geothermal water and cold water for consumption in over 20 communities, the largest being Reykjavík, the capital of Iceland. It was founded in 1999 with the merger of Rafmagnsveita Reykjavíkur (1921) and Hitaveita Reykjavíkur (1943). In 2000, Vatnsveita Reykjavíkur (1909) was merged with Orkuveita Reykjavíkur. Since 2000, several smaller district heating utilities have merged with Orkuveita Reykjavíkur. Orkuveita Reykjavíkur owns and operates geothermal plants for district heating and electricity production[1].

Orkuveita Reykjavíkur is owned by the City of Reykjavík (93.5%), Akranesbær (5.5%) and Borgarbyggð (1%) that guarantee some of its loans. The subject of this report is to estimate an appropriate guarantee premium that OR should pay its guarantors in turn for the guarantees. This is done in order to eliminate the advantage OR enjoys due to the guarantees. The analysis is twofold as the premium is estimated separately for 1) the loans of OR that have been granted to finance power plants and related structures and 2) for other loans of OR that are within the public sector, such as district heating networks, cold water networks, electricity grid for conventional customers, sewage systems etc. and for general financing needs. Orkuveita Reykjavíkur has also obtained loans from its owners as well as loan without guarantee from the owners.

Orkuveita Reykjavíkur will be referred to as OR in this report.

1.2 EFTA Surveillance Authority Decision

On the 8th of July 2009 the EFTA Surveillance Authority (ESA) issued Decision No: 302/09/COL[2] *to propose appropriate measures with regard to state aid granted to Landsvirkjun and Orkuveita Reykjavíkur*. As detailed in the decision, it is a result of a complaint that was lodged with ESA in 2002 alleging that Landsvirkjun received state-aid as defined in the EEA Agreement. In 2004 the Authority extended the scope to cover all publicly owned electricity undertakings active in Iceland, including OR. The final decision was a product of a process that involved information gathering, reviews and correspondence between stakeholders.

In the context of this report the views of ESA regarding the premium associated with credit guarantees are most relevant, e.g. (p. 5):

> *The state guarantee in favour of the undertakings addressed in this decision constitutes an advantage within the meaning of the state aid rules. The security which a state guarantee represents improves the creditworthiness of the companies, thereby enabling the undertakings in question to obtain a more favourable credit rating. This in turn entails that the undertakings benefit from more favourable funding terms than they otherwise would have obtained.*
>
> *As mentioned above, the State carries the risk associated with the guarantee. This risk should normally be counter-balanced by the payment of an appropriate premium. Where the State foregoes such a premium, there is not only a drain on the resources of the State but also a benefit*

[1] For further information on Orkuveita Reykjavíkur see the website of the company http://www.or.is/English/. Websites that are referenced in this report were accessed in December 2012 and the links provided may become obsolete or the information that the websites contain change.

[2] See http://www.eftasurv.int/fieldsofwork/fieldstateaid/stateaidregistry/sadecice09/302_09_col.pdf.

> *for the undertaking, which puts up with less costs than it would have carried in the normal course of business.*
>
> *Even if no payments are ever made by the State under a guarantee, there is nevertheless state aid within the meaning of Article 61(1) of the EEA Agreement. This is because the aid is granted at the moment when the guarantee is given, and not the moment at which the guarantee is invoked or payments are made under its terms.*

Article 1 of the decision further states (p. 9):

> *... the Authority proposes that the Icelandic authorities shall take any legislative, administrative and other measures necessary to eliminate any incompatible aid resulting from the unlimited state guarantees granted to Landsvirkjun and Orkuveita Reykjavíkur. Any such aid measures should be abolished with effect from 1 January 2010.*

1.3 Current premium, funding and guarantees in light of the decision

As stated in Article 1 of Act 139/2001 the owners of OR guarantee all its debt in proportion to their ownership[3]. Previously, the guarantee premium was fixed at 25bp but in order to comply with ESA ruling the laws changed and in the fall of 2009 an independent consultant estimated the premium at 48bp[4]. Additionally the terms regarding the guarantee were changed such that the owners will only guarantee up to 80% of the financing of any new project. However, these changes only became effective after the laws came into effect on January 1st 2011 and do not change the guarantee for older loans in any way. Furthermore, the guarantee provided by the owners is a guarantee of collection, which means that it will only become effective after reasonable collection efforts have been pursued. The premium was last revaluated by an independent consultant in February 2018. The premium for power plants was estimated 58bp, premium for other loans 91bp and premium for all loans with guarantee from owners was estimated 74bp[5].

Nonetheless, it is clear that current funding will continue to benefit from the guarantee that was effective when the loans were issued. According to the rules of the Agreement on the European Economic Area (EEA) on state-aid guarantees[6] it is admissible to provide state-aid guarantee to companies. However, the benefitting companies must pay an appropriate premium for such a guarantee. The price for the state-aid guarantee should be reflected by the difference between the lending spread of a company with – and one without – the state guarantee.

Therefore, in order to *eliminate any incompatible aid* and comply with the EEA agreement it is necessary that OR pays a premium that is equivalent to the difference in the interest rates obtained with and without state-aid guarantee to its owners, in proportion to the equity stake they hold, as a compensation for the guarantee. Summa, an independent consultant, was contracted to evaluate what premium is in line with market prices and to compare it to the current premium. The evaluation is to be based on present borrowings that OR has acquired in the domestic and international markets during the last years. Summa received data from OR regarding the loans but did not independently verify the data.

Furthermore, the estimation is based on the ESA guidelines regarding *State Aid Guidelines*[7] that are frequently referenced in this report.

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3 See legislation regarding OR, http://www.althingi.is/lagas/nuna/2001139.html (in Icelandic).

4 http://www.althingi.is/altext/139/s/0222.html

5 Premium for guarantees granted to Orkuveita Reykjavíkur, February 2018, Summa Ráðgjöf slf.

6 See Chapter 2, Articles 61-63 in the EEA agreement, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=OJ:L:1994:001:FULL&from=DE.

7 See http://www.eftasurv.int/state-aid/legal-framework/state-aid-guidelines/ *State guarantees* in particular, which is the first document under Part V *Specific aid instruments*.

1.4 Applicability of guarantee premium to loans from guarantors

Regarding the subordinated loans, from the point of view of the guarantor the guarantees on those same loans are definitely worthless and they therefore do not play a part in the pricing of the subordinated loan. According to informal communication with representatives of the owners the terms of the loans reflected the fact that there was no effective guarantee. In the view of Summa Ráðgjöf it would therefore be counterintuitive to collect guarantee premium for the subordinated loans but it remains a legal question. Furthermore, Summa Ráðgjöf understands that the Ministry of Finance and ESA have been in correspondence regarding these loans. In the light of this, Summa will not estimate an appropriate premium for these loans unless given further information and/or directions.

1.5 Self-financing condition

Calculating and applying an appropriate premium is not the only condition that guarantee scheme must meet. In order to be admissible the premium that is paid for the guarantee needs to meet the self-financing condition criteria as laid out in the ESA guidelines[8]. The self-financing condition entails that the premiums collected from OR must be high enough to compensate for the scheme, i.e. it must be an economically viable decision to grant these guarantees.

1.6 Structure of the report

This report is an update of a report that was written in February 2018. For discussion on the foundation and methodology employed reference is made to chapter 2 in previous report[9]. For discussion on stand-alone and relative rating and calculation of spread for the loans reference is made to chapter 5 and 6 respectively in previous report[10].

In chapter 2 of current report data on loans is analysed, in terms of timing, purpose and composition. In this report a new chapter 2.2 is added on a new loan from EIB to OR. In chapter 3 the relative spread is applied to the current loans of OR. The self-financing condition is estimated in chapter 4 and finally in chapter 5 the results are presented.

[8] See paragraph 3.4(d) of *State guarantees.*

[9] Premium for guarantees granted to Orkuveita Reykjavíkur, January 2013, Summa ehf.

[10] Premium for guarantees granted to Orkuveita Reykjavíkur, January 2013, Summa ehf.

2 Data on loans

OR provided data for the 91 relevant bonds and loans that the company has borrowed in the domestic and international markets and were still outstanding at the end of December 2018. The main characteristics of the loans are shown in figure 1. The loans date as far back as year-end 2001 and will mature during the next 28 years.

Most of the funding is in foreign currencies, thereof 24% of the loans are in USD and the rest of the foreign currency loans are mainly in EUR and CHF. Around 40% are in ISK and most of them linked to the consumer price index. Most of the funding has floating interest rates but the rest has fixed interest rates.

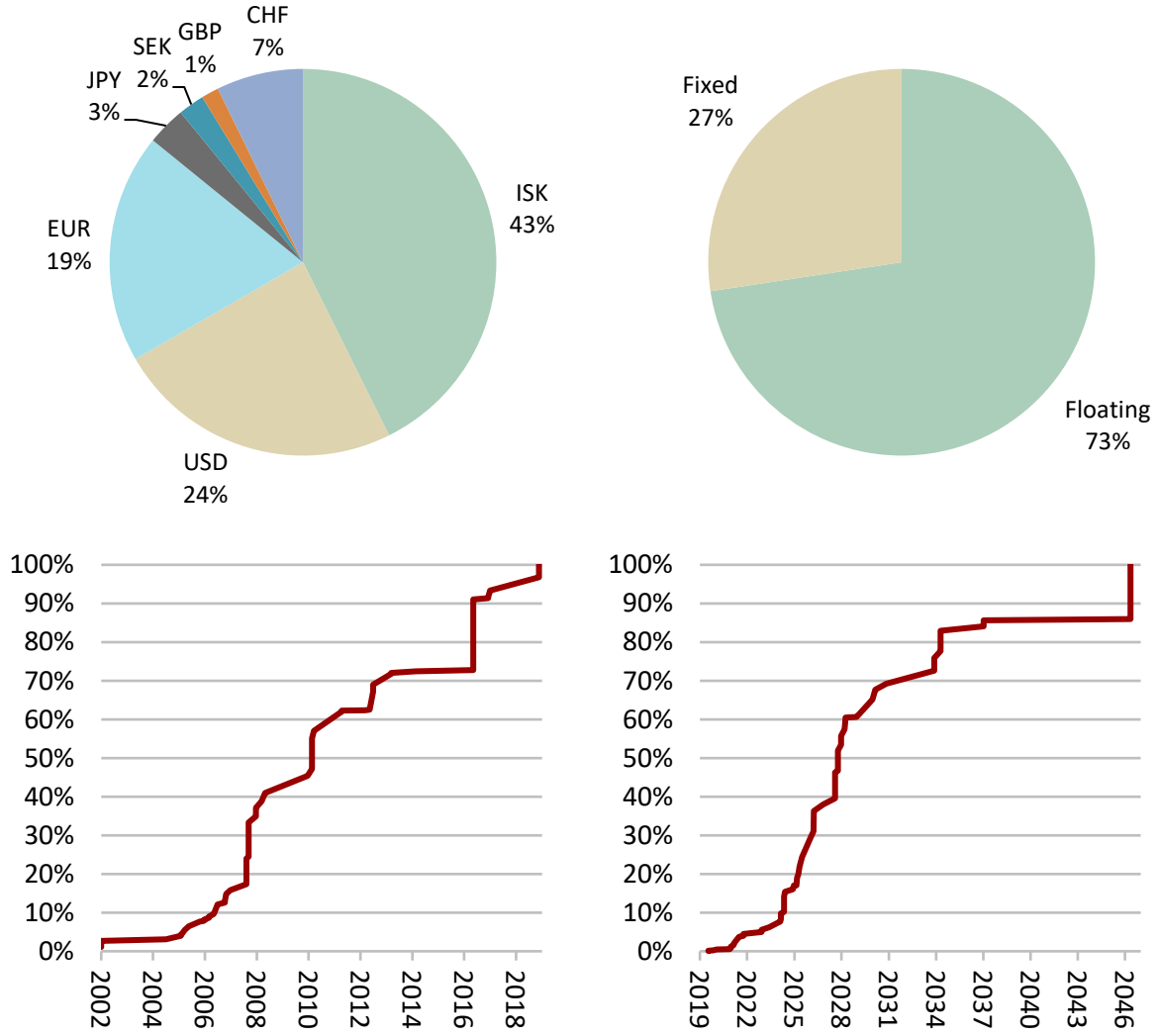

Figure 1 Attributes of outstanding loans as of December 31st, 2018. By currency (top left). By type of interest rates (top right). Cumulative outstanding of loans by date of issue in percentages (bottom left). Cumulative outstanding of loans by maturity in percentages (bottom right).

2.1 Timing of loans

In some instances loan agreements are signed some time before the loans are paid out. This is for example best practice when constructing power plants. Before the construction starts the whole financing is secured and paid out as phases are finished and new stages in the construction are started. The same applies to committed loan facilities; the terms may be agreed way ahead of withdrawals. In this sense Summa has looked toward the signing

of initial loan agreement rather than the timing of the distribution of funds, withdrawals from committed lines or insignificant changes of loan terms.

2.2 New loan from EIB to OR

In this chapter an appropriate guarantee premium for a new loan with guarantee from the owners of OR is estimated.

On December 14th, 2016 OR entered into a new loan agreement with the European Investment Bank (EIB). The terms of the loan were decided when the loan agreement was signed. The rates are benchmarked with Euribor interest rate with an additional spread that is applied to the benchmark rate. The duration of the loan is approximately 8 years according to OR[11]. The loan was drawn on November 19th, 2018.

One of the key considerations to estimate the guarantee premium is the Moody's rating of OR, with and without guarantee from owners. Moody's issued a rating action on OR in September 2016, stating:

"The company's Ba2 rating incorporates one notch of uplift for potential extraordinary support to the company's baseline credit assessment (BCA, a measure of standalone credit strength) of ba3. This recognises that despite the very strong incentives of the owners to provide timely financial support to OR its ability to do so in potential stress case scenarios may be constrained, given OR's very significant debt burden relative to the financial resources of its shareholders."[12]

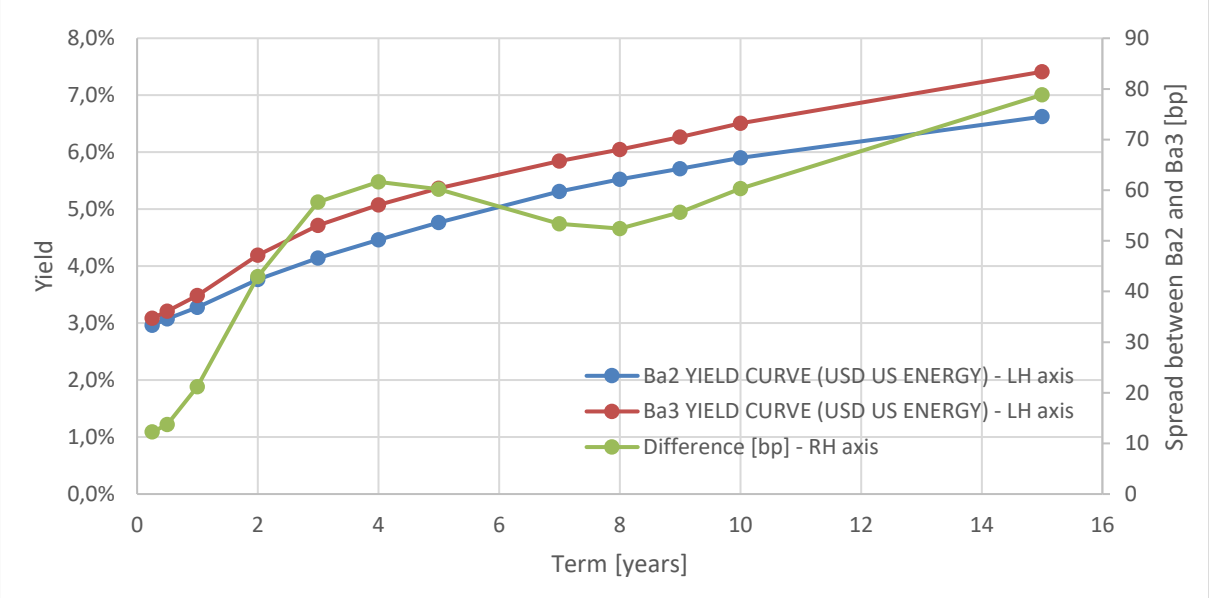

Figure 2: Yield curves for energy companies rated Ba2 (blue) and Ba3 (red) in USD on December 14th 2016, left hand axis. The green line shows the difference between the two yield curves in bp, right hand axis. Data is obtained from Bloomberg.

Moody's upgraded OR rating to Ba2 with stable outlook. According to Moody's, OR gets one notch uplift from Ba3 to Ba2 because of the extraordinary support from OR's owners (City of Reykjavik, Municipality of Akranes

[11] Information by e-mail from Gísli B. Björnsson, OR Treasury, based on Macaulay duration

[12] Moody's Investors Services, September 2016.

and Municipality of Borgarbyggð). With this one notch uplift OR gets better loan terms with guarantee from its owners than it would get without guarantee from the owners.

Bloomberg issue's yield curves for the energy sector in USD. Figure 2 shows the yield curves for Ba2 rated energy companies and for Ba3 rated energy companies. The difference between these two yield curves is the guarantee premium uplift (spread) that OR gets from the guarantee of its owners.

For the duration of 8 years the one notch of uplift due to extraordinary support of the owners, is estimated to be 52bp. This spread is applied in the calculations below for the new loan. For other loans taken prior to 2016 the appropriate guarantee premium from previous analysis is shown in Figure 4.

2.3 Purpose of Loans

Along with the loan attributes the purpose of the loans were listed in the data received from OR. The total amount of the loans was 139.9 bn ISK at the end of December 2018. Thereof 53.2 bn ISK or 38.1% were labelled as power plant financing, 45.7 bn ISK or 32.7% were categorized as being for other needs. Loans from owners were 11.7 bn ISK or 8,3% and loans without guarantee from owners amounted to 29.3 bn ISK or 20.9% of loans. Loans with guarantees from owners are, 98,9 bn ISK or 70,8% of all loans and loans without guarantee from owners are 41,0 bn ISK or 29,2%. As previously discussed the subordinated loans from owners and loans without guarantee from owners are omitted from the analysis in this report.

Figure 3 illustrates the division according to the purpose of the loans as well as distribution along issue dates across half-year intervals.

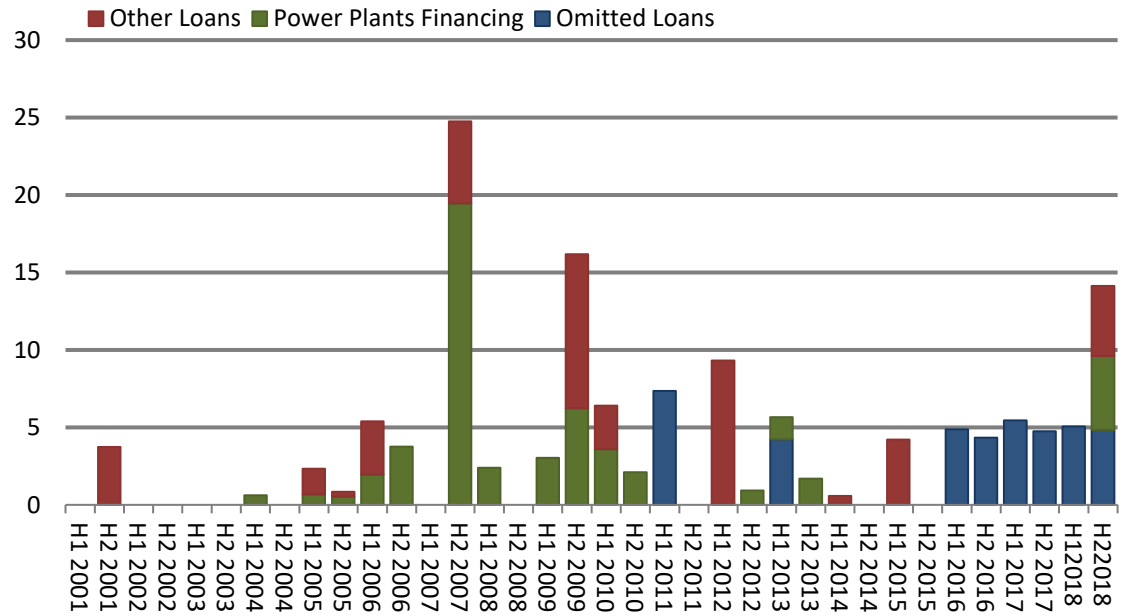

Figure 3 Distribution of loans in bn ISK as of December 31st, 2018 by distributed by issue date across half-year intervals. Red part of columns indicates power plant financing and green shows loans for other purposes. The blue column shows the loans from the owners that are not included in this analysis.

As it usually takes a few days to prepare loan documentation after negotiation the average difference for the month prior or to the signature date is applied to each loan. The results are robust in this regard and the changes

from using the spread on the exact date are small. The resulting curve for the spread that estimates the appropriate premium from the analysis is shown in Figure 4.

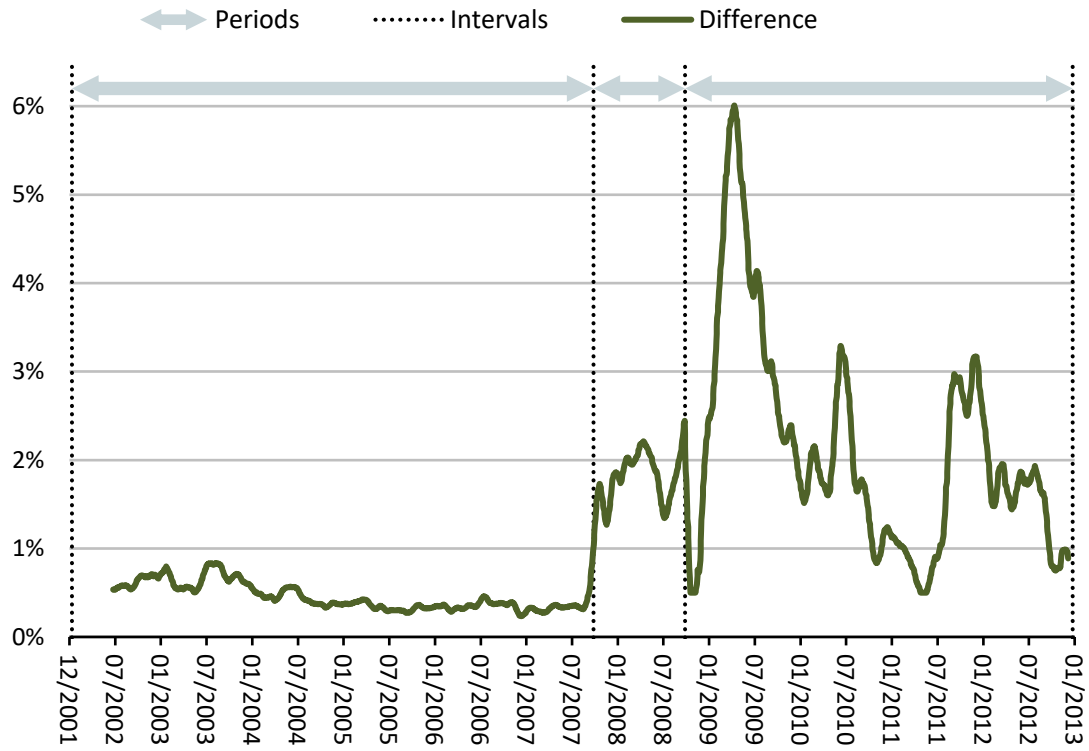

Figure 4 Spread difference between OR and the City of Reykjavík according to the model. Three periods and intervals are also indicated as before.

The spread difference was in the range 0.4% to 0.8% during 2002 to 2004. This was followed by a benign period where the spread difference was at historical low in the range 0.25% to 0.50% from 2004 to 2007. During the transition period the spread was close to 2%. Post collapse the spread drops very low but then rises sharply. This is the result from the large and sometimes contradictory swings in the credit markets during those days. With regard to the loans of OR these swings immediately following the events in September and October 2008 are not important as no new loan agreements were signed in second half of 2008 or first half of 2009. Less than 2% of the loans were issued at the very end of 2001 or the beginning 2002. For these loans a premium of 0.5% is used, which is close to the first calculated spread that was effective a few months later.

When the historic spread has been calculated it can be applied to each and every loan according to the date of origination. The calculation of the average spread is based on the weighted average spread of the remaining principal of the loans:

$$\bar{S} = \frac{\sum_{i=1}^{N}(S_i^c - S_i^s)P_i}{\sum_{i=1}^{N} P_i}$$

Where $\bar{S}$ is the average spread difference between the corporate and the sovereign borrowings, S_i^c is the credit spread for corporate borrowing *i*, S_i^s is the credit spread for sovereign borrowing *i* and P_i is the remaining principal of borrowing *i* and *N* is the number of loans.

Table 1 below summarizes the findings. The spread is calculated for the total loan mass, as well as total loan mass excluding the loans from owners. Furthermore, the spread is calculated for three sub-portfolios as previously discussed and indicated in the table.

Type of loan	Amount [bn ISK]	Premium [bp]
All loans	98,9	73
Sub-portfolio – *Power Plants*	53,2	60
Sub-portfolio – *Other Loans*	45,7	89

Table 1 Results for estimated premium for different portfolios.

On average the premium for all loans should be 73 bp, which excludes subordinated loans from owners in 2011 to 2013 as previously discussed and loans without guarantee from the owners.

Regarding the sub-portfolios the premium for loans for power plants is 60 bp premium of other loans are 89 bp. The difference in premium for power plants and for other loans is due to different timing of the loans. As evident from the model there have been large swings in the premium lately and OR has sought loans in recent times for general purposes but has not to the same degree financed power plants with new loan commitments.

3 Self-financing condition

3.1 The self-financing condition

Up until here, this report has focused on estimating an appropriate premium for the loans of OR, i.e. a premium that eliminates the competitive advantage of OR due to the guarantee. However, this is not the only condition that the premium that the government collects needs to meet as the scheme also needs to be self-financing. The self-financing condition entails that the premiums collected from OR must be high enough to compensate for the scheme, i.e. it must be an economically viable decision to grant these guarantees.

The subject of this part of the report is to estimate the minimum compensation needed for running the scheme according to the guidelines by ESA. Section 3.4 of the ESA Guidelines on State Guarantees[13] lists conditions that need to be fulfilled in order to rule out the presence of state aid. Subsection d) of section 3.4 calls for that

> *[t]he terms of the scheme are based on a realistic assessment of the risk so that the premiums paid by the beneficiaries make it, in all probability, self-financing. The self-financing nature of the scheme and the proper risk orientation are viewed by the EFTA Surveillance Authority as indications that the guarantee premiums charged under the scheme are in line with market prices.*

Sub-section f) gives further information regarding calculation methods:

> *In order to be viewed as being in line with market prices, the premiums charged have to cover the normal risks associated with granting the guarantee, the administrative costs of the scheme, and a yearly remuneration of an adequate capital, even if the latter is not at all or only partially constituted.*
>
> *As regards administrative costs, these should include at least the specific initial risk assessment as well as the risk monitoring and risk management costs linked to the granting and administration of the guarantee.*
>
> *As regards the remuneration of the capital, the EFTA Surveillance Authority observes that usual guarantors are subject to capital requirement rules […]. State guarantee schemes are normally not subject to these rules and thus do not need to constitute such reserves. […] In order to avoid this disparity and to remunerate the State for the risk it is taking, the EFTA Surveillance Authority considers that the guarantee premiums have to cover the remuneration of an adequate capital.*

3.2 Methodology

In short – the self-financing condition means that premiums collected need to be at or above the sum of:

i. the price associated with the risk of granting the guarantee
ii. the administrative costs of operating the scheme
iii. remuneration of an adequate capital.

The guidelines can be interpreted as a straightforward model for the pricing of guarantees or loans at financial institutions. It consists of three basic elements that are in parallel with the list above.

[13] See http://www.eftasurv.int/state-aid/legal-framework/state-aid-guidelines/ for the State aid guidelines and page 10 of *State guarantees* for the quoted text, which is the first document under Part V *Specific aid instruments*.

1. Expected Loss (EL)

Expected loss is the credit loss that is expected to take place on average, usually over a period of one year. It is a direct estimate of the risk associated with the guarantee. It is most often expressed in the terms of *Probability of Default* (PD), *Loss Given Default* (LGD) and *Exposure at Default* (EAD)[14].

The PD is the likelihood of a default event of the obligor over some horizon, usually a year. The LGD is the loss suffered by the grantor of the loan or guarantee in the case of a default, expressed in percentage of the outstanding loan or guarantee. The EAD is the relevant exposure at the time of default to which LGD should be applied.[15]

Having established these three quantities the EL is calculated as follows:

$$EL = PD \cdot LGD \cdot EAD$$

2. Cost (C)

Cost is the relevant costs incurred by the grantor due to the guarantee on an annual basis.

3. Return on capital (ROC)

The financial institution is required to hold capital against the loan or guarantee due to unexpected loss and will furthermore be required by investors to show return on this capital. The ROC is linked to the necessary spread increase on the loan, referred to here as the risk premium (RP), through the capital binding of the loan. Under normal circumstances RP varies according to the risk associated with the loan, i.e. higher the risk – the higher the risk premium. If the capital binding associated with loan is 8% then:

$$RP = 8\% \cdot ROC$$

Added together these three elements give a simple formula for a relevant minimum price (P) of a guarantee:

$$P = EL + C + RP$$

As said before, the guidelines align with above formula and the methodology in this report follows it. The three parts of the equation will be estimated separately and then added together and compared to the premium established previously.

3.3 Determination of Expected Loss

Loss Given Default

In the absence of further information, it is standard practice within financial markets to assume that recovery is 40%, i.e. LGD is 60%. This is for example true about pricing of CDS's, CDO's and most other credit related derivatives. In some sense, this market convention is a choice of convenience. It is the expected loss that is important and as LGD is inseparable from PD in quoted market prices it can be convenient to translate all changes in market prices of said derivatives to implied changes in PD, rather than some mixture of PD and LGD.

[14] The references for this kind of setup around expected loss are numerous. The most extensive documentation is the Basel II framework, the calculations of PD, EAD and LGD are at the heart of credit modelling under the framework, see www.bis.org for further information.

[15] In the context of this report EAD is assumed to be 100% as total loans are not assumed to change significantly in the course of one year.

By international conventions, OR would be categorized as belonging to the utilities sector. Generally, the utility sector consists of privately and publicly owned establishments that generate, transmit, distribute, or sell resources such as electricity, gas, hot and cold water etc.

At first notion a 40% recovery rate seems very low for a utilities company, which is built into the infra-structure, with producing power plants, long term contracts and a steady cash-flow. This perception is confirmed by studies on recovery rates. Such studies are not numerous but the earliest study found that addresses the subject was published by *Altman and Kishore* in 1996[16]. In their sector specific study the authors found that the creditors of defaulted public utility companies do fare better than other creditors during default. They show that the average recovery rate is around 70.5% and median recovery rate 79.1% for the 56 default observations within the public utility sector they had in their data set. This is both the highest recovery observed within any sector and the lowest variance within any sector, i.e. the recoveries are high and stable compared to other sectors.

In a more recent study from *Acharyaa, Bharathb and Srinivasan* from 2007[17] the older results are confirmed:

> *Consistent with the evidence of Altman and Kishore (1996) […] we find recoveries are the highest for the Utility sector. The mean (median) recovery at emergence is 74.49 (76.94). These levels are statistically different from mean recoveries for other industries*

In a study performed by Moody's in 2007[18], the recovery rate in the utility sector is estimated to be around 85%. The study is based on 3500 loans and bonds of over 720 non-financial corporate default events during the years 1987 to 2006. This study is based on more recent data and larger data set than the two studies mentioned earlier.

Based on these studies and referencing the median and mean recovery rate in the more recent study it is concluded that using recovery rate of 85% which corresponds to LGD of 15% is a fair assessment for OR.

Default Probability

Previously in this report, the appropriate guarantee premium was found using ratings or shadow-ratings for the guarantor and OR. To estimate the appropriate PD it is most straightforward to use default studies by the credit rating agencies that link the credit ratings to default probabilities.

Recently, the three major credit rating agencies, *Moody's*[19], *Standard and Poor's*[20] and *Fitch*[21], have all issued updated historical overviews of credit defaults. The studies are directly applicable as – along with other results – they use the commonly quoted letter grading and link it to observed defaults. The observation periods end in 2010.

Figure 5 shows the results from the three large rating agencies along with the best exponential fit through the available data. The observation periods in all cases include 2010 and look back 20 to 30 years. The data set therefore include the recent tumultuous times when relatively several companies with good ratings have gone bankrupt. In that sense it is conservative to favour these recent findings rather than looking up older or longer

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16 Altman, E.I., Kishore, V.M., 1996. *Almost everything you wanted to know about recoveries on defaulted bonds.* Financial Analysts Journal November/December 57–64.

17 Acharyaa, V.V., Bharathb, S.T., Srinivasan A., 2007. *Does industry-wide distress affect defaulted firms? Evidence from creditor recoveries.* Journal of Financial Economics, Vol. 85, Issue 3, September 2007, Pages 787-821.

18 Moody's Ultimate Recovery Database, April 2007, Page 9.

19 Moody's Investors Service. Corporate Default and Recovery Rates, 1920-2010. February 2011. Default data taken from exhibit 30: Average One-Year Alphanumeric Rating Migration Rates, 1983-2010.

20 Standard & Poor's. Default, Transition, and Recovery: 2010 Annual Global Corporate Default Study And Rating Transitions. March 2011. Default data taken from table 23: Average One-Year Transition Rates For Global Corporates By Rating Modifier (1981-2010).

21 Fitch Ratings Global Corporate Finance 2010 Transition and Default Study. March 2011. Data taken from table in appendix: Fitch Global Corporate Finance Transition Rates: 1990–2010.

periods. Moreover, it is considered to be a cautious choice to select the best fit as representative for the default probabilities at each grade.

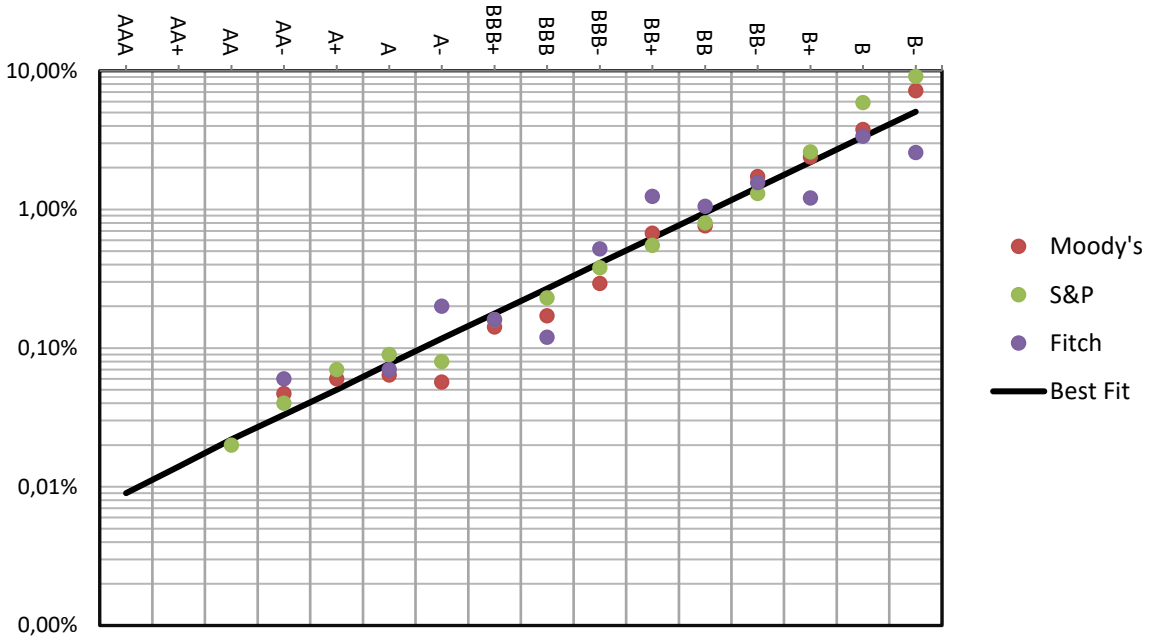

Figure 5 The horizontal axis shows grades according to the Moody's scale. The vertical axis shows one year default probabilities on a logarithmic scale. The red, green and purple dots show default probabilities according to Moody's, S&P and Fitch according to grade, respectively. The black line shows the best fit through the points. While calculating the best fit missing values are not used.

As commonly observed with default probabilities and rating schemes of some sort the default probabilities are close to being exponentially related to the grades, i.e. are close to a line on a logarithmic scale.

The table below shows the default probabilities for each of the providers and the average for available data points at each grade, but the average is used in subsequent calculations.

Grade	Moody's	S&P	Fitch	Best fit
AAA				*0,009%*
Aa1				*0,014%*
Aa2		0,020%		*0,022%*
Aa3	0,047%	0,040%	0,070%	*0,033%*
A1	0,060%	0,070%		*0,050%*
A2	0,064%	0,090%	0,070%	*0,077%*
A3	0,057%	0,080%	0,210%	*0,117%*
Baa1	0,142%	0,160%	0,170%	*0,177%*
Baa2	0,171%	0,230%	0,130%	*0,269%*
Baa3	0,292%	0,380%	0,550%	*0,410%*
Ba1	0,674%	0,550%	1,360%	*0,623%*
Ba2	0,760%	0,800%	1,150%	*0,947%*
Ba3	1,729%	1,300%	1,740%	*1,440%*
B1	2,381%	2,600%	1,310%	*2,189%*
B2	3,775%	5,880%	3,710%	*3,329%*
B3	7,158%	9,120%	2,800%	*5,061%*

Table 2 Default probabilities according to grade. The table shows the default probabilities according to letter grade in the referenced studies and the best fit through available data. Empty cells indicate no or inadmissible data points and are not used while calculating the best fit.

3.4 Risk Premium

According to the guidelines on state charges from the EFTA guidelines the risk premium is straightforward to calculate. The capital binding is considered to be 8% but for entities with high ratings there is a discount, from A3 to A1 the ratio is 4% and from Aa3 to AAA 2% is required. The relevant return on equity is 400 bp.

The Risk Premium is consequently 8 bp, 16 bp and 32 bp for capital binding ratio of 2%, 4% and 8% respectively.

3.5 Cost

Cost is different from Expected Loss and Risk Premium as it cannot be directly estimated in basis points. Rather it has to be estimated in real terms and then converted to basis points using the outstanding remaining principal of the loan guarantees. The cost is twofold:

1. Assessment of the appropriate loan guarantee cost

   The cost of an annual estimate is estimated to be 1 mn ISK, which is conservative in the sense that this should cover the cost.

2. Administration and other cost

   According to information from the City of Reykjavík the cost is approximately 2 mn ISK for overseeing the guarantee scheme on their behalf.

3.6 Minimum Guarantee Premium

Apart from the cost, the model that has been built here is specific down to a credit grade – up to here nothing has been assumed regarding the loans to OR.

By applying the model to the distribution of remaining principal of loans over ratings that prevailed at the date of issue according to the model presented in the previous chapters the results are found in a straightforward way. Table 3 shows these distributions for loans along with calculations of expected loss and risk premium for each grade as outlined before.

	Risk Premium			Expected Loss				Main Results	Weights diff. porf.	
Grade	CR	ROC	RP	DP	LGD	EL	RP+EL	All loans	Power Plants	Other
AAA	2%	400 bp	8 bp	0,009%	15%		8,0 bp	–	–	–
AA+	2%	400 bp	8 bp	0,014%	15%		8,0 bp	–	–	–
AA	2%	400 bp	8 bp	0,02%	15%	0,3 bp	8,3 bp	–	–	–
AA-	2%	400 bp	8 bp	0,03%	15%	0,5 bp	8,5 bp	–	–	–
A+	4%	400 bp	16 bp	0,05%	15%	0,8 bp	16,8 bp	–	–	–
A	4%	400 bp	16 bp	0,08%	15%	1,2 bp	17,2 bp	–	–	–
A-	4%	400 bp	16 bp	0,12%	15%	1,8 bp	17,8 bp	–	–	–
BBB+	8%	400 bp	32 bp	0,18%	15%	2,7 bp	34,7 bp	–	–	–
BBB	8%	400 bp	32 bp	0,27%	15%	4,0 bp	36,0 bp	–	–	–
BBB-	8%	400 bp	32 bp	0,41%	15%	6,2 bp	38,2 bp	47,2%	68,0%	22,9%
BB+	8%	400 bp	32 bp	0,62%	15%	9,3 bp	41,3 bp	–	–	–
BB	8%	400 bp	32 bp	0,95%	15%	14,2 bp	46,2 bp	9,4%	9,0%	9,9%
BB-	8%	400 bp	32 bp	1,44%	15%	21,6 bp	53,6 bp	10,7%	4,5%	17,9%
B+	8%	400 bp	32 bp	2,19%	15%	32,8 bp	64,8 bp	–	–	–
B	8%	400 bp	32 bp	3,33%	15%	49,9 bp	81,9 bp	–	–	–
B-	8%	400 bp	32 bp	5,06%	15%	75,9 bp	107,9 bp	32,7%	18,5%	49,3%
							Self-financing without cost:	63,4 bp	52,5 bp	76,1 bp
							Total loans [bn ISK]:	98,9	53,2	45,7
							Total cost [mn ISK]:	3,0	1,5	1,5
							Basis points due to cost:	0,3 bp	0,3 bp	0,3 bp
							Self-financing:	63,7 bp	52,8 bp	76,5 bp

Table 3 The table shows the Capital Requirement (CR), the required Return on Capital (ROC) along with resulting Risk Premium (RP) for each grade. Also shown is the estimated Default Probability (DP), Loss Given Default (LGD) and the resulting Expected Loss (EL) for each grade. Finally, the distribution of loans of OR across grades is shown as further explained in the text.

As is to be expected, both the Risk Premium and expected loss increase with lower grades, but the latter much more rapidly. Regarding the distribution, the loans are concentrated in the BBB- with around 47% of the loan mass and corresponding to the *stable period* as previously defined. The rest is distributed in grades BB about 9,4%, BB- about 11% and B- around 33% that correspond to the *transition period* and in the *post collapse.*

To arrive at a single value for the estimates of a minimum appropriate premium a weighted average of the quantities in the previous table must be calculated and cost estimates added as shown in the table.

4 Results

4.1 Fair premium and self-financing

Table 4 summarizes the findings in this report in 2019 and in previous report from 2018.

Type of loan – 2019	Amount [bn ISK]	Premium [bp]	Self Fin. [bp]	Difference [bp]
Main Results – 2019				
All loans	98,9	73	64	9
Sub-Portfolios – 2019				
Power Plants	53,2	60	53	7
Other Loans	45,7	89	77	12

Type of loan – 2018	Amount [bn ISK]	Premium [bp]	Self Fin. [bp]	Difference [bp]
Main Results – 2018				
All loans	101,4	74	65	9
Sub-Portfolios – 2018				
Power Plants	50,1	58	53	5
Other Loans	51,3	91	76	15

Table 4 Results for estimated premium and self-financing needs for the loan mass in whole and for different portfolios in years 2019 and 2018.

Comparing the self-financing needs of all loans shows that the self-financing condition is met. In fact, the premium is around 9bp above the required minimum. Here, as before, the loans from the owners in 2011 to 2013 are omitted as well as loans without guarantee from owners. When looking at the different sub-portfolios the condition is also met for *other loans* – the self-financing is 12bp lower. For loans to *power plants* the fair premium and the self-financing condition is met with the latter being 7bp lower.

Comparing the results in 2018 and 2019 shows that the overall premium is 1bp lower in 2019 than in 2018. The spread on the sub-portfolio power plants is 2bp higher and the spread on sub-portfolio other loans decreased by 2bp. The total loan mass that has a guarantee is reduced from 101,4 bn ISK to 98,9 bn ISK.

4.2 Conclusion

The guarantee premium for 2019 is 73bp on loan amount of 98,9 bn ISK. The guarantee premium is at similar level as in 2018, which was 74bp.

The OR loans with guarantee from owners have been decreasing over recent years. At year end 2015 the loans with guarantee from owners were 147,1 bn ISK. At year end 2016 the loans with guarantee from owners amounted to 114,8 bn ISK and at year end 2017 the guarantee from owners amounted to 101,4 bn ISK and by end of year 2018 amounted to 98,9 bn ISK. In three years, the guaranteed loan amount by owners has decreased 32,7%.

OR borrowed a new loan with guarantee from owners but in recent years OR has been borrowing without guarantee from owners, last 28 loans out of 29 have been borrowed without guarantee from owners. At year end, 2018, 70,8% of OR loan portfolio had guarantee from owners and 29,2% are without guarantee from owners.

In the view of Summa, the premiums obtained in this report are a fair assessment and meet the self-financing condition.