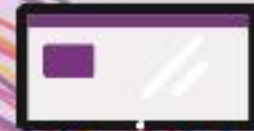




WEIGHTED AVERAGE COST OF CAPITAL



Consultation Document

23 April 2019

MCA/C/19-3557

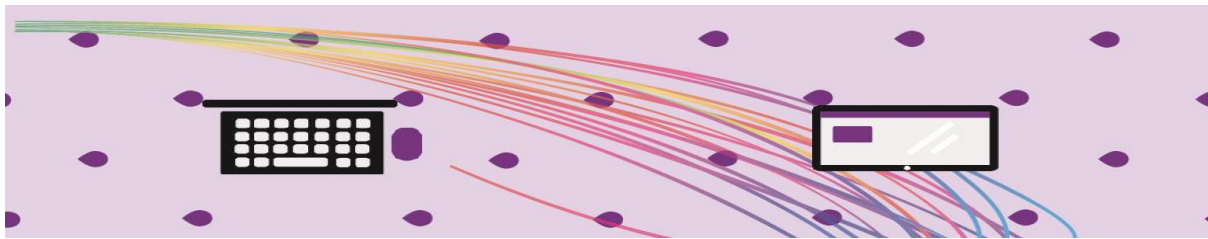
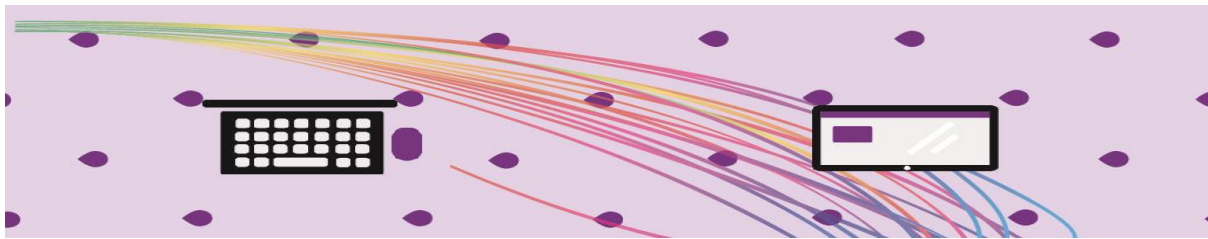


Table of Contents

1	Background.....	3
2	General Approach.....	4
2.1	Use of Capital Asset Pricing Model (CAPM).....	4
2.2	A range of WACC estimates.....	4
2.3	Price base (nominal versus real WACC).....	4
2.4	Taxation.....	5
2.5	Different variables making up the WACC calculation.....	5
2.6	Sources used for the WACC estimation.....	6
3	WACC Parameters Evaluation.....	6
3.1	The Risk Free Rate (RFR).....	6
3.2	The Equity Risk Premium (ERP).....	12
3.3	Beta.....	15
3.4	The Cost of Debt.....	22
3.5	The Gearing Ratio.....	25
4	Proposed WACC rates.....	29
5	Consultation Framework.....	31



1 Background

According to Article 13 of the Access Directive when imposing obligations relating to cost recovery and price controls, NRAs shall take into account the investment made by the operator and allow a reasonable rate of return on adequate capital employed. NRAs typically determine this return by estimating the weighted average cost of capital (referred to as 'WACC') of the SMP operator. The WACC is therefore one element of the price control obligations as it determines the maximum return that SMP operators can earn on the capital they employ to provide the regulated services.

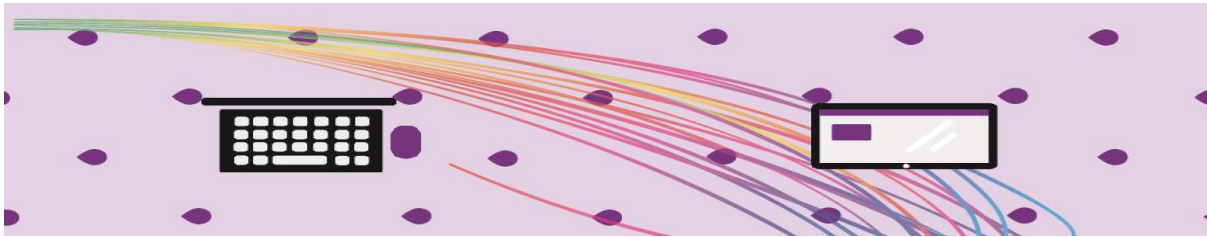
In 2018 the European Union (EU Commission) engaged the Brattle Group to evaluate the WACC methodologies adopted by the NRAs. The Brattle Group (Brattle) identified¹ that NRAs have established their own methodologies and practices for estimating the WACC. Thus the EU Commission concluded that there is a need of more consistency regarding the existing practices and eliminate as far as possible subjective differences in the WACC methodologies. Some of the parameters for the WACC calculation can be calculated by applying a single methodology or data source, so as to have a harmonized WACC rate across all Member states. Further to the Brattle study the EC is also issuing guidelines² for the NRAs to follow so that parameters are to be standardized by adopting a common methodology.

The report is structured as follows:

- Section 2 provides an outline of the general approach to WACC sources and calculation;
- Section 3 is the main section in which the various WACC components are evaluated;
- Section 4 reflects the WACC calculation and the WACC rates for the fixed and mobile market;
- Section 5 sets out the Consolation Framework.

¹ The Brattle Group – Review of approaches to estimate a reasonable rate of return for investment in telecoms network.

² Background document describing the commission services working assumptions for the determination of the WACC.



2 General Approach

2.1 Use of Capital Asset Pricing Model (CAPM)

There are a number of models that can be applied to estimate the cost of equity amongst which are the Capital Asset Pricing Model (CAPM), the Arbitrage Pricing Theory (APT) and the Fama and French three factor Model. Each of these models share the common views that all investors hold a well-diversified portfolio and that an investment is risk free only when there is certainty that the actual return will be equal to the expected return.

Despite its shortcomings, the CAPM remains the most appropriate and widely adopted model to estimate the cost of equity. This has also been concluded by the Brattle Group³ as the best approach possible.

2.2 A range of WACC estimates

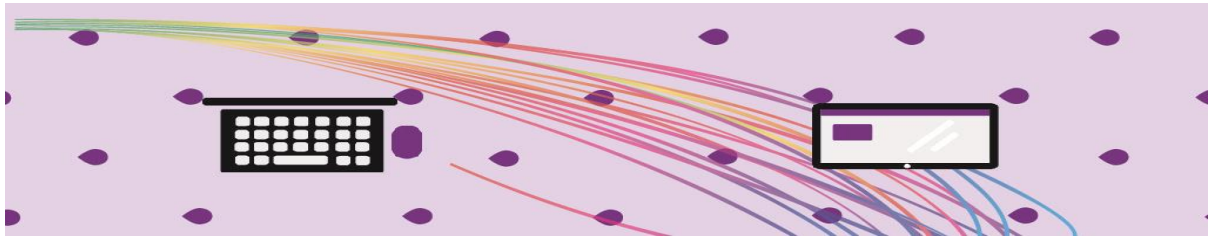
The WACC calculation is dependent on a number of estimations made for the key variables forming the cost of equity and the cost of debt. Very often it is not possible to award these key variables based on a single value, but a range of values dependant on the different assumptions considered. Therefore it is not straightforward to identify a single WACC estimate.

Based on the above, the MCA approach is that the WACC applied for regulatory purposes should be based on a defined range of parameters of the key variables and hence an average will be considered as the final WACC value.

2.3 Price base (nominal versus real WACC)

A common consideration in the WACC estimates is whether the rate of return should be expressed in real or nominal terms. A nominal WACC is one which does not take into account movements in inflation rates and is calculated in current terms, whereas real WACC is expressed in constant terms. So far, the MCA has mandated that the WACC is expressed in nominal terms.

³ The Brattle Group – Review of approaches to estimate a reasonable rate of return for investment in telecoms network.



2.4 Taxation

WACC may be estimated on either a pre- or post-tax basis. When taxation is applied to the capital base the pre-tax WACC indicates the pre-tax operating profit required to finance tax and interest payments while providing shareholders with their required return.

The typical approach is to compute the WACC on a pre-tax basis since tax liabilities are highly dependent on factors outside of normal operations, such as fixed assets base and tax planning skills. However in practice market information may only be available as post tax, implying that WACC rate would be estimated on a post-tax basis and then converted into the pre-tax WACC by applying the following formula:

$$\text{Pre-tax WACC} = \text{Post tax WACC}/(1-T)$$

where T is the effective tax rate.

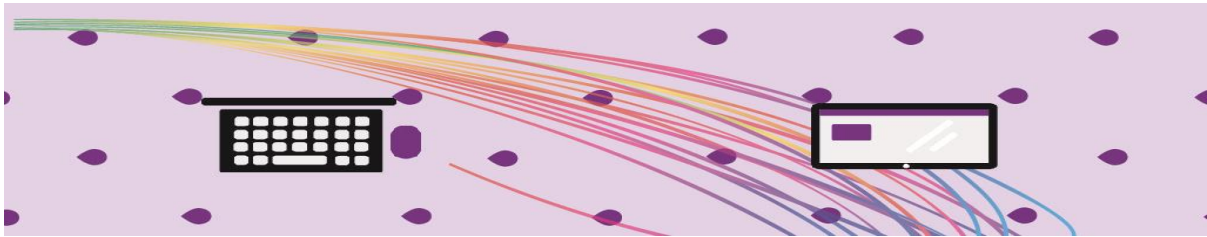
To estimate a pre-tax WACC rate a single tax rate is required, but in practice it is difficult to estimate a single effective tax rate, reflecting a company's taxation liability. Additionally, the taxation charge will inevitably vary from year to year. Furthermore, forward-looking costs do not depend on the tax rate of previous years, but on the corporate tax rate that can be expected in a forward-looking perspective.

The MCA proposed Decision on Estimating the Cost of Capital issued in 2012, applied a tax rate of 35% as a proxy for the effective tax rate. The MCA considers that applying the same tax rate is reasonable since the use of the corporate tax rate eliminates the uncertainty that emerges when attempting to estimate the effective rate.

2.5 Different variables making up the WACC calculation

The cost of capital calculation is a measure to understand the rate of return that a company is required to generate from its investment in order to raise money in the capital markets. The variables composing the cost of capital calculation using the CAPM methodology comprise the following:

- The risk free rate (RFR) is the expected return on an asset which theoretically bears no risk of default and that bears no reinvestment risk;
- Equity risk premium (ERP) represents the additional expected return that an investor demands for investing in equities rather than in a risk free investment;
- Equity/asset beta represents the premium risk of a particular company's shares being considered in relation to the stock market as a whole. It is measured as the volatility of that stock relative to the overall market volatility;
- Debt premium represents the premium by debt owners to compensate for the risk of default and;
- Gearing corresponds to the weight of the debt capital as a portion of total invested capital.



It is important to note that except for Beta and Gearing, values all other components are similar for both the mobile and the fixed market.

2.6 Sources used for the WACC estimation

As mentioned, the EU Commission commissioned Brattle to evaluate a methodology that harmonizes the WACC rate across the EU member states. Hence, the MCA based its analysis on the Brattle report, the latest BEREC⁴ report, the WACC guidelines being issued by the EU Commission and any other relevant information where necessary.

3 WACC Parameters Evaluation

3.1 The Risk Free Rate (RFR)

The risk free rate is the return which an investor can expect to gain from investments which do not carry any risk, in other words it measures the expected return on an investment free of default and systematic risk. In practice it is impossible to find an investment that is entirely risk-free, since some form of risk tends to exist but, freely traded government bonds can generally be regarded as having close to zero risk of default and liquidity. In nominal terms the yield to maturity on such bonds, which takes into account future expectations of inflation and any differences between the coupon rate of interest and the prevailing market rates, is typically regarded as a proxy for the risk free rate.

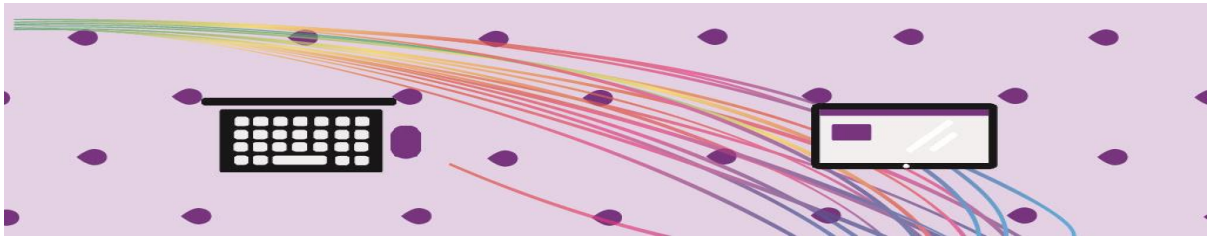
3.1.1 International Studies

3.1.1.1 Brattle report

According to the Brattle report, most NRAs determine the risk free rate by reference to the yield on traded government bonds, and this is the methodology that should be applied by most NRAS since it will compensate the SMP operator for country and regulatory risk. From their analysis, Brattle listed the below three key criteria which should be taken in consideration when determining the risk free rate;

- Which country bond should be used, where the SMP operator is located?
- The bond maturity should range from six month to a five or a twenty year bond.

⁴ BEREC Regulatory Accounting 2017 Report on WACC



- Over what period should the NRA measure yields, for example on an average yield over the last month or on the last two years?

The Brattle report stated that most NRAs estimate the risk free rate using the bond yields of their own Member States and these are referred as domestic bonds. Prior to the Eurozone debt crisis of 2008, the bond yields were very similar across EU and most of them were even risk free. However as from 2010 onwards, the situation changed since the yields have diverged significantly. This divergence mentioned by Brattle indicates the variation in the risk of default across the Eurozone, and raised questions about the validity of using the respective country bond yield to estimate the risk free rate. Brattle concluded that most Eurozone countries can use the member state bond yields to calculate the risk free rate given;

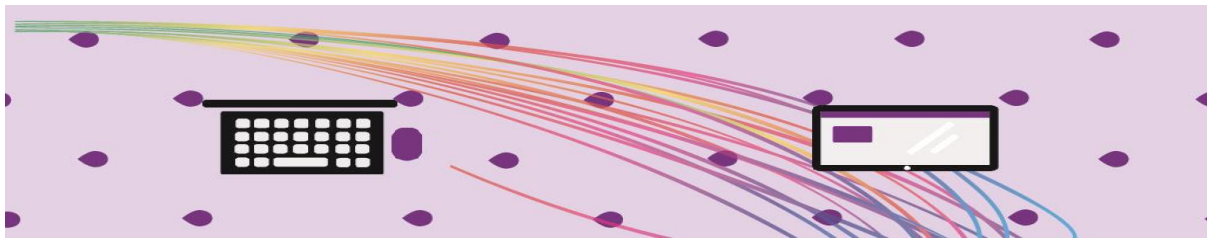
- The firms are subject to regulatory risk, which increases both business and financial risk. This risk occurs whenever changes in existing regulations or applications are perceived by the investors as jeopardizing the opportunity to earn risk compensatory returns on their investments. This risk would lead to the possibility that the firm may not actually earn the revenues as promised. A regulated firm to be able to earn a fair return on its investment has to earn more than a fair return during good time, so as to compensate for negative regulatory events during difficult times.
- The NRAs tend to compensate regulated firms through this allowed rate of return. In practice this compensation is applied by using the domestic member state bond yield to calculate the risk free rate. The latter mentioned bond yield is in fact higher than a true risk free rate thus this small difference in the risk free rate is called the country risk premium.
- The regulated firms need to be compensated for this regulatory risk, and by using the domestic bond yield they are indirectly being compensated for this country risk premium.

Brattle identified only two cases when it is not suggested to use the domestic bond yield to estimate the risk free rate. The first case scenario is if the domestic bond are not liquid. If the NRAs uses the yield on a relatively illiquid domestic bond, it would over compensate investors in the regulated firm. The second case is when the member state has a significant risk of default. In this case it is no longer reasonable to estimate the risk free rate using the domestic bond yield in doing so it will overestimate the return that the SMP operator requires because of the risk of default.

Brattle also stated that it is difficult to identify when NRAs should not use the yields of their Member states bonds to estimate the risk free rate, however the points below act as general guidelines:

- The bonds should not have a credit rating below investment grade, BAA3;
- Yields on bonds are above the yields on bonds issued by large firms operating in the country, and which earn most of their revenues in the country.

The Brattle study identified a number of factors that need to be considered when deciding the bond maturity including the following:



- Matching the bond term to the regulatory period;
- The volatility of the bond yield;
- The liquidity of the bonds for example 10 year bonds may be more liquid than 5 year bond.

Brattle emphasised that the risk free rate chosen should be consistent with the equity risk premium (ERP) used, otherwise the cost of equity will be miscalculated. This consideration means that the ERP could be calculated with respect either long term or short term bonds as long as there is consistency. They quoted Dimson, Marsh and Staunton, since these are the most commonly used source for the historical ERP and they have measured the ERP with respect to either short term six months bonds or long term around 20 years. Hence for consistency purposes to estimate the ERP it is required to apply either the short term bill or a relatively long term bond.

Brattle further considered that the long term bonds in particular the 10 year ones are the ones most common bonds issued by sovereign states, and these tend to be liquidly traded. These bonds have the advantage of making the calculated yields more reliable.

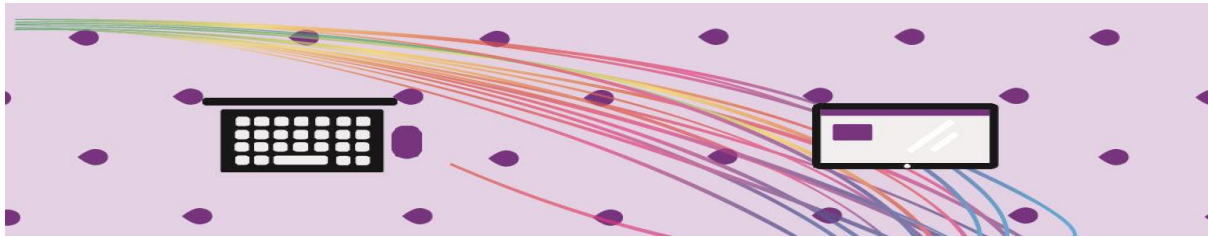
Apart from these considerations, it was also recommended that, in order to estimate a reasonable risk free rate, NRAs should base their calculation on an average yield over a period of time, which should not exceed 12 months. Another factor is that this bond yield source, should be a reliable one such as the Central Bank or a large data provider such as Bloomberg.

3.1.1.2 BEREC Report

Similar to the Brattle report, the BEREC report mentioned the fact that from the Euro introduction until the crisis of 2010, the nominal government bond yields in the Eurozone economies have been at similar levels. The trend changed as from 2010 when there was the global financial crisis and from that period the difference between the country bond yields increased.

In general, BEREC concluded that the domestic bond yield is the correct approach as it provides a good approximation of the nominal risk free rate considering the fact that the domestic bond yield captures inflation expectations in a forward looking perspective. The domestic bond yield will generally compensate for the country specific risk. The domestic bond is only not recommended in cases of illiquidity, or when the Member state have a significant risk of default and if the bond credit rating is below investment grade of (BAA3).

BEREC has mentioned other elements which need to be considered including the bond maturity and the averaging period. The bond maturity can be chosen by considering the following elements; the regulatory period taken into account, the volatility, the liquidity and the equity risk premium estimation. The long term bonds 10/20 years seem to be a better choice for estimating the risk free rate because they are less volatile, more liquid and generally consistent with the equity risk premium estimation.



The following table and chart below provide an overview of the main figures regarding the nominal risk free rate as extracted from the BEREC report.

	Average	Median	Standard Deviation	Relative Standard Deviation	Minimum	Maximum
Nominal RFR (30 NRAs)	3.04%	2.89%	2.03%	66.74%	0.52%	10.67%

Table 1: BEREC RFR Descriptive Stats

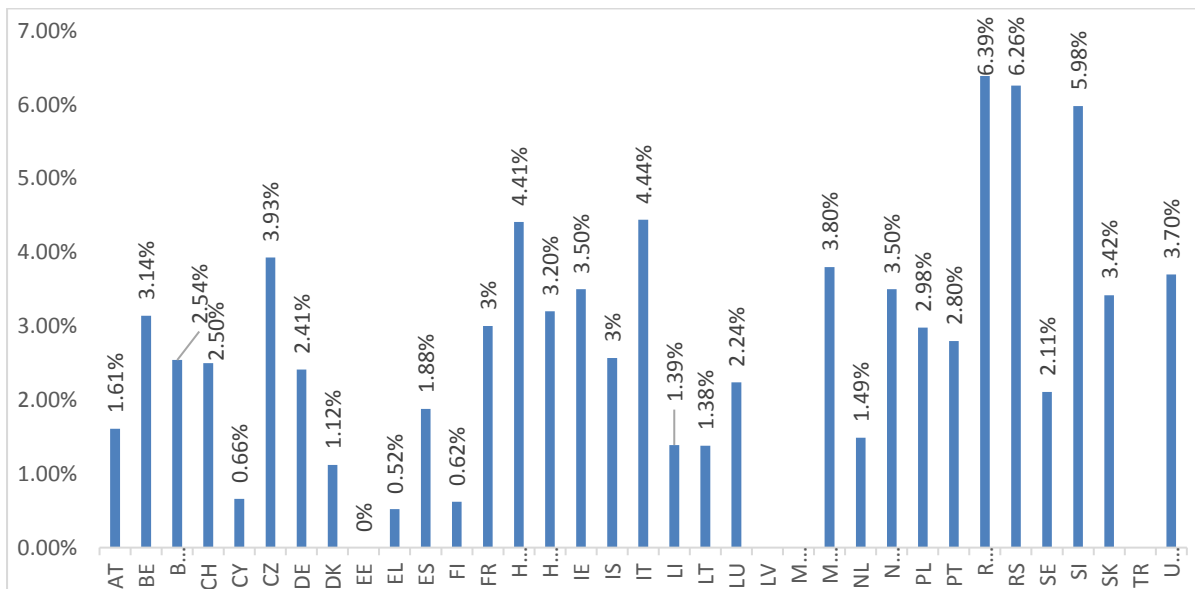
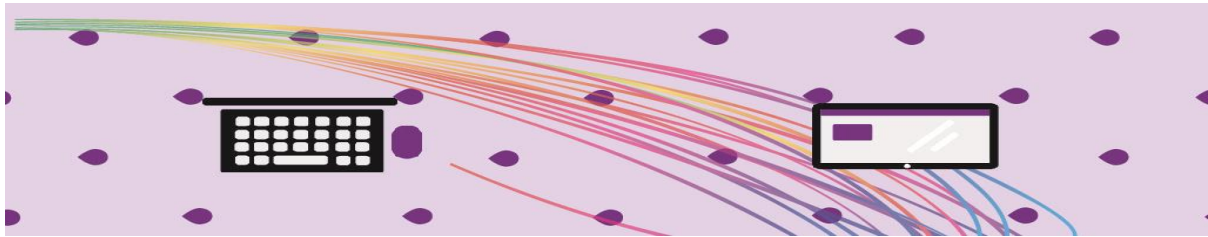


Figure 1: BEREC equity risk premium by country

As a preliminary output from the BEREC overview, most of the NRAs use a nominal estimation of the risk free rate without evaluating a real risk-free rate, while a real risk-free rate is estimated by 7 NRAs (CH, IE, IS, LU, NO, PL, UK).

All the indicators identified by the questionnaire show quite a consistent approach in terms of the main methodology used for estimating the risk free rate. The averaging window is the only factor which was applied differently by the NRAs. The NRAs that utilised domestic bonds and a time window less than one year stated that this methodology is considered to be consistent and forward looking with respect to the financial situation. An important aspect to take in consideration is the frequency of updating the WACC which can have an influence on the methodology. The report indicated that eight NRAs applied a short time windows, and five of them update the WACC yearly (ES, HU, LT, PL, SK). On the other hand, eight NRAs used a longer time window but only one NRA updates the WACC yearly (DK).



NRAs that use domestic bonds and a time window average of more than 5 years stated that the reasons for choosing this particular time window is due to the imposition of some “regulatory objective”, thus granting predictability, consistency, transparency and to overcome the effects of quantitative easing. The choice of averaging period window seems to be related to adjusting the level of the risk free rate by including a country risk premium when this is not included elsewhere. This approach was applied since the current period resulted in low yields. Thus the aim was to place more emphasis on longer data series to mitigate the risk of under estimating the WACC.

BEREC also concluded that the time windows adopted by the NRAs between 2013 and 2017, reflected that there is a preference with respect to a time window which is greater than 5 years. At the same time the average risk free rate in the same period resulted in a higher rate as compared to the European bonds.

3.1.2 MCA 2012 Decision

For the 2012 Decision, the MCA identified the below as the most common approaches adopted by other NRAs:

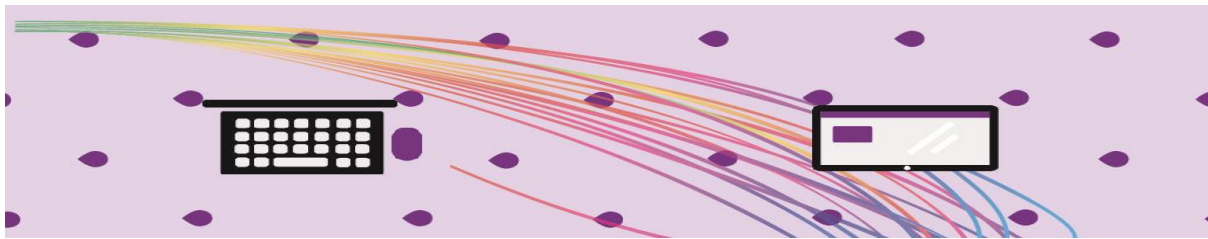
- consider government bonds as risk free assets;
- take into account bonds maturing in 10 years and some also take into account 5 year bonds.

In order to obtain a range that would be appropriate to calculate the nominal risk-free rate for the WACC, the MCA considered data of 5 to 10 year Malta Government Stocks (“MGS”) covering a period from January 2010 to June 2012. The following were the rates applied;

	Yields on 5 year Bonds	Yields on 10 year Bonds
Malta Government Stocks	3.25%	4.23%
German Government Bond adjusted for country	3.5%	4.3%

Table 2: Yields for 2012 Decision

As shown in the table above, the data from the local market has been corroborated to the German bond as a reasonable proxy for the risk free rate. The evaluation and the rates reflected in a similar range for the risk free rate.



3.1.3 MCA Proposed RFR

The Brattle report guidelines and the results of the BEREC report concluded that the application of the domestic bond to calculate the risk free rate is very appropriate. The aforesaid reports also indicated that the longer the maturity the better, as the yields are less volatile and more liquid. The EU Commission has issued further guidelines after the Brattle report that suggested that a common European RFR value is to be utilised by NRAs rather than a domestic value. This was justified using the below regulatory principles;

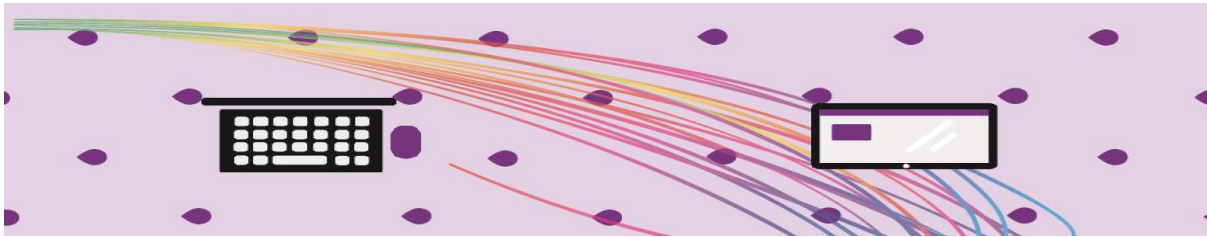
- **Predictability** to ensure the stability of the value of this specific parameter;
- **Efficiency** one should assume that the investor hold an efficient portfolio;
- **Consistency** between the estimation of the RFR and ERP;
- **Regulatory predictability** to reduce volatility over time of the value of the RFR;
- **Transparency** one value that is worked out and available to all NRAs.

The MCA evaluated the below workings to arrive at a reasonable risk free rate by taking the Malta Government stock yield for a period of 12 months for both bond maturing after 10 and 20 years. The yearly average and quarterly average were calculated to obtain the following risk free rate amounts;

	Maturin g	Jan- 17	Feb -17	Mar -17	Apr -17	May -17	June -17	July -17	Aug -17	Sept -17	Oct -17	Nov -17	Dec -17
Malta governme nt bonds 10 year maturity	2028	1.6 7	1.5 2	1.5 6	1.5 6	1.41	1.40	1.4 7	1.37	1.47	1.3 2	1.24	1.3 2
Malta governme nt bonds 20 year maturity	2036	2.3 1	2.1 8	2.2 9	2.3 2	2.2	2.19	2.2 2	2.07	2.15	1.9 7	1.88	2.0 2
End of quarter average	10 year bonds	20 year bonds											
	1.44	2.16											
Year average	1.44	2.15											

Table 3: Domestic Bond Yields

The MCA has based its yields using the Malta Government stock. In addition these results were corroborated to the other NRAs risk free rate as depicted in Table 1 above. As stated, the EU Commission and BEREC have provided further guidance on the preferred method to arrive at a



consistent RFR across MS and it was suggested to use a common EU RFR value. Therefore, the MCA has taken in consideration the EU Commission guidance and corroborated against the domestic data and concluded that the RFR should lie in a range between 1.4% and 2.5%. The 1.4% represents the yield of the 10 year domestic bond as indicated by the Brattle preferred long term bond yield methodology and the 2.5% is the average of a 20 year domestic bond which is in line with the figures issued from the BEREC report.

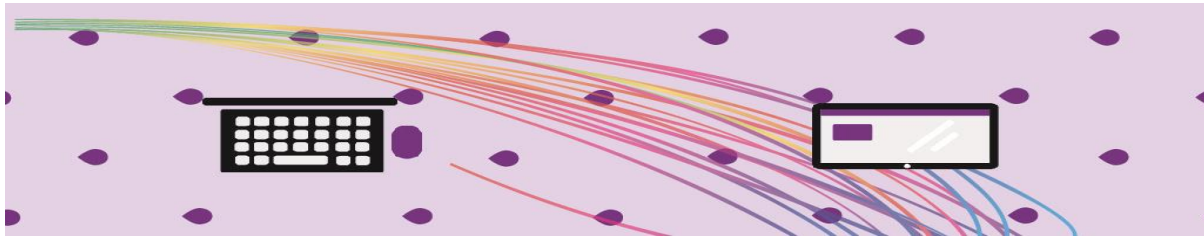
3.2 The Equity Risk Premium (ERP)

BEREC defined the equity risk premium as the higher expected yield on stocks in relation to the risk-free yield. The risk premium is key to the proportion of savings individual investors can be expected to place in stocks. The challenge presented by the equity risk premium is that it is not a value which can be directly observed in the market, and must therefore be estimated. This can be done in several ways, and consequently the current level of the risk premium is subject to much dispute. The estimation methods can be divided into three categories: 1) historic and, retrospective, 2) theoretical and, forward-looking, and 3) enquiry. Each has its advantages and drawbacks, but a common trait is that none of them can unequivocally determine the true value of the risk premium beyond any doubt. In theory the risk premium is influenced by a number of economic variables (e.g. economic growth, inflation, corporate profits and investors' risk aversion), and changes in these variables can therefore affect the risk premium.

The risk premium is the higher yield in relation to the risk-free yield that an investor expects to achieve from an investment where the outcome is not known for certain. The risk premium is thus an expression of the circumstance that high-risk investments are expected to yield higher returns than secure investments, since otherwise no investor would risk its capital. In other words the equity risk premium represents, as the term indicates, the payment for the risk related to an investment in stocks.

3.2.1 How is the risk premium estimated?

Basically, there are three different approaches to estimate the risk premium: 1) the historical approach, 2) the forward-looking theoretical approach, and 3) the enquiry approach. In the historical approach, the risk premium for a given period is calculated on the basis of historical yields on stocks and the risk-free yield. In practice the risk-free yield – like the equity risk premium – cannot be observed directly, so that an approximation is applied. The historically calculated risk premium is therefore identical to the average additional yield on an investment in stocks over a selected period compared to the return on a given government bond. The historical approach is widely used in spite of the drawbacks related to the method. Firstly, the estimated risk premium is affected by the period selected. Secondly, the approximation for the risk-free yield is in actual fact not entirely risk-free (e.g. because investors cannot be sure that their current yields can be reinvested at the same rate of interest). Finally, there is a general



aspect in relation to the historical risk premium, that it does not necessarily provide a good picture of the expected future scenario, unless history repeats itself.

The forward-looking theoretical approach is based on a given model, where the risk premium is estimated on the basis of the current market prices and future expectations. The advantage of this method over the historical approach is that it gives an estimate of the current expectation of the risk premium in the market. The drawback of the method is that it depends on the model applied, and thus on the underlying assumptions and prerequisites.

The enquiry approach consists of a panel of market participants – chosen at random or selectively – giving their view of the current risk premium, after which a consensus estimate is calculated. This method is highly subjective and is best used as a supplement to the other two methods. The risk premium can therefore be estimated in several ways, and consequently opinions differ greatly as to the size of the risk premium.

3.2.2 International studies

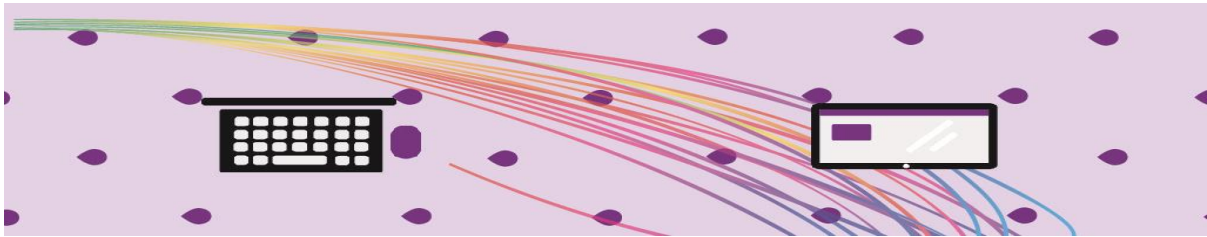
3.2.2.1 Brattle Report

The Brattle Group has address two key questions in estimating the Equity risk premium;

- Whether there should be a worldwide ERP or a Europe ERP, either way there would be a single ERP for all MS;
- Whether to estimate the ERP using historic returns, survey data or evidence from Dividend Growth Models or a mixture of these methods.

In a nutshell there is significant debate and uncertainty regarding predictions of the ERP, largely because it involves a prediction of the excess returns that investor's expect today and predictions are inherently uncertain. There is no academic consensus as to where the historical data or estimates based on dividend growth models are superior. Given this uncertainty it would be wrong to overly prescriptive regarding the methodology for estimating the ERP. NRAs could agree to estimate the ERP based on historical data on the excess return of stocks over bonds as reported by Dimson and Marsh and Staunton. Survey data seems to be unreliable, and ERP forecast from dividend growth models tend to be sensitive to input assumptions which includes forecast of future dividends. On the other hand historical data is relatively stable, because it is hard for an additional year to change the average of over 100 years' worth of data. Stability, predictability and lack of volatility are desirable in a regulatory context. The historical ERP provides a good 'anchor' for estimates and prevents larges changes from one regulatory period to the next.

The other option is that NRAs should base their ERP estimates on the arithmetic average of the historical excess returns however this is not recommend since it does not take the academic research on the topic into consideration.



The third opinion is for the NRAs to set reasonable adjustments to the historical data, informed by other sources of evidence on the ERP, for example, Dividend Growth Models. NRAs should avoid a mechanical application of historical data, which could result in an erroneously lower estimate of the ERP when stock markets have fallen.

Brattle’s view is that the final ERP estimate will often be the combination of data and judgment, but at the same time it would be desirable to have a single ERP value for EU. Since there is no theoretical reason why the ERP should vary across MS. It was concluded that the ERP value should be of 5 – 5.5% over bonds.

3.2.2.2 BEREC Report

From the BEREC report it is possible to derive the following graph which indicates the ERP used by other NRAs;

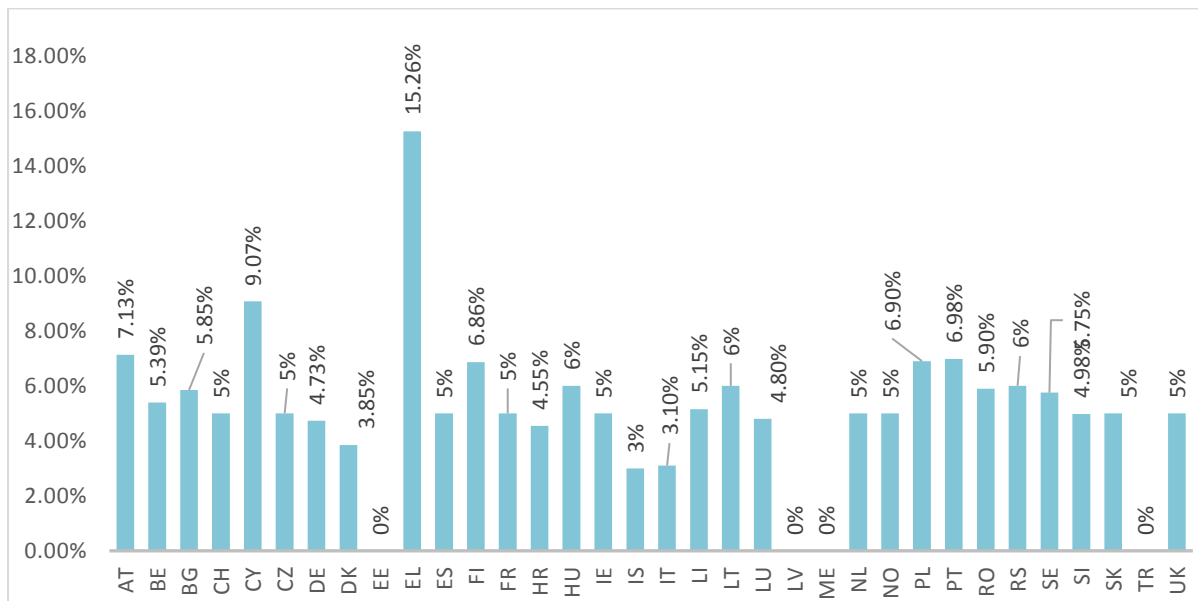
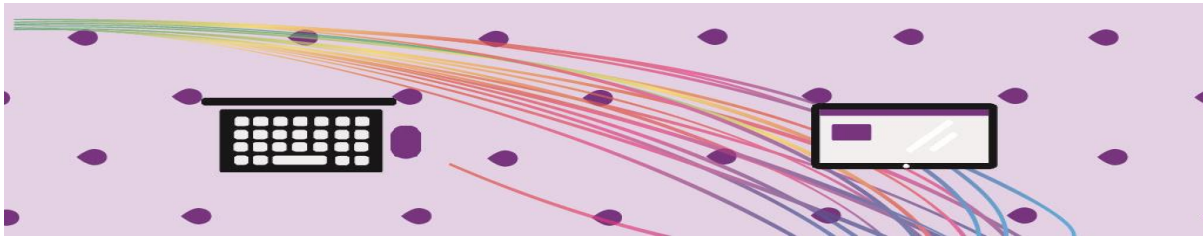


Figure 2: BEREC Equity risk Premium per country

From the figures provided the following stats can be extracted;

Average	Median	Standard deviation	Maximum	Minimum
5.77%	5.15%	2.12%	15.26%	3.00%

Table 4: BEREC ERP Stats



3.2.3 MCA 2012 Decision

The MCA, for the 2012 Decision, pointed out that in general NRAs refer to international studies and the MCA based on widely recognised sources such as Damadoran. These sources were considered as reliable and used their estimates for the ERP value which was between 6.01% and 6.10%.

3.2.4 MCA proposed ERP

The MCA has reviewed the study issued by the Brattle Group outlining that the way forward should be to adopt a single ERP across the board. The Berec survey resulted in an average of 5.77%, the latter being in line with the Brattle Group recommendation. In general the ERP is mostly derived from international studies corroborated with other NRA's methodologies. The most recent study done by Brattle and the results of the Berec report result in an ERP value in the range of 5% to 6% and based on these studies, the MCA proposes that the ERP rate should be between 5 and 5.5% as suggested by Brattle.

3.3 Beta

Beta measures the systematic risk: that is the risk that cannot be diversified away by investors. Beta is the relationship between the share price and the market portfolio of investments the firm owns, the latter represents the investor's other investments opportunities. The Equity beta is a measure of the level of investment risk in a specific stock market with respect to a perfectly diversified market portfolio. It quantifies the systematic and not the diversifiable risk that is risk that cannot be reduced or eliminated. The higher the value of beta, the higher the uncertainty about the return on a firm's equity.

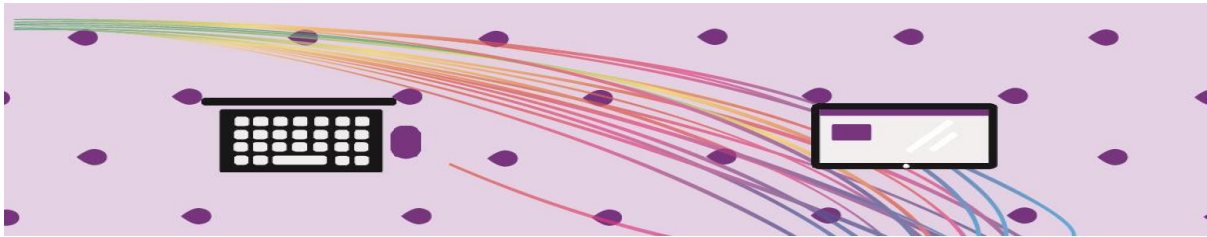
3.3.1 International studies

3.3.1.1 Brattle Report

Brattle pointed out that the beta estimate is very complex and there are various issues involved in establishing this parameter. Hence Brattle addressed a number of issues to obtain a reasonable beta and to estimate the equity betas, some of which are the following:

- What time horizon and sampling period should be considered?
- Which market index should be used?
- Is there a need to make adjustments to observed betas?
- Which debt betas and levering formulae should be used?
- Will betas vary across the EU?

Brattle concluded that choosing a time horizon over which to estimate beta involves a trade-off; on one hand if the time horizon is extended more observations will be included in the calculation of the beta,



and hence it will reduce the statistical error of the beta estimation. But on the other hand if beta is changing over time then the older data may no longer be relevant to estimate the future beta. The rapid technological evolution of the telecoms sector suggests that calculating betas based on a relatively short time horizon is more likely to give the best estimate of future betas. Hence it was recommended that NRAs require to estimate betas based on the daily returns over a two year period. This relatively short time horizon implies the need for a daily sampling period so as to generate sufficient observations for the beta to be statistically robust.

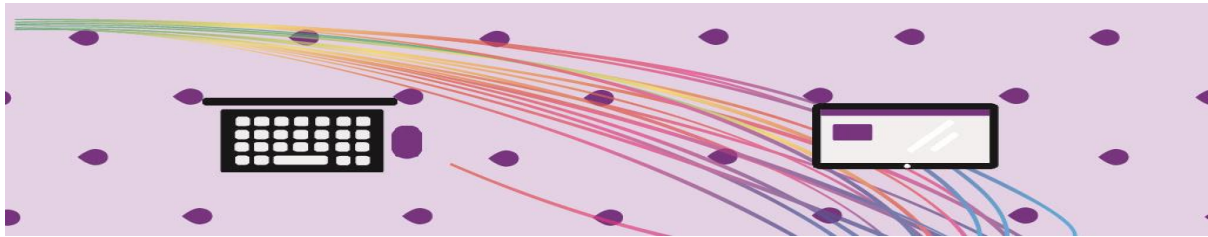
The second issue addressed is the choice of index, that is a World index or a European index. Brattle stated that beta measures systematic risk that is the risk that cannot be diversified by the investor. Thus beta is the relationship between the share price of the firm and the market portfolio, which represents the investor's other investment opportunities that is the risk that cannot be avoided. In theory the market portfolio should include all other investments opportunities but in practice financial practitioners limit it to a stock market index. Betas could be collaborated against for example a world index, since in theory investors could invest anywhere in the world, however in practice investors tend to invest closer to home markets which they know better, for example a European market rather than across the world. There are a number of reasons why investors prefer to invest closer to home, due to different markets including investment and political risks, or currency risk, or large fluctuations in exchange rates would reduce the beta estimates. Taking in consideration all the above and using a more focused index based on European stocks rather than world stock would result in a more reasonable beta.

Brattle pointed out that the use of a wider European index is more consistent with the assumptions on the Equity risk premium that is to adopt a harmonised ERP across the EU countries.

The equity beta will depend on the financial leverage or gearing of the firm that is the relative financing between debt and equity. It was suggested that NRAs should estimate beta based on a sample or peer group of suitable firms. When estimating the average beta it is required to remove gearing by calculating an unlevered or asset beta from the observed equity beta (levered beta). This will ensure that the averaged betas are similar on a like with like basis. Failing to un-lever before calculating the average risks incorporates differences in financing decisions, rather than actual differences in underlying business risk.

Brattle also gave the option to use the bottom-up or off the shelf beta estimates, meaning that the beta is already available and is not specifically related to the national market but is a real approximation. Some data providers such as Bloomberg provide pre calculated or 'off the shelf' betas, and according to the Brattle Group these betas are reliable and can be applied by the NRAs. Brattle listed one requirement which is that they are calculated on the same bases as the recommended 'bottom up' beta where a two yearly daily data is used, and apply the Dimson adjustment.

Brattle has stated that EU NRAs should use a common beta for legacy network activities, and this should be estimated from a sample of firms based on the same criteria previously discussed. According



to Brattle Group there is a significant uncertainty associated with the asset beta estimate for the legacy network, thus based on the available evidence it would be reasonable to use an asset beta ranging from 0.50 to 0.67

In practice it is difficult to find a data provider that can provide 'off the shelf' betas. Thus NRAs could use the most recent beta estimates that other NRAs have used in their regulatory decisions.

3.3.1.2 BEREC Report

The BEREC report defines beta as a measure of the level of investment risk in a specific stock market with respect to a perfectly diversified market portfolio. It quantifies the systematic and not the diversifiable risk. The higher the value of the beta, the higher the uncertainty about the returns on a firm's equity. The report identified these main elements to estimate the equity beta:

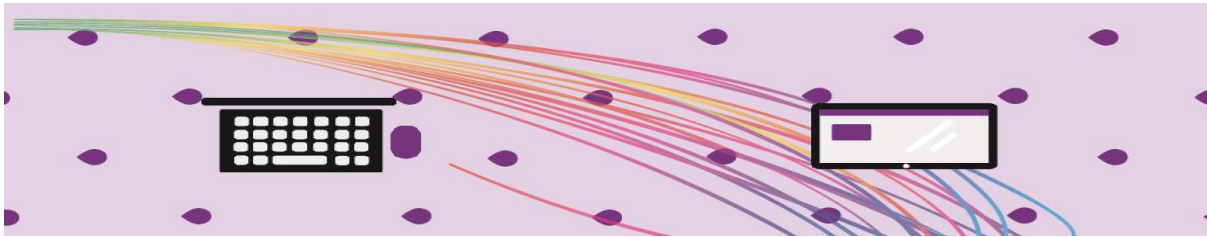
- The methodology (Bottom-up/notional vs SMP operator);
- The time horizon and sampling period;
- The market index;
- The adjustment of the beta; and
- The un-levering formula.

A notional asset beta which is the beta of a company without the impact of debt, can be evaluated as an average among a number of European operators that comprise a peer group. The criteria in choosing the peer group of companies generally are:

- The liquidity of the traded stock should be high (volume and frequency);
- The volumes of the company stocks should not exceed an amount of volume stocks of the compared index in which they are quoted (less than 10%);
- The investment credit rating (from AAA to BBB-);
- The peer group should not be involved in M&A processes;
- The peer group should be active in network investments and not only as a reseller.

From the BEREC report it is identified that these are the main variances among the NRAs; sampling frequencies - daily, weekly or monthly - and a time horizon between 1 to 10 years. The NRAs have the option of either having enough data points to be sufficiently robust or ensuring the beta is a reasonable estimate on a forward looking basis (i.e. with about 500 data points, in case of 2 years' time windows and daily estimation, can ensure an accepted trade-off between a forward looking perspective (short time frame) and statistical significance of the beta estimation).

The idea behind this method is that:



- For stocks that are extensively traded it is conceivable that it takes a while for the general market to catch up with news which is reflected in the stock's price almost instantly;
- For stocks that are thinly traded it is conceivable it takes a while for the price of the individual stock to adjust to the market.

The BEREC Report included a category of other adjustments, which targets the improvement of the accuracy of the final estimation of the equity beta. The most commonly used are “Blume”, “Bayesian” and “Vasicek”. The first two methods provide an adjustment with the presumption that the beta estimated through the CAPM model should be adjusted. The Vasicek adjustment is similar to the Bayesian adjustment with the difference that the beta of the peer group take in consideration is not supposed to be equal to “one” but to a different value.

The equity beta depends on the financial leverage or ‘gearing’ of the firm. In case the beta is estimated from a peer group of companies, it is common to un-lever the equity beta of each firm by determining the asset beta from which the average asset beta is evaluated. Then the average asset beta, is re-levered through an average gearing value that is obtained from the gearing of the selected peer group. This recalculation results in an equity beta for determining the cost of equity in the WACC formula. Through this procedure the obtained beta highlights only differences in the underlying business risk rather than financial leverage conditions.

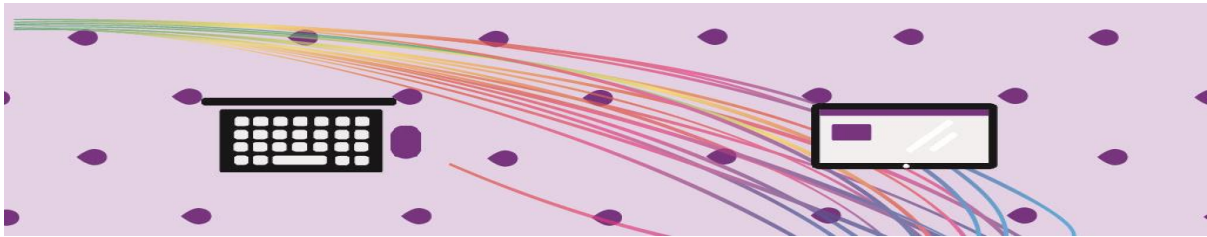
Based on the BEREC report it is concluded that the most frequent methodology applied by (16) NRAs to estimate a notional beta is based on an analysis of telecom operators. The second common approach (‘Other’) was adopted by 6 NRAs, and this refers to hybrid methodologies that takes into account different sources of estimation. The remaining NRAs indicated that either benchmarking (3 NRAs) or SMP operators’ (6 NRAs) methodology was used.

As stated by BEREC, when the NRAs use the notional approach the number of comparable operators varies between ten and thirty four. The peer group taken in consideration for the notional approach sampling includes operators differentiated according their main business, such as the provision of fixed, mobile or broadcasting.

3.3.2 MCA 2012 Decision

The MCA, in the 2012 decision, concluded that the beta estimate using the local stock exchange market information does not necessary provide a suitable estimate of the systematic risk. Hence it was necessary that the beta estimates should be evaluated based on benchmark data from comparable companies and that of other regulators.

Data published by BEREC provided a good indication of the betas utilised by other NRAs. The Asset beta ranged from a minimum of 0.43 in Italy to a maximum of 0.98 in Austria with a simple average of circa 0.57. The Equity beta range from 0.67 in Lithuania to 1.15 in Serbia with an average of 0.83.



	Average	Median	Standard deviation	Relative Standard deviation	Maximum	Minimum
Equity beta	0.83	0.82	0.12	0.14	1.15	0.67
Asset beta	0.57	0.54	0.13	0.24	0.98	0.43

Table 5: BEREC Beta Descriptive Stats

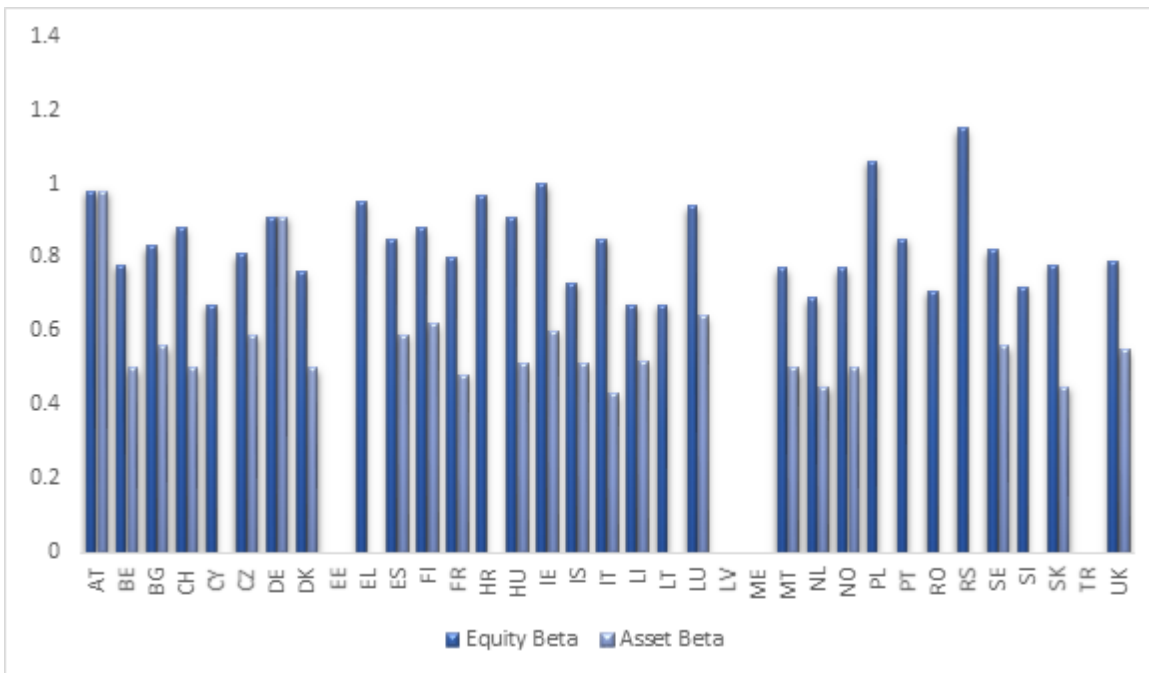


Figure 3: BEREC - Equity and Asset Beta by Country

From the BEREC report it is possible to obtain the following charts showing the evolution of the Equity and Asset beta. These charts indicate that the estimated Beta has been relatively stable throughout the years.

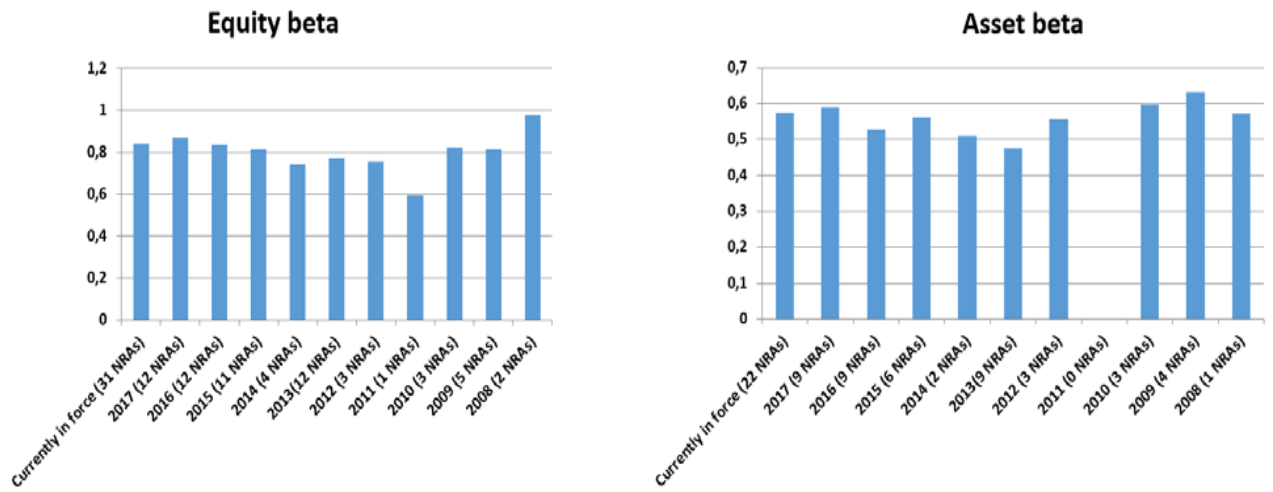
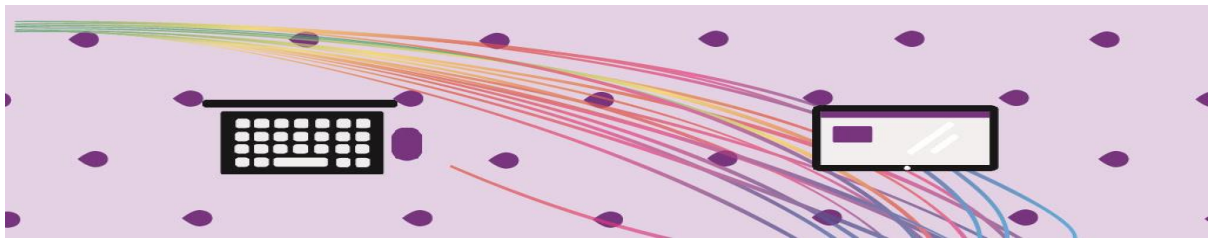
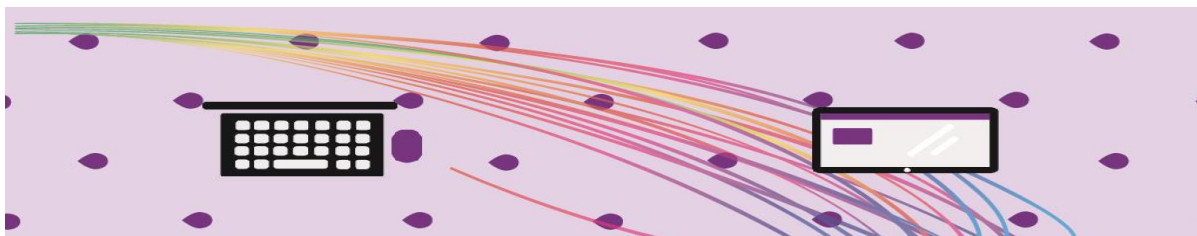


Figure 4: BEREC - Asset and Equity Beta throughout the various reports

3.3.3 MCA Proposed Beta

The MCA based the beta computation on a number of criteria the EU Commission suggested; (i) that the operators are credit rated, (ii) own and invest in electronic communication infrastructure and (iii) have main operations in EU. The companies which fall in the above mentioned criteria are;

Selected Companies	Total Debt to Equity	Income tax rate (Average 5yr)	Monthly asset beta (unlevered) (3yr)
BT Group plc	138.54	17.73	0.45
Orange	120.83	38.26	0.55
Koninklijke KPN	226.21	15.26	0.57
Proximus	78.60	22.10	0.66
Swiss com AG	100.26	19.28	0.61



Telecom Italia S.p.a	145.94	48.20	0.48
Tele 2 S.A.	66.35	29.46	0.74
Telefonica S.A.	315.34	20.94	0.62
HIGH	315.34	48.20	0.74
MEAN	151.29	25.71	0.59
MEDIAN	138.54	20.94	0.61
LOW	66.35	15.26	0.45

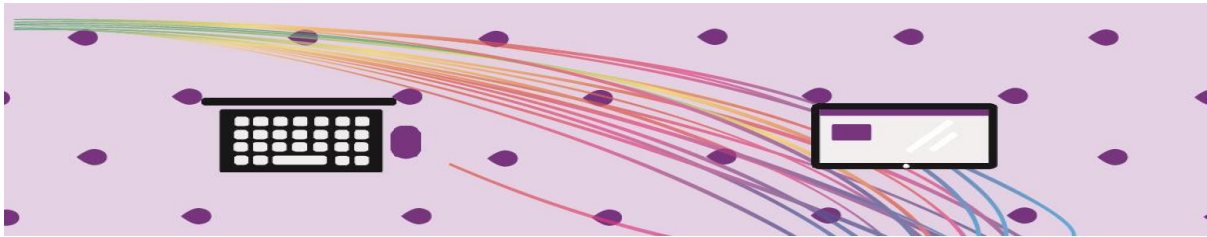
Source of monthly asset beta is the www.infrontanalytics.com, the tax rate and total debt to equity are sourced from the Reuters.

Table 5: Selected companies for the Asset Beta

	Range	Median	Mean
NRAs	0.43 – 0.98	0.57	0.54
Reference Group	0.45 – 0.74	0.61	0.57

Table 6: Asset Beta comparison: All NRAs and Selected companies – BEREC Report

Comparing the asset betas of the NRAs and the reference group it is noted that some commonalities exist where the range, median and mean are very similar. One may argue that the values of the reference group may not be representative of the local market but in the absence of a reliable local stock market index, the appropriate estimate would be the betas applied by other NRAs. Vodafone Group plc which has a branch operating in Malta is the only stock exchange listed Telecoms Company whose operations are solely limited to mobile communications and has an asset beta of 0.42. Based



on Vodafone asset beta and the reference group outcome, the MCA considers that a reasonable beta for the local mobile should range between 0.4 and 0.5 while for the fixed market 0.5 to 0.60.

3.4 The Cost of Debt

Cost of debt refers to the effective rate a company pays on its current debt. In most cases this refers to cost of debt after tax, but sometimes it is also used to mean the company's cost of debt before taking taxes into account. The difference in cost of debt before and after taxes is relevant, due to the fact that interest expense are usually deductible for tax purposes.

3.4.1 Estimating the Cost of Debt

A company's cost of debt is normally identified by reference to the average cost of borrowing based on market values. However where market information is not available or where it is unlikely that a company continues to borrow at the current cost of borrowing, estimates are required.

Corporate debt behaves in essential the same manner as government debt however companies are more risky than government, implying that a higher interest rate has to be offered to investors. In practice this debt premium is driven by credit ratings based on financial characteristics such as market capitalisation, earnings volatility, and leverage business risks specific to the company and/or sector.

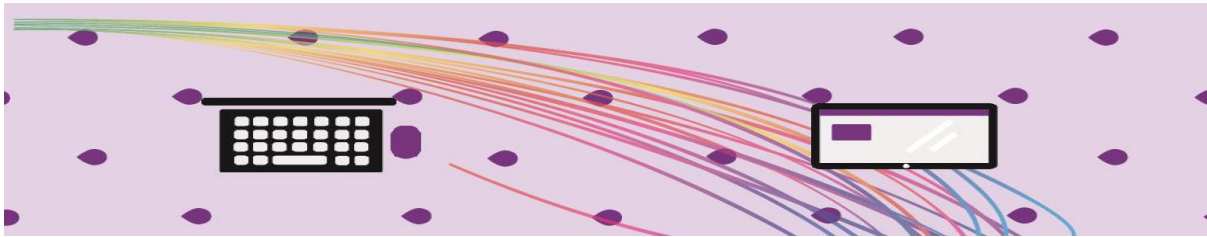
3.4.2 International studies

3.4.2.1 Brattle Report

The Brattle report suggested that the NRAs could calculate the debt premium by reference to a period consistent with the calculation of the risk free rate and also propose that more weight should be provided to the SMPs actual bonds subject they are consistent with the target credit rating. Using a 10 year bond maturity should reflect a typical average debt maturity for a large firm. The period used should be consistent with that applied in the calculation of the risk free rate apart from the fact that a 10 year debt maturity reflects the typical average debt maturity for a large firm.

3.4.2.2 BEREC Report

BEREC reported that the cost of debt is generally evaluated by adding a debt premium to the risk free rate or directly from company bond yields. Generally a higher gearing percentage for a company implies an increase of the interest rate paid on debts in form of wider spread. On the other hand the level of the debt premium is also related to the main market in which the firm operates and so linked to the credit rating of the company.



BEREC compiled data from 31 NRAs on the approach used to calculate the cost of debt. The data compiled indicated that the most common approach applied by regulatory authorities in estimating the cost of debt is to base the estimate on the risk free rate plus a premium determined by reference to the specific company under construction or other similarly rated companies. The majority of the NRAs adopted the notional approach (13 NRA out of 31), the 'other' category which means a mix of approaches (SMP and notional) is used by 10 NRAs, followed by an estimation of an SMP cost of debt (7 NRAs). Most NRAs including Malta estimate a debt premium instead of estimating the cost of debt directly and this is the general approach when the notional approach is applied. When a notional approach is considered, NRAs generally use peer groups according to the credit rating of at least BBB-

The following chart shows the Cost of debt and Risk free rate of what the NRAs reported.

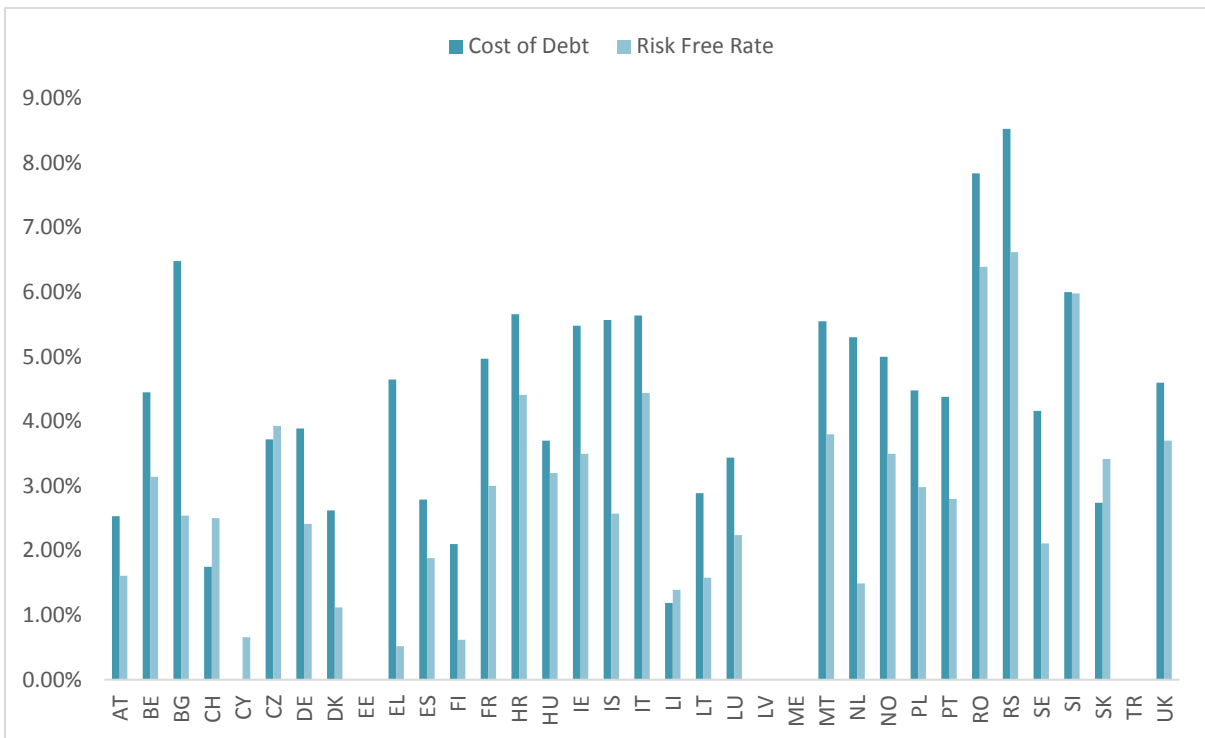


Figure 4: BEREC - Cost of Debt & Risk Free Rate per country

From the data it resulted that 19 NRAs including Malta work out the Debt premium as a standalone and the remaining NRAs (11) focus on the cost of debt. Given this differentiation it was possible to extract those NRAs that work on the debt premium as shown in the figure below;

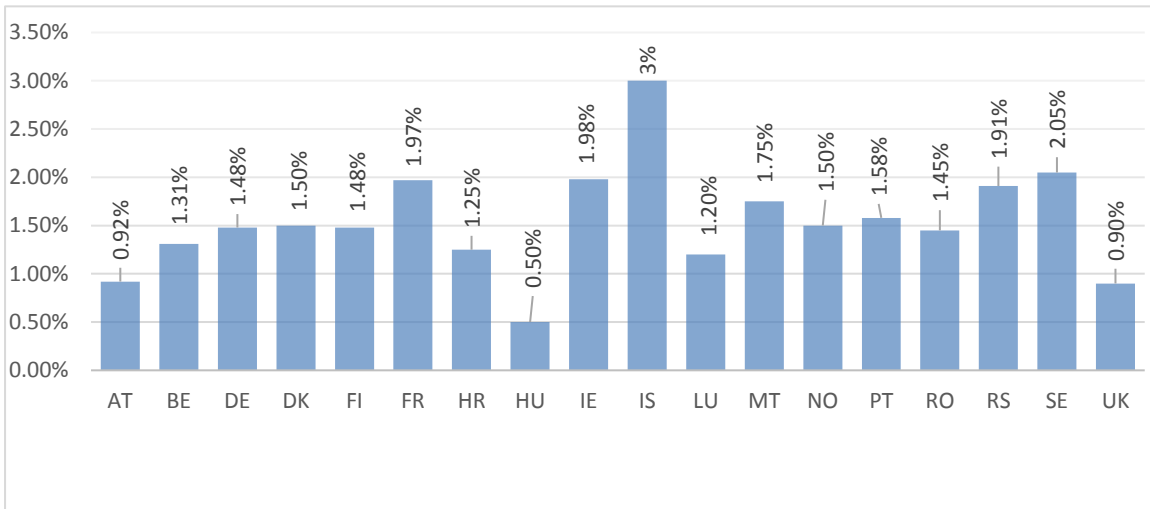
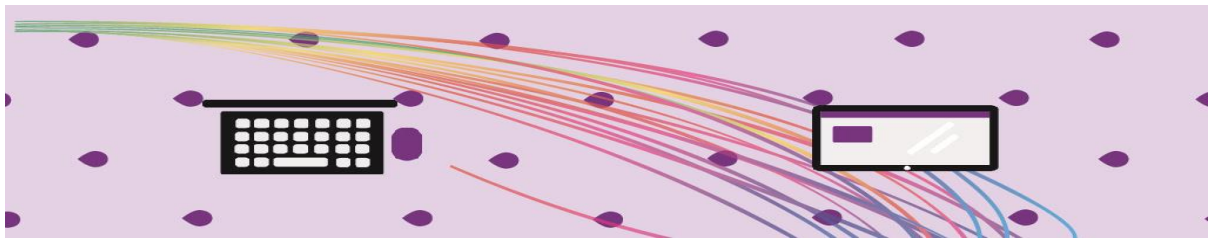


Figure 5: BEREC - Debt Premium by country

From the figures above, the debt premium ranges from a minimum of 0.5% to a maximum of 3%, where the mean is 1.49%.

	Range	Median	Mean
Debt premium	0.5 – 3.00	1.49	1.54

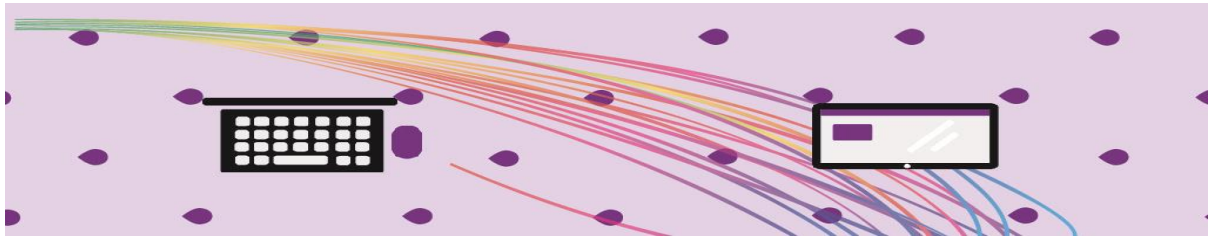
Table 6: BEREC - Debt Premium Descriptive Stats

3.4.3 MCA 2012 Decision

The Brattle report and the BEREC report arrive to the same conclusions in the way that the cost of debt has to be calculated and the main parameters which need to be taken in consideration when calculating the rate. In the case of Malta, the SMP or similar companies, do not have a public available credit rating, and therefore it is difficult to use the traded bond yield or the incumbent bond yields to estimate the cost of debt. In the absence of such information the MCA had expressed the view that reference should be made to the debt premium applied by other regulatory authorities in estimating the cost of debt.

3.4.4 MCA Proposed Cost of Debt

Similar to the premium on equity, the debt premium represents the additional return required by lenders to compensate for the additional risk of lending to a particular entity. There are a number of methodologies that can be used - the Brattle Report did not suggest a possible range but provides only a number of parameters, whereas the EU Commission has suggested that the value should be based on the domestic SMP operator Cost of Debt but subject to values of EU peers. As also stated in the previous MCA decisions, since the Malta SMP or similar companies are not credit rated it is difficult to use the traded bond yield to estimate the cost of debt. Given this limitation the MCA applied the Brattle,



BEREC and the EU Commission guidelines as reasonable sources to derive the Malta debt premium for this purpose. The results issued by aforementioned provided similar outcomes both for the methodology to be used and also on the range of values derived, as shown in the above figures. Thus the MCA proposes that a reasonable debt premium on the above should be between 1% and 2% given the figures provided in Table 8.

3.5 The Gearing Ratio

A gearing ratio is a general classification describing a financial ratio that compares some form of owner's equity (or capital) to funds borrowed by the company. Gearing is a measurement of the entity's financial leverage, which demonstrates the degree to which a firm's activities are funded by owner's funds versus creditor's funds. The gearing ratio in the WACC calculation refers to the portion of the debt with respect to the entire financing of the company. Specifically, it is defined as the ratio between the debt and the value of the company (Equity + Debt). Gearing determines the relative weighting of debt and equity in the WACC calculation.

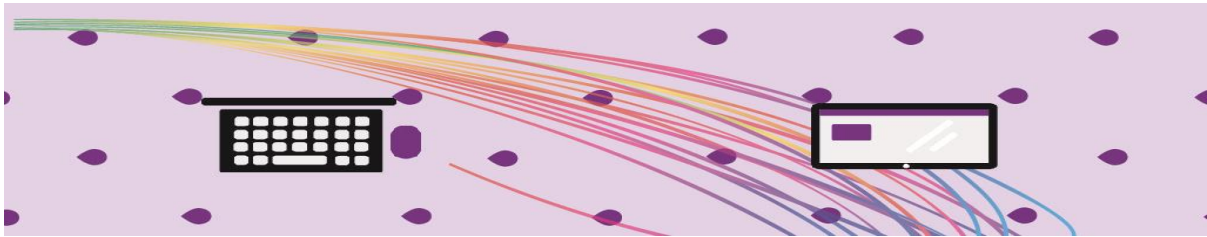
3.5.1 International studies

3.5.1.1 Brattle Report

In the Brattle Report, it was concluded that the gearing clearly varies between telecom operators and thus will definitely reflect the variations present amongst NRAs. Given these variations it is important that NRAs arrive at a common methodology to calculate the gearing so as to avoid arbitrary differences distorting WACC estimates. Brattle recommend that NRAs should measure gearing by reference to the market value of equity since it is the market value of equity which measures the future potential earnings of the firms and their ability to sustain debt. Where a firm's share price declined sharply then the debt as a percentage of the value of the firm could increase significantly, which implies that the risk of default would also increase significantly. Therefore, calculating the gearing using the market value of the firm would capture this effect. .

From the Brattle analysis it was noted that a common EU gearing ratio is not feasible, since the tax rates vary across the EU and the tax benefits of debts depend on the tax rates. Hence the optimal gearing will not be harmonised across the EU.

Another aspect is that if a common EU gearing level was opted for and this varied significantly from the SMP actual gearing, this variation could introduce measurement difficulties, such as the NRA could be faced with a task to estimate the cost of debt for a firm with 20% gearing, when the actual SMP has a 70% debt level. Estimating the cost of debt in these circumstances can be challenging due to the different levels of gearing amongst the national market players as compared to the average gearing at EU level.



Brattle concluded that it was difficult to identify what an inefficiently low or high level of debt amounts too, and the effect of gearing on the WACC is relatively modest in any event. Hence, it was recommended that the NRAs are free to adopt their own level of target gearing but with the basis that these two parameters are applied;

- The target level of gearing should not be more than 10 percentage points higher or lower than the average gearing of the peer group used to estimate beta;
- Notwithstanding the first parameter above there should be an absolute maximum level of gearing.

Brattle concluded that a lower limit is not required, since choosing a ‘low’ target gearing would increase the WACC and the tariffs, which is something that NRAs are reluctant to.

3.5.1.2 BEREC Report

As part of the WACC analysis, BEREC also captured the gearing aspect and the following main information is extracted. The following chart reflects the average gearing ratio applied for the fixed and mobile markets. Although the majority of the NRAs are reporting an average gearing ratio of above 30%, there are a number of outliers that impact on the EU average

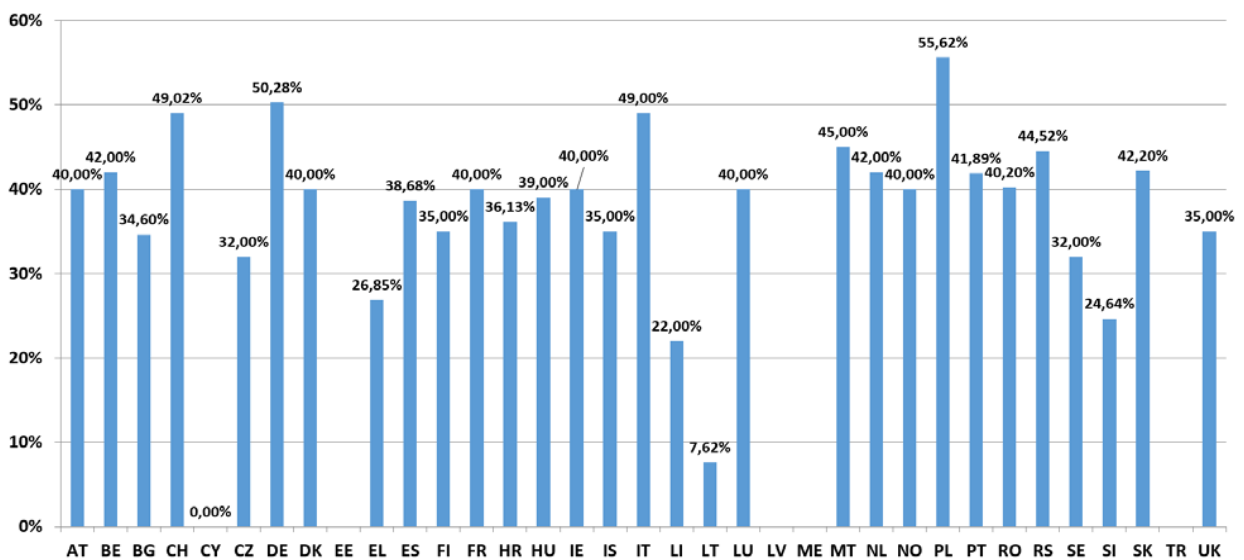
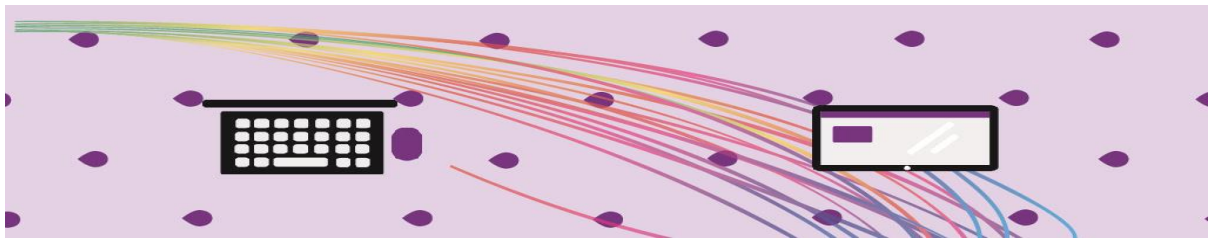


Figure 6: BEREC - Average Gearing Ratio per country

From the BEREC analysis, it was concluded that the average gearing ratio from 30 NRAs for both the fixed and mobile market is around 36.78% but there is a wide variation among NRAs, varying from



0% in the case of Cyprus to 55.62% in the case of Poland. The following shows some statistical figures related to the gearing ratio.

Average	Median	Standard deviation	Relative standard deviation	Maximum	Minimum
36.78%	40%	11.38%	30.93%	55.62%	0%

Table 7: BEREC - Gearing Ratio Descriptive Stats

Currently, Malta's average gearing ratio is of 45% which is very close to the median (most common) value of 40%. Another aspect extracted from the BEREC report is the variance present among operators, in fact the following chart shows the gearing ratios of some European operators.

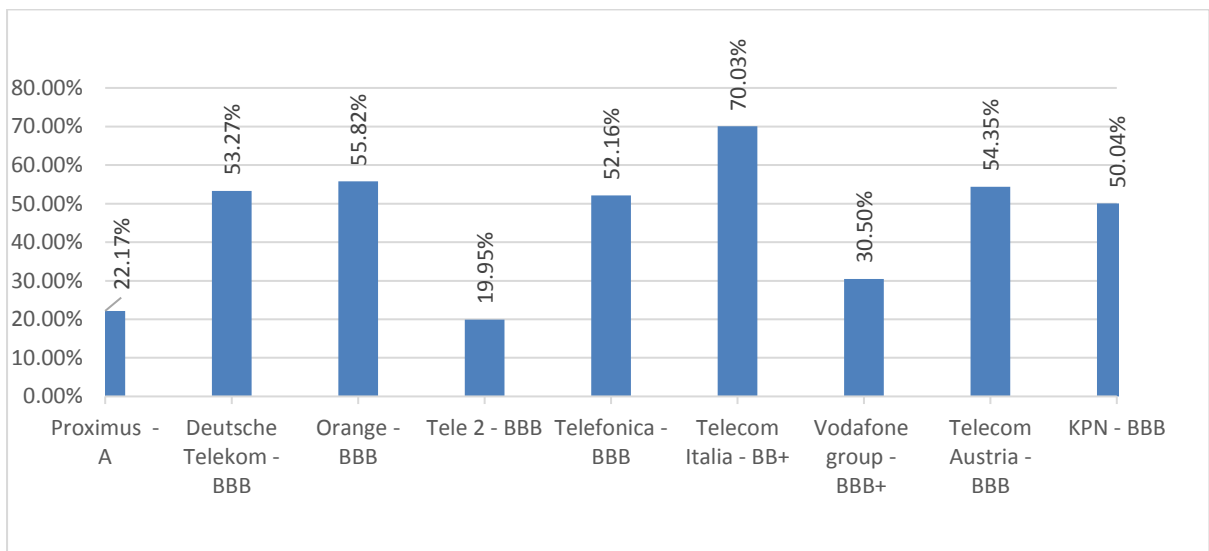
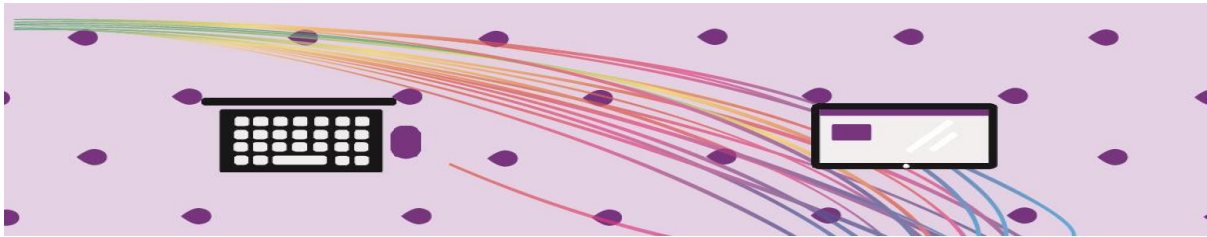


Figure 7: BEREC - Gearing Ratio of some EU operators

As observed from the above figure, the gearing ratio among operators varies quite significantly from a minimum of 19.95% set for Proximus to a maximum of 70.03% set for Telecom Italia. The operators considered in this analysis have an average gearing of 45% which is similar to Malta's current average gearing ratio.

3.5.2 MCA 2012 Decision

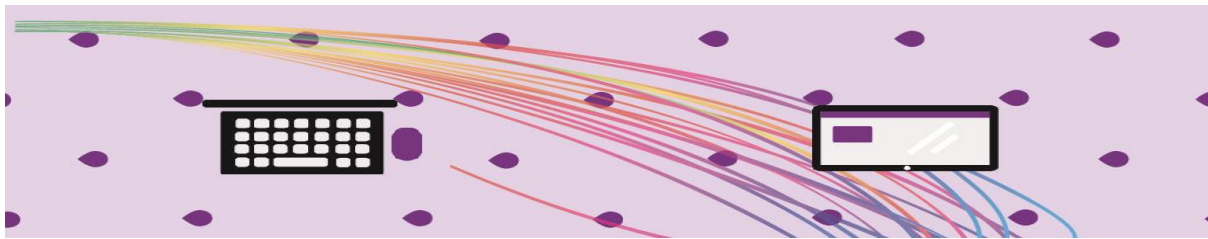
For the 2012 decision, the MCA, has reviewed the gearing levels reported by the local operators in their respective latest financial statements and noticed that the local operators have significantly different gearing levels. In view of these discrepancies the MCA considered that the optimal gearing



by reference to the levels adopted by other NRAs as well as the averages registered by the local operators.

3.5.3 MCA proposed Gearing

The MCA believes that fixed and mobile operators share many characteristics, but there are potential differences between fixed and mobile networks in terms of capital structure and risk profile. For this reason the MCA considers that different risk profiles should be attached and thus different gearing structures as proposed below. The MCA took into consideration the local main operators' gearing levels in their respective financial statements, and that the gearing levels differ significantly from one another - the MCA based on the Brattle report recommendations as a good source of the gearing ratio. The latter corroborated with the BEREC report results which also depicted a gearing range between 50 – 55%. Following the Brattle and BEREC outcome, the MCA is recommending that the gearing ratio for the fixed market to be 40% to 50% while for the mobile market to be 35% to 45%.



4 Proposed WACC rates

Theoretically, the WACC rate is based on the following formula

$$WACC = \left(rE * \frac{E}{D + E} \right) + \left(rD * \frac{D}{D + E} \right)$$

where

rE refers to rate of Equity;

E refers to Equity;

D refers to Debt;

rD refers to rate of Debt;

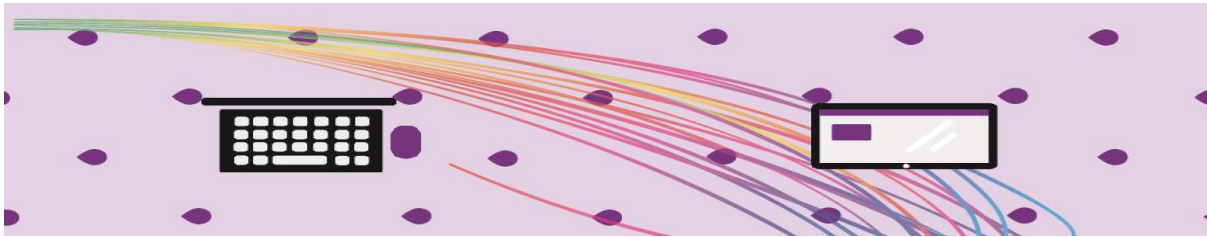
rF refers to risk free rate;

B refers to Beta.

In the case of Malta, a scenario for each case is evaluated and the average of these scenarios represents the proposed WACC rate. The following workings reflect the analysis of the different scenarios for the fixed and mobile market.

Fixed Market WACC	Low gearing		Medium Gearing		High Gearing	
	Low estimate	High estimate	Low estimate	High estimate	Low estimate	High estimate
Risk free rate	1.4	2.5	1.4	2.5	1.4	2.5
Equity risk premium	5	5.5	5	5.5	5	5.5
Equity beta	0.72	0.86	0.77	0.92	0.83	0.99
CoE post tax	5.0	7.2	5.2	7.6	5.5	7.9
CoE pre tax	7.67	11.12	8.05	11.62	8.5	12.22
Debt Premium	1.0	1.0	1.5	1.5	2	2
CoD post tax	1.56	2.28	1.89	2.6	2.21	2.93
CoD pre tax	2.4	3.50	2.90	4.0	3.40	4.5
Optimal gearing	40%	40%	45%	45%	50%	50%
Tax rate	35%	35%	35%	35%	35%	35%
WACC rate	5.56	8.07	5.73	8.19	5.95	8.36

Table 8: Fixed Market WACC Rate per scenario



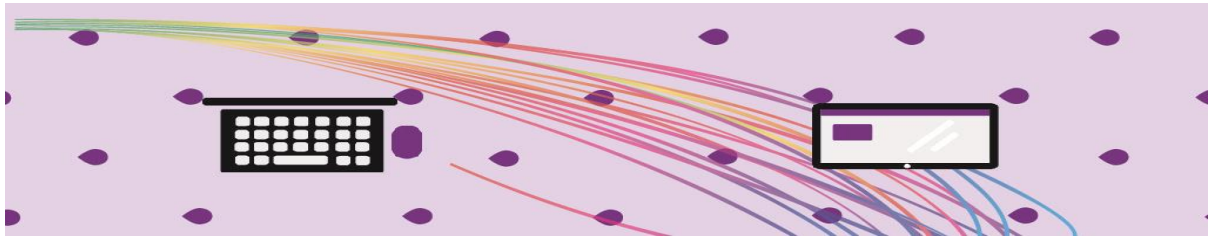
Mobile Market WACC	Low gearing		Medium Gearing		High Gearing	
	Low estimate	High estimate	Low estimate	High estimate	Low estimate	High estimate
Risk free rate	1.4	2.5	1.4	2.5	1.4	2.5
Equity risk premium	5	5.5	5	5.5	5	5.5
Equity beta	0.54	0.68	0.57	0.72	0.61	0.77
CoE post tax	4.1	6.2	4.3	6.4	4.5	6.7
CoE pre tax	6.31	9.56	6.56	9.91	6.87	10.33
Debt Premium	1.0	1.0	1.50	1.50	2.0	2.0
CoD post tax	1.56	2.28	1.89	2.60	2.21	2.93
CoD pre tax	2.40	3.5	2.90	4.0	3.4	4.50
Optimal gearing	35%	35%	40%	40%	45%	45%
Tax rate	35%	35%	35%	35%	35%	35%
WACC rate	4.94	7.44	5.10	7.55	5.31	7.70

Table 9: Mobile Market WACC Rate per scenario

From the workings above, the MCA proposes that the WACC rates be revised as per below

WACC rate	Fixed Market	Mobile Market
Current rate	9.65%	10.8%
Proposed rate	6.98%	6.34%

Table 10: MCA Proposed WACC Rates



5 Consultation Framework

The MCA invites comments from interested parties on this consultation document.

For the sake of clarity and ease of understanding, the MCA encourages stakeholders to structure their comments in order and in line with the section and sub-section numbers used throughout this document.

In accordance with Article 4A of the Malta Communications Authority Act [Cap 418 of the Laws of Malta], the Authority welcomes written comments and representations from interested parties and stakeholders during the national consultation period which shall run from the 23rd April 2019 to the 23rd May 2019.

The Authority appreciates that respondents may provide confidential information in their feedback to this consultation document. This information is to be included in a separate annex and should be clearly marked as confidential. Respondents are also requested to state the reasons why the information should be treated as confidential.

For the sake of openness and transparency, the MCA will publish a list of respondents to this consultation. The Authority will take the necessary steps to protect the confidentiality of all such material as soon as it is received at the MCA offices in accordance with the MCA's confidentiality guidelines and procedures⁵. Respondents are however encouraged to avoid confidential markings wherever possible.

All responses should be submitted to the Authority, in writing by not later than **12.00hrs on 23rd May 2019** and addressed to the

Chief of Operations
Malta Communications Authority
Valletta Waterfront, Pinto Wharf Floriana, FRN 1913 Malta
Tel: +356 21 336 840 Fax: +356 21 336 846
Email: coo@mca.org.mt

⁵ <https://www.mca.org.mt/articles/mcas-internal-guidelines-confidentiality>