WORKING PAPER SERIES
ISSN 2785-1079

Number 17
SEPTEMBER 2021

ECONOMIC AND TECHNICAL ISSUES IN THE ASSESSMENT OF THE REGULATORY WACC FOR UTILITIES

Alberto Dell'Acqua

Università Bocconi
GREEN
Centre for Geography, Resources, Environment, Energy and Networks

Economic and Technical Issues in the Assessment of the Regulatory WACC for Utilities

Alberto Dell'Acqua, Ph.D.[1]

GREEN Research Centre

Bocconi University

Via Rontgen, 1 – Milan, Italy

Email: alberto.dellacqua@sdabocconi.it

Discussion Paper

September 8, 2021

Abstract

In this discussion paper I review and discuss the main economic and technical issues affecting the Regulatory WACC assessment in the sector of regulated utilities. I focus on three main compelling issues (the estimation of the risk-free rate, the treatment of risky debt, the calculation of the equity risk premium), for which I analyse the proposed approach of the Italian Regulatory Authority for Energy, Networks and Environment (ARERA) and some alternative viewpoints that can fulfil the current debate. Moreover, I also analyse some minor technical issues relating the consideration of a small size risk premium in the cost of capital estimation and the optimal investment level.

[1] Although the author currently serves as Non-Executive Chairman of Italgas SpA, an Italian company regulated by the Italian Authority for Energy, Networks and Environment, this paper reflects solely the personal opinions of the author and has the objective to foster the academic and practitioners debate on the topic. No institutional position of Italgas SpA is here reported and the content of this paper could not be attributed to Italgas SpA for any possible reason. Any inappropriate use of the content of this document may be prosecuted by law.

1. The Regulatory WACC Assessment by the Italian Authority for Energy, Networks and Environment

As part of its regulatory procedures, defined by the deliberation 380/2020/R/COM, the Italian Authority for Energy, Networks and Environment (ARERA), develops a process to review the methods and the criteria for the determination and update of the remuneration rate of the invested capital (Weighted Average Cost of Capital, WACC) in the electricity and gas sectors for the second regulatory period (II PWACC), starting from January 1, 2022.

In a document released on July 15, 2021, the Italian Authority made public the guidelines for the revision of the regulatory framework of the WACC assessment, containing specific updates on some key variables (the gearing level, the beta-β assessment and the cost of debt).[2]

According to the common rules set for the European Union, the authorities regulating the sector of utilities have to adopt reasonable measures capable to grant the following objectives:

- helping in achieving, in a cost-effective manner, the development of non-discriminatory, safe, reliable and efficient systems oriented to consumers and to promote their adequacy;
- ensuring the offer of fair incentives on the short and long term to the industry players to improve the efficiency of the system performances and to promote market integration;
- favouring the transfer of benefits to consumers, that can arise from an efficient functioning of the national market, by promoting an effective competitiveness and by granting consumer protection.

In searching for the appropriate WACC for regulated utilities the regulators find themselves "between a rock and a hard place". This is due to the tension brought by the two conflicting concepts of "cost recovery", which tends to limit the WACC assessment to the recognition and coverage of the costs sustained by the average industry players, and the "fair incentive provision", which instead favours a more generous assessment of the metric to stimulate investments and to spur innovation. Moreover, the regulators have to tackle some technical issues in identifying and mixing the correct financial metrics to obtain a reliable rate of remuneration. These are issues that all the Authorities involved in regulating the utilities sector face at an international level, without local exceptions.

The aim of this paper is to review the Regulatory WACC approach adopted by the Authority and provide some additional viewpoints to enhance the related debate among academics, practitioners and corporate executives. For the purpose of more effectively discussing the main economic and technical issues of the WACC assessment, I will refer to the parameters set by the Italian Authority as a base for analysis and discussion. Nevertheless, the same concepts and reasoning that I am going to address could be effectively applied in other international regulatory contexts.

[2] ARERA, *Criteri per la determinazione e l'aggiornamento del tasso di remunerazione del capitale investito per le regolazioni infrastrutturali dei settori elettrico e gas nel secondo periodo di regolazione (II PWACC) – Orientamenti iniziali,* Documento per la consultazione 308/2021/R/COM, 15 Luglio 2021.

2. The general formulation of the Regulatory WACC

The Regulatory WACC formula has been defined by the Italian Authority in the first regulatory period (I PWACC) and will be maintained in the same version for the second regulatory period. The regulatory cost of capital is then set as follows:

$$W_{pre-tax,p,s}^{real} = Ke_{p,s}^{real} x \frac{(1 - g_{p,s})}{(1 - T_p)} + Kd_p^{real} x \frac{g_{p,s}\, x\, (1 - tc_p)}{(1 - T_p)} + F_{p,s}$$

where:

$Ke_{p,s}^{real}$ = *real cost of equity*, applied to regulated services in the electric and gas sectors

Kd_p^{real} = *real cost of debt*, applied to regulated services in the electric and gas sectors

T_p = *theoretical corporate tax rate*

Tc_p = *corporate tax rate*, to compute the tax shield of interest expenses

$g_{p,s}$ = *gearing ratio*, assumed for regulated services in the electric and gas sectors

$F_{p,s}$ = *corrective factor*, employed for the coverage of taxes on nominal profits

In the following paragraphs I am going to review and analyse in more depth the main critical economic and technical issues regarding some of the items included in the Regulatory WACC. In particular, I focus my attention on the estimation of the risk-free rate, the treatment of risky debt, the calculation of the equity risk premium. I also take into consideration and discuss some more marginal issues related to the small size risk premium and the optimal investment level.

3. Main technical and economic issues in the Regulatory WACC assessment

- *Risk-free rate*

The main technical issue in assessing the risk-free rate (RF) for the cost of capital is related to the particular contingencies of the current macroeconomic environment characterized by very low or even negative yields of government bonds. In particular the 10-year (10-Y) government bond issues, which are usually taken as a reference to estimate the average risk-free rate, are remarkably low, driving the estimation of the RF close to zero. However, a risk-free rate set to zero contradicts the economic significance of it and also the common sense applied by the investors in demanding a minimum return on the financial market. In fact, the risk-free rate should serve as a base rate to remunerate investments with a negligible risk and its existence offers an economic incentive for exchanging capital surpluses through investments. Its absence would strongly discourage the capital exchange flows on the financial market. To cope with the current extraordinary environment that drives the reference rates to zero, the Authority has just two routes: the first one is to assess a risk-free rate without anchoring it to market rates and self-defining it through an institutional attribution, while the second one is to consider a benchmark rate according to the expectations and consensus of market participants. In this respect the data collected and provided by Fernandez, Bañuls and Acin (2021) on the average and median levels of the risk-free rate, according to a survey made every year on a wide international panel of finance experts, could serve as an appropriate and effective reference (see Table 1.).

Table 1. – Risk-free rates in the main EU countries according to surveyed finance experts in 2021

Risk-free rate	Average	Median
Belgium	0.6%	0.6%
France	0.8%	0.7%
Germany	0.6%	0.4%
Italy	1.0%	1.0%
Netherlands	0.9%	1.0%
Spain	1.0%	0.9%

Source: Fernandez, Bañuls and Acin (2021).

The current risk-free rate assessment by the Italian Authority, being defined as follows, could be positioned in the middle of the two aforementioned routes:

$$(1)\quad \text{RF} = \max\left(\frac{RF^{nominal} - isr}{1+isr}; 0{,}5\%\right)$$

where:

RF = *real risk-free rate*

RF nominal = *nominal risk-free rate*, average of the 10-Y government bond yields in the Euro Area with AA credit rating (France, Belgium, Netherlands and Germany) recognized over a one-year period

isr = *inflation rate proxy*, average of the 10-Y inflation-linked interest rate swap computed on the same time horizon

In fact, the formula assesses the risk-free rate by picking the maximum value between the nominal risk-free rate observed in the financial market, properly adjusted for the inflation, and 0.5%. The value of 0.5% is a "floor" defined directly by the authority to establish a minimum level to sterilize the depressive effects of the expansionary monetary policies. In the current macroeconomic environment, it is very likely that the risk-free rate produced by the application of the formula would stick to the 0.5% "floor".

The proposed revision by the Italian Authority for the variable calculation erases the "floor" and introduces a second term of the equation which adds some additional risk premia, as follows:

$$(2)\quad RF = \left(\frac{RF^{nominal} - isr}{1+isr}\right) + \frac{CP+FP+UP}{1+ia}$$

where:

CP = *convenience premium*, calculated as the difference between the government bond yields and the corporate bond yields with the highest ratings

FP = *forward premium*, computed according to the curves of the forward rates in the same time horizon of the regulatory period

UP = *uncertainty premium*, estimated to account the higher volatility of the spot interest rates with respect to forward rates

ia = *inflation level*, determined by the ECB forecasts

The Italian Authority estimates a convenience premium equal to 1% and a forward premium equal to 0.24%. No current estimate of the uncertainty premium is available while writing this paper.

Interestingly, computing the RF by assessing the real risk-free rate and applying these additional risk premia would arguably produce a value close to the benchmark rates provided by the finance experts surveyed by Fernandez, Bañuls and Acin (2021).

- *Risky debt*

The main issue in the assessment of the cost of debt (Kd), within the Regulatory WACC, relates the concept of "risky debt" and its translation into economic and financial measures. From a financial and risk perspective, the profile of a debt characterized by higher-than-zero credit risks would implicitly mean that a positive beta of debt exists. This would lead to the following calculation of the β levered:

$$(3)\quad \beta^{levered} = \beta^{asset} + (\beta^{asset} - \beta^{debt}) \times \frac{D \times (1-t_c)}{E}$$

where:

D = *net financial debt*

E = *equity*

t_c = *corporate tax rate*

However, the beta levered formula approved and proposed by the Italian Authority follows the Hamada equation, which assumes no default risk and a beta of debt equal to zero, as follows:

$$(4)\ \beta^{levered} = \beta^{asset} * (1+(1-t_c)*D/E)$$

The choice is made by following some recent evidence, reported by Oxera (2021), which assert a negligible consideration for the average beta of debt in the utilities sector and positions it around 0 and 0.05. The argument could be strong and motivated by the fact that large utilities enjoy stable businesses, with high visibility of future cash flows, and thus transfer a very low risk to debtholders. But, a consistency problem, rather than a technical one, remains, since, on one side, the current Regulatory WACC considers a beta of debt equal to zero and, on the other side, it estimates a debt risk premium (DRP) to reward a default risk of a "risky debt", as follows:

$$(5)\ K_d^{real} = RF + DRP + CRP$$

In light of the latter argument the assessment of a debt risk premium should be matched with a positive, even if tiny, beta of debt in the calculation of the equity cost of capital.

The new proposed assessment of the Kd in the II PWACC replaces the previous cost-oriented structure with a more market-oriented structured which derives the main variables of the corporate cost of debt directly from the financial market. This new perspective requires the distinction and separated estimate of the *cost of current debt* and the *cost of future debt*. The *cost of current debt* is computed as the average yield of the iBoxx index for A and BBB-rated non-financial bond issues with 10+ and 7-10 maturities of the last ten years. Whereas, the *cost of the future debt* is determined as the sum of the average spot yield of the iBoxx index for A and BBB-rated non-financial bond issues with 10+ and 7-10 maturities with a *forward premium* and an *uncertainty premium*.

Thus, the estimation of the Kd will be as follows:

$$(6)\ Kd_{p,s}^{real} = \frac{\left(\left(iBoxx_{p,s}^{spot} + FP + UP\right) x\ \varphi_{new} + iBoxx_{p}^{10y} x\ \varphi_{old} + ADD\right) - ia}{1 + ia}$$

where:

$iBoxx_p^{spot}$ = *cost of future debt*, computed as the average spot yield of the iBoxx index for A and BBB-rated non-financial bond issues with 10+ and 7-10 maturities

$iBoxx_p^{10y}$ = *cost of current debt*, average yield of the iBoxx index for A and BBB-rated non-financial bond issues with 10+ and 7-10 maturities of the last ten year

φ_{new} = *weight of the future debt on the total debt*

φ_{old} = *weight of the current debt on the total debt*

ia = *inflation level* determined on the forecasts of the European Central Bank

FP = *forward premium*, computed according to the curves of the forward rates in the same time horizon of the regulatory period

UP = *uncertainty premium*, estimated to account the higher volatility of the spot interest rates with respect to forward rates

ADD = *additional component for the coverage of debt issue transaction costs*

This new approach establishes an innovative *mark-to-market* method to estimate the cost of debt instead of the previous approach that was more rooted on the traditional and more institutional method of estimating the cost of debt by summing up its theoretical cost components.[3]

However, this alternative method still implicitly includes the debt risk premium embedded into the iBoxx reference yields. Thus, the consistency problem of the economic treatment of risky debt still remains.

- *Equity risk premium*

The main critical issue in the assessment of the regulatory cost of equity capital (Ke) relies in the estimate of the Equity Risk Premium (ERP)[4]. The current approach used and confirmed by the Italian Authority to estimate the cost of equity determines the Market Risk Premium (MRP) as the difference between the Total Market Return (TMR) and the risk-free rate (RF). The overall formula to compute the Ke is as follows:

$$(7)\quad Ke^{real} = RF + \beta^{asset} x \left[(1 + (1 - tc) x \frac{g}{1-g}\right] x (TMR - RF) + CRP$$

[3] A deeper analysis of the methods to estimate the cost of debt following a more institutional approach is contained in Dell'Acqua A., *Corporate Debt Management*, Bocconi University Press, 2018.

[4] In this paper the ERP is defined separately from the MRP as the equity risk premium applied to account the specific risk characteristics of a corporate. Hence, it is given by the combination between the company beta and the MRP. Whereas, the Italian Authority uses the term Equity Risk Premium as a synonym of Market Risk Premium, as a general parameter for the regulated sector and not for the specific corporate.

where:

Ke^{real} = *cost of equity*, in real terms

RF = *real risk-free rate*

tc = *corporate tax rate*

g = *gearing level*, for regulated services of electricity and gas sectors

TMR = *Total Market Return*

CRP = *Country Risk Premium*

The TMR is computed by weighting the geometric average (20% weight) and arithmetic average (80% weight) of the government bond yields of countries with a high credit rating in the period 1900-2014. The MRP is obtained by deducting the RF from the TMR. Then, the ERP results from the combination of the beta levered and the MRP.

The abovementioned method follows strictly the established criteria of the classic financial literature but may have some flaws in its application to the sector of regulated utilities. This is due to their energy transition phase under compelling requests of enhancing the industry environmental standards. In fact, the adoption of historical market risk premia combined with betas derived from historical stock returns may not reflect the correct risk features of sectors in transition nowadays. Accordingly, there will be low or null incentives for the industry players to innovate and invest in energy transition projects which are, by definition, more expensive and characterized by higher uncertainty in their returns.

An alternative approach to assess the equity risk premium for regulated utilities involved in an energy transition path could be to properly adjust the equity risk premium. This could be done by adding a *transition premium* component to consider the higher uncertainty of the current and future industry scenario. To avoid some opportunistic behaviours by industry players, which could obtain this additional premium without making substantial investments in the energy transition, the premium could be defined on a variable basis (in a range of 0.5%-1%, just as an example). A variable nature of the premium, which could be then defined on an annual basis, would spur responsibility and entrepreneurship by motivating those actors with sound investment projects to make them, being sure that at least part of their investment effort and related risk will be covered by the Regulatory WACC. At the same time, this variable definition of the premium would reduce the possibility of extracting undue rents by those that instead are not willing to make investments. On a regular basis the Authority can in fact make proper investigations to monitor the development of the investment processes for energy transition and re-modulate the premium accordingly.

- *Small size risk premium*

Another issue of a relatively smaller relevance relates the possible consideration of a small size risk premium (SSRP), to be included in the assessment of the equity cost of capital. Here again the issue seems more a consistency problem rather than a technical one, since the Italian Authority discusses the possibility of considering a SSRP in the regulatory cost of debt (but then concluding that no evidence would support its inclusion) but does not discuss the same concept with reference to the equity cost of capital. However, the

need of questioning the introduction of a SSRP for the equity cost of capital is even more compelling since many industry players in the Italian, as well as in the European, utilities sector are companies of small and medium size. Hence, a SSRP should be recognized, to consider the higher risk to which the shareholders of these companies are exposed to. Moreover, many of these small industry players are also not listed on public markets and consequently the hypothesis of perfect diversification of their shareholding base could not be confirmed (a total beta measure should then replace the classic raw beta measure). However, the addition of SSRP could be justified only in presence of a small size and this would create two different costs of capital: a lower one, without the SSRP, for large companies, and a higher one, which includes the SSRP for smaller companies. This would create a bias towards the different industry players, by remunerating more the smaller ones, which are actually less prone or simply more constrained to make considerable investments. Additionally, there could be an implicit polity orientation of the Authority to reduce incentives for industry fragmentation and instead favour the consolidation of the sector. Then, the consideration of a SSRP would be against a policy of stimulating the aggregation between the different industry players and support the establishment of bigger and more efficient economic actors.

- *Optimal investment level*

A final, even if more marginal issue, in the Regulatory WACC assessment is represented by the puzzle of the optimal investment level. One of the challenges set by the Authority is indeed the search of the correct remuneration rate that could lead to reach an optimal investment level by regulated utilities. In fact, one on side, higher levels of WACC could produce an over-investment phenomenon, which could impact on the price of the service rendered, on the other side, lower levels of WACC would drive companies to under-invest, with higher price of the service in the long run. The real issue here is that it is difficult to determine ex-ante the optimal investment level for corporates. More appropriately, determining in advance a theoretical optimal investment level would act as a self-fulfilling prophecy: the optimal investment level could simply result from the application of the Regulatory WACC in the investment selection. Thus, once the Regulatory WACC is defined, corporate executives will screen their investment opportunities by selecting solely those investments with a ROI net of taxes equal or lower than the Regulatory WACC and set aside those with a ROI net of taxes higher than the Regulatory WACC. The sum of the financial requirements requested by the selected investments will determine the additional invested capital, to be financed by a mix of debt and equity according to the optimal capital structure. The only discrepancy which may lead to a different investment level is related to the presence of financial constraints that could reduce the investment capabilities of some industry players. In this respect, the odds of a possible under-investment are higher than a possible over-investment. As such, in the opinion of this author, the Authority should not target an optimal investment level for the industry in its WACC assessment exercise, but should rather work more on finding the right balance between a “cost recovery” policy and a “fair incentive provision” policy. The optimal investment level will then come naturally as a result of the implemented policy.

Conclusions

The revision and discussion of the main economic and technical issues in the Regulatory WACC assessment for regulated utilities brought to highlight some key topics. For each of them I hereby provide some concluding remarks:

- *Risk-free rate*: the main puzzle here relates the choice between a direct institutional attribution versus an indirect benchmark rate that embeds the consensus and expectations of market participants. The current proposed approach of the Italian Authority seems to be positioned in between the two different approaches.

- *Risky debt*: the implicit assumption of risky debt would suggest the inclusion of a beta of debt, even if tiny, in the β levered computation. This would make the weighted average cost of capital more coherent with the inner risk features of corporate financing. Hence, this looks more a problem related to the internal consistency of the cost of capital formulation rather than a technical problem.

- *Equity risk premium*: In the assessment of the cost of equity, a *transition premium* could be considered to better relate the projected return with the higher profile of risk of the energy transition in the utilities' sector. This additional premium could also serve to better align the cost of equity structure to the new proposed structure of the cost of debt. Otherwise, the new cost of debt will be assessed by applying a market-oriented structure while the cost of equity will remain anchored to a cost-oriented structure, thus creating an internal discrepancy and asymmetry between the two cost of capital items.

More in general, what seems to emerge in the current regulatory revision of the Regulatory WACC is a hidden clash between a "top-down"/institutional approach and a "bottom up"/market-based approach. This clash is probably brought in by the translation of the concepts of "cost recovery" and "fair incentive provision" to a more executive and applicative level. In the Italian case, the Authority seems now trying to evolve from a pure institutional approach to a more market-based approach, positioning its Regulatory WACC assessment exercise "half of the way" between the two different approaches. In the following months more analysis and debate will probably help in defining the final positioning of the Regulatory WACC assessment.

References

ARERA, *Criteri per la determinazione e l'aggiornamento del tasso di remunerazione del capitale investito per le regolazioni infrastrutturali dei settori elettrico e gas nel secondo periodo di regolazione (II PWACC) – Orientamenti iniziali,* Documento per la consultazione 308/2021/R/COM, 15 Luglio 2021.

Dell'Acqua A., *Corporate Debt Management*, Bocconi University Press, 2018.

Fernandez P., Bañuls S., Acin P.F., *Survey: Market Risk Premium and Risk-Free Rate used for 88 countries in 2021*, IESE Business School Working Paper, 2021.

Oxera Consulting LLP, *Methodological Review of the Cost of Capital Estimation,* June 2021.

GREEN
Centre for Geography, Resources, Environment, Energy and Networks
via Röntgen, 1
20136 Milano - Italia

www.green.unibocconi.eu