ANALYSIS OF FLEXIBLE-TERM CONTRACTS

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The effect of the time, the level of investment and the demand variability

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ABSTRACT

This paper brings a financial analysis of flexible-term contracts in road franchises. We intend to show the influence of key deterministic variables in the financial results of the projects by using Monte-Carlo simulation, in which the traffic level is the main stochastic variable. The deterministic variables are: the project life; the maximum project life extension; the initial investment; and the demand variability of the project. The results of the simulations show some interesting effects of flexible-term mechanisms, such as the reduced efficiency in scenarios of high demand variability or in projects with long project lives.

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ARTICLE TITLE:

Analysis of Flexible-Term Contracts
1. INTRODUCTION

Public-private partnerships (PPPs) have been used both in developed and developing countries for a long time, in many different forms and for different reasons. Over the last 20 years, developing countries such as Chile, Argentina, Brazil and Mexico relied on PPPs mainly to overcome the lack of public funds for infrastructure projects and to obtain efficiency gains having the private sector running the business. However, the private participation is not free of problems, especially because of the informational asymmetry between the partners and the different risks of a project when it is undertaken as a PPP.

The use of PPPs is quite widespread in the provision of transport infrastructure. Traditionally, in developing countries, concession contracts are used to transfer to the private sector the responsibility for financing, building and operating a road infrastructure for a fixed term. The transfer normally includes both the costs and the risks of the projects. As the revenues of the projects are generally dependent on the demand on the road, one of the most important risks of road projects is the traffic risk.

The expression “traffic risk”, in this paper, refers to the probability of the traffic on the road infrastructure assuming values different than those forecast, causing some volatility in the indicators of the road project (revenues, profits, etc.).

In the mid 1990’s, with a simple but ingenious idea, Engel, Fischer and Galetovic (EFG) (Engel, et al., 1996, 1997a, 1997b, 2001) proposed a new model of auction that intends to implement more efficient contracts and has the reduction of the traffic risk as one of its most notable outcomes. In EFG’s model, the contract term is flexible and varies according to the present value of revenues from the users’ payments. A few years after, Nombela and De Rus proposed a variation of the EFG’s model (Nombela & de
Rus, 2001, 2004), adopting net revenues instead of gross revenues as the reference for the end of the contract. The changes introduced in the new model make it more efficient and reduce the uncertainty about operational and maintenance expenses in the road project.

This paper presents a financial analysis of the returns for investments in hypothetical road concessions with flexible-term contracts. The results analysed consider the project cash flows and the cash flows for equity investments. Three models have been used, one for each of the two flexible-term contracts and one for a traditional fixed-term contract. The influence of four key factors has been analysed: the project life; the maximum project life extension; the initial investment; and the demand variability for the project.

The section 2 of this paper presents a brief review of the literature about flexible-term contracts, their benefits and disadvantages. Section 3 describes the method used to simulate the results, including the structure of the simulation models, the variables and the assumptions used. Section 4 presents an analysis of the results found. The last section brings the concluding remarks of the paper.

2. FLEXIBLE-TERM CONTRACTS

Flexible-term mechanisms have been used since the 1980s in the United Kingdom, to overcome the problems caused by the uncertainty about the demand for road infrastructure projects (Engel, et al., 1997e). Despite the real experiences during the 1980s, the development of a franchising mechanisms based on the use of flexible-term contracts has its origins a few years later, in the works of Engel, Fischer and Galetovic (EFG).
EFG’s model is called Least Present Value of Revenue (LPVR); the name comes from the selection criteria used in the auction mechanism. In an LPVR auction, the government franchisor (regulator) fixes the user fees and the firms bid on the present value of revenues to be generated by charging the users of the road. The concession term ends when the present value of the revenues of the project equals the value of the winner’s bid. As the revenues are assessed by their present value, the discount rate used must be a good estimation of the cost of capital for investments in the projects (Engel, et al., 1996).

In order to make their mechanism more suitable for road concession in urban areas, Engel, Fischer and Galetovic (Engel, et al., 1997a) introduced some changes in the model. The authors proposed the use of a range of values for the fees charged instead of using just one value, so that the demand could be managed by charging different values for peak and off-peak hours, for instance. The other change introduced is the use of a limit for the extension of the concession term. Without the limit, a concession with flexible-term contract could last forever in situations of extreme low demand.

Nombela and De Rus (Nombela & de Rus, 2001, 2004) proposed a new auction model based on the idea developed by Engel, Fischer and Galetovic. This model is called Least Present Value of Net Revenues (LPVNR) and intends to improve EFG’s model by introducing the use of the present value of the net revenues instead of the gross revenues as the trigger for the end of the contract. The authors demonstrate that the use of LPVNR mechanism lead to the selection of the more efficient firm to be the concessionaire. Also, the use of net revenues as the reference for the end of the contract reduces the uncertainty about operational and maintenance expenses in the road project, reducing the risks for the concessionaire.
The auction model developed by Nombela and De Rus uses a two-dimensional bid scheme. The firms participating in the auction must submit a sealed-envelope containing two values: a) the total revenues to be obtained from the concession; and b) the average annual costs for maintenance and operation of the road. The winner is selected according to the total expected costs. However, to obtain the total expected costs it would be necessary to know ex-ante the duration of the contract. As it is not possible for flexible-term concessions, the authors suggest the use of a range of values for the duration.

Izquierdo and Vassallo (Izquierdo & Vassallo, 2002) proposed a small variation of the flexible-term models, to be used in concession with short term. However, in their proposal, the structure of EFG’s model is not changed, it just includes a payment by the government at the end of the contract.

2.1. Advantages and drawbacks

Flexible-term contracts have a series of advantages over traditional contracts. However, they also present problems. Among the most relevant benefits of flexible term contracts are:

- The selection of the most efficient firm – Nombela & de Rus (Nombela & de Rus, 2004) demonstrate that auctions for traditional fixed-term contracts may not select the most efficient bidder, neither in a minimum price (fee) auction nor in an auction with bids on the payment for the franchisor.

- Reduction in the winner’s curse – At least in what concerns optimism about the demand, winners’ curse is reduced. Tirole (1997) states that since there is no need for traffic forecasts to bid for flexible-term contracts, the problem of
optimistic demand bids is eliminated, and the firms would be more concerned about cost control.

- Lower incentives for opportunistic bids – Engel, Fischer, & Galetovic (Engel, et al., 1996, 1997b) and Nombela & de Rus (Nombela & de Rus, 2004) argue the flexible-term contracts reduces the incentives the firms have in traditional auctions to use opportunistic bids and look for compensations in the future, as they would not have any gains in doing that. The reason for this is the transparent and easy method to valuate a fair compensation for the concessionaire when a renegotiation takes place.

- Reduction in the economic loss due to excessive information collection – Engel, Fischer & Galetovic (Engel, et al., 1996) argue that when a flexible-term contract is used, the only demand forecast need has viability purposes. Besides the reduction of expenditures in demand studies undertaken by the bidders, the authors (Engel, et al., 1997a, 1997b) argue the information need for the regulatory task is also reduced, as the costs do not need to be verified.

- Simplicity of the auction mechanisms and contract rules – bidders have just one concern, the costs of the project. Also, the basic rules of the contract are easy and clear, such as the compensations for early termination or renegotiation.

- Reduction of the traffic risk – The most remarkable benefit of flexible-term contracts is the reduction of the traffic risk allocated to the investors. The highlight in this benefit is not without a reason. One important problem of fixed-term contracts (and the cause of some other problems) is the uncertainty of demand forecasts for a long term (e.g. 20 years), such those presented in road projects.
On the other hand, the most important problems that come with flexible-term contracts are:

- Limitation in compensating losses – In scenarios of low demand, the concession term could last forever, if not limited, and even though the investment would not be all recovered. Engel, Fischer and Galetovic (Engel, et al., 1997a) see this as a positive point of flexible-term mechanisms, as it would be helpful in creating an incentive against “white elephant” projects. However, the limitation of flexible-term mechanisms causes a negative skewness in the probability distribution of the returns and reduces the expected value of the returns. These two effects would have a cost, possibly with effect on the cost of capital.

- Reduced incentive for commercial efforts and maintenance of the quality standards – Engel, Fischer, & Galetovic (Engel, et al., 1996, 1997a, 1997b, 1997c, 1997d) state that, as the concessionaires are protected from demand loss, they do not have incentives to increase or even maintain the traffic level. The lack of incentive can induce the concessionaire to reduce its costs investing less in quality, as the demand lost because of the low quality would be compensated by the term extension.

3. FLEXIBLE-TERM CONTRACTS ASSESSMENT

The analysis of the contract models in this work has been based on the results obtained by the simulation of different projects, using Monte-Carlo Simulation (MCS). MCS has been undertaken to generate the outputs of the models as distributions of probability. Three financial models have been created for the simulations: one for a fixed-term
contract; one for the model developed by Engel, Fischer & Galetovic; and one for the model developed by Nombela & De Rus.

The results are influenced by a wide variety of factors; however, it would be impossible to analyse all of them. In this work, we focus on the effect of four deterministic variables: the project life; the maximum project life extension; the initial investment; and the variability the demand in the first year could present. The only stochastic variable of the models is the volume of traffic on the road, and it depends on the variability of the demand of the project.

The literature about flexible-term contracts discusses a series of benefits and problems that would have impact on the franchising of road projects. The analysis in this work focuses on financial outputs of the projects and left aside the analysis of other important issues. In the decision about the contract model to be used, however, the benefits brought to the regulator and the whole society, such as those stemmed from the auction method and the simplicity and transparency of the contract rules, may be decisive.

3.1. Simulation models

The simulation models are financial models that have the project life determined according to the rules set by the contract models. They have been built in Excel spreadsheets and share data relative to the traffic, input costs (investments, fixed costs and the unitary variable costs), cost of capital, taxation, and basic financial information. The specific parts of each model include: the debit repayment schedule; depreciation for each year; profit and loss account; and the cash-flow statement.

The project life of each of the flexible-term models varies according to the demand in each iteration of the Monte-Carlo simulations. The end of one contract is determined at
the end of the month within which the present value of the revenues (for the EFG’s model or the net revenues for Nombela and De Rus’ model) equals the value used as the “auction’s winner bid”, calculated as described further in this paper. The use of the end of the month as the reference have been chosen to overcome some problems that could be found in real life when using one vehicle or a day as the reference (high uncertainty in forecasting the end of the contract).

The outputs of the model are the net present value of the cash flows of the project before financing, called project results, and the net present value of the cash flows for equity investment (equity investments and the dividends paid). The cash flows have been obtained using a capital structure of 60% debt and 40% equity, with the debt interest rate set at 50% of the value of the equity cost of capital, set at 11%. The debt maturity is set equal to the equivalent to 60% of the duration of the fixed-term concession and the grace period is equal to zero. All these factors have influence on the results.

The gearing (ratio between the amount of debt and equity capital) influence the value of the toll charged as it is determinant in the calculation of the weighted average cost of capital (WACC) for the projects as well as influence the risk for the equity investor: the higher the gearing, the higher the risk for the equity investor. The ratio 60/40 used in the models was chosen to represent the maximum gearing road projects could have to be eligible for loans provided by the Brazilian National Development Bank (BNDES). The Brazilian reality is used to set not only the limits for the gearing ratio, but also for most of the models’ parameters values and constrains.

The cost of debt (interest rates) has direct influence on the costs of the whole concession, with impact on the value of the toll (used in the WACC calculation). The
value of 50% has been chosen as it represents an almost general rule for debt contracts for road concessions with a gearing of 60/40 in Brazil.

The maturity of the debt contracts has been set as the longest possible. Longer maturities would result in lower costs for the concessions, as the interests paid can be discounted from the profits, reducing the tax to be paid. However, there is a limit for the maturity. In the Brazilian market, for instance, it is difficult to obtain debt contracts with maturity longer than 10-12 years, even for project with life of 30 years or more.

The tax rate is set at 30% and the tax credit that can be carried forward is set at the same level. The depreciation rule follows the method used in first round of road concessions in Brazil, where all the investments must be depreciated within the contract term and tax savings can be increased with the inflation. Thus, for the fixed-term model, investments made in the first year are depreciated in 20 years; those made in the second year are depreciated in 19 years and so on. As the flexible-term contracts do not have a specific duration, at the end of each year the expected contract duration is calculated, using the traffic on the road in that year and the expected growth rates for the following years. Thus, if the demand is higher than the forecasts, the duration would be shorter and the depreciation higher.

The values used for the cost of capital and discount rates are all in real terms. Inflation rates are not used in the simulations. This simplification of the models is particularly facilitated by the possibility of increasing tax savings with inflation, as all the costs and revenues would be increased. Thus, the values to be depreciated every year can be easily calculated by the total value to be depreciated divided by the depreciation period. Eventual cash flow shortfalls that the projects may have are compensated with equity investments. Although this compensation mechanism may seem too extreme in the protection of debt holders and risky for equity investors, it is common in project finance
analysis. One must notice that these investments and risks can be transferred to other investors by the emission of bonds by the equity investors, for instance.

3.2. Projects and simulations

The analysis of the models has been made by the comparison of different projects that share common characteristics. The variables of the projects are:

- [Expected] Project Life – the projects are structured considering a pre-defined life. For the fixed-term model, the project life is equivalent to the duration of the contract. For flexible-term models it is used just as a reference, but has an important role for all the contract models as it is used to calculate the toll charged. Four levels of project life have been used: 10, 15, 20 and 25 years.

- Maximum project life extension (MPLE) – a limit for the duration of the contracts has been used for the flexible-term models. It is defined as the maximum extension over the expected project life. Five levels of MPLE have been used: 20%, 40%, 60%, 80% and 100% of the project life.

- Initial investments – the investments necessary for construction, rehabilitation or just to start the operation of the projects. Four levels of initial investment have been used: $75,000,000, $150,000,000, $225,000,000 and $300,000,000.

- First year demand variability – three levels of demand variability have been used to compose the projects: 0.05, 0.15 and 0.25. The variability is described by the coefficient of variation (Standard deviation/Mean) of the traffic in the first year. They intend to represent the variability of the actual demand and are relative to the value (mean) the traffic in the first year is expected to assume.
39 different projects have been built for the analyses, all of them with the cost of capital set at 11%. This value life is in line with those found in road concessions in Brazil. To better represent the “real-life experience”, operation and maintenance costs (O&M) were divided into fixed ($3,000,000.00 p.a., valid for all the project life) and variable elements, which include those costs that are relative to one car (charging costs, pavement wearing, services, etc.) and those relative to the value charged (supervision fees and other forms of compulsory contribution). The variable elements are equivalent to $8,751,152.60 for the first year ($0.58 for each vehicle).

Prior to the Monte Carlo simulations, the value of the toll for each project has been calculated. It is set at the exact value need to cover the construction, operation and maintenance costs, the debt service, to pay all the taxes and to give the equity investors a return equivalent to the cost of capital. The traffic used in the toll definition is the expected value for the project.

The “auction’s winner bid” is calculated for each flexible-term model as the present value of the revenues or net revenues of the project. The values are obtained using the value of the toll and all the information used to calculate it.

Although a number of different traffic growth profiles could be used to represent the expected traffic on the road project, we decided to choose a simple linear growth, in order to make the model simpler. The values assumed by the traffic in the first year follow a bell shape variability distribution with mean equal to the expected value (forecast) for that period – 15,000,000 vehicles. The variability distribution has been limited in a minimum of 0 (zero) and the maximum in 30,000,000 vehicles. The standard deviation is set according to the demand variability of the project and can be equal to 750,000 (CV 0.05), 2,250,000 (CV 0.15) or 3,750,000 vehicles (CV 0.25).
The traffic for the other years of the project has been calculated using an expected 3% growth for each year. However, in the simulations, the traffic growth of each year is described by a bell shape variability distribution with mean equal to the expected value (3%) and standard deviation equal to 3%. The variability distribution has been limited in the bottom by a growth rate of –100% and the upper limit was set at +106% (symmetrical distribution with central value of 3%). The maximum traffic volume on the road has been set at 65,000,000 vehicles.

For each Monte Carlo simulation iteration, the traffic of each year is sampled using Latin Hypercube Sampling (LHS). As the intention of this paper is to analyse the models under the same conditions, all the projects have been simulated using the same values for the demand in each iteration of the MCS. This was possible using the same seed to generate the random numbers used for the LHS. Each simulation uses 2,000 iterations, sufficient for the convergence of the results, according to tests we have undertaken with the models.

The level of convergence used in the analysis is of 0.1% change in the value of the means considering updates with 50 iterations. That means that the introduction of the results of 50 new iterations using the same sampling method would not change the mean in more than 0.1%. The analysis of the results must consider that differences of about 0.1% in the means, positive or negative, could be attributed to imprecision of the MCS.

4. SIMULATIONS RESULTS AND ANALYSIS

The results of the simulations were grouped in Table 1, Table 2 and Table 3, with sub-groups according to the level of demand variability in the first year and the output analysed (project or equity returns). The results are described and analysed using both
the variability (standard deviation and the coefficient of variation) and the central value (mean of the results and also the difference for the investment made).

One general characteristic of the results is the difference between the initial investment and the results (means) of the fixed-term model. Some really small distortions can be attributed to the imprecision of the Monte-Carlo method. Higher differences in this case can be explained by the distortions caused by the taxation and depreciation rules on the cash flows.

The first distortion comes from the fact that the depreciation and tax credits loose their value over time (they are increased by the inflation rates, but do not consider real interest rates); the longer the depreciation period or the later the eventual tax credits start to be used, the bigger the loss. As this distortion causes just losses, the means of the results were expected to be lower than the initial investments. The second distortion comes from the fact that, in some low demand situations, the tax credits may not be fully used until the end of the contract term, and the residual value could be seen as a loss.

Although the effect of the distortions may be easily noticed when analysing the results of the fixed-term model, it also affects flexible-term models. However, these models are affected in a more complex way, as the contract term may be extended and contracted, relieving or increasing the distortions.

Another general characteristic of the results is that, considering the assumption of same cost of capital for flexible-term and fixed-term concessions, flexible-term models present lower returns than those presented by the fixed-term model. The difference should not be misinterpreted as the gains obtained by the extraction of the information rent when the new auction models developed are used. This consequence can be
explained by the limitation of flexible-term mechanisms in compensating extreme low demand situations, especially within a practical period of term extension.

The limitation of flexible-term mechanisms causes a negative skewness in the probability distribution of the returns and reduces the means of the results. When analysing the investment in projects with flexible-term contracts, investors would adjust their prices to compensate such differences. To avoid the problem of the reduced means, policy makers involved with the financial design of concession projects using flexible-term contracts should consider the differences, possibly introducing a small increase in the value of the toll.

On the other hand, it must be borne in mind that flexible-term concessions present lower variability in the results and, consequently, would potentially have lower costs of capital. Thus, the interest rate used to discount the cash flows of a flexible-term concession should be lower than that used for a fixed-term concession, increasing the net present value of the returns. These differences make necessary some attention when comparing values between different models.

Unfortunately, so far we have no precise studies about how much would be the difference between the cost of capital for fixed and flexible-term concessions. The values presented by EFG (Engel, et al., 1996) (reductions of up to 64.6% in the cost of capital) may not be reliable as the authors consider the traffic risk as the only influence over the cost of capital and that all this risk would be eliminated. Also, the authors assume that the variability in the time would not affect the cost of capital. As we do not know how big is the real impact of flexible-term mechanisms on the cost of capital, we do not draw final conclusions about the limits for the use of flexible-term contracts.

The last general characteristic is the similarity between the flexible-term models results. The values and the patterns of the flexible-term models results are very similar and,
except in very special circumstances, the LPVR model produces higher values for the means and for the variabilities than those produced by the LPVNR model.

4.1 Project Life

The results presented in the Table 1 show a different pattern for the means of the fixed and flexible-term models’ results. For fixed-term model, the effect of longer project lives is a reduction in the differences between the means and the values invested in the project. This effect can be explained by the diminution in the significance of the second distortion described before.

When a project has a longer contract term, it is unlikely that, at its end, there will be any tax credit still to be used. The reduction in the effect of the second distortion seems to overcome the effects of the first distortion (which is increased as projects with long lives have lower levels of net revenues and are more likely to have losses in the first years).

However, for flexible-term contracts, except for the cases when the demand variability is small, the pattern presented by the results’ means is absolutely opposite to those of the fixed-term model: the longer the project lives, the bigger the difference between the means and the value invested in the project. The effect of the distortions observed in the fixed-term model’ results is also present in the flexible-term models’ results, however, another important effect is more significant.

The pattern presented by flexible-term models’ results can be better explained by the higher discount applied to future cash flows. The further in the future a cash flow is, the lower is its value. Thus, additional cash flows obtained by the extension of the concession term are less significant the longer the project life. This lower significance
makes flexible-term mechanisms less efficient in their task of compensating low demand situations, as more years would be necessary to compensate losses.

Although presenting opposite patterns for the models results’ means, the models results’ variability patterns are the same for fixed and flexible-term models: the longer the project life, the higher the variability. This pattern stems from the possibility of more extreme results (big losses and gains) with longer project lives, what spreads the results’ probability distributions.

4.2 Maximum project life extension

As it could be expected, the results presented in the Table 2 show that the longer the maximum project life extension, the lower the difference between the initial investments and the present value of the returns of flexible-term models and lower the results’ variability. This happens because long extensions would help in compensating some of the extreme low demand situation, improving the means and reducing the variability of the results.

4.3 Initial investment

The results presented in the Table 3 show a common pattern for all the models: higher initial investments reduce the difference between the initial investments and the present value of the returns. Higher initial investments also reduce the variability of the results. The results presented by the models for projects with low initial investments are especially significant. Projects like these have lower levels of net revenues compared to
those demanding higher investments; and lower levels of net revenues lead to more tax distortions.

Due to the characteristic of LPVNR contracts of having their duration linked to the present value of net revenues, it will be necessary more years to compensate losses and gains the lower the level of net revenues. As the gains are more efficiently compensated than the losses, projects with LPVNR contracts are more sensitive to the level of investment in the projects, presenting worst results than those with LPVR or fixed-term contracts.

4.4 Demand variability

The effect of the project life, the maximum project life extension and the initial investment is influenced by the demand variability, among other factors. Higher levels of demand variability lead to lower results’ means and higher variability of them. For the fixed-term model, the higher variability leads to more situations in which both the distortions discussed above occur, reducing the means. For the flexible-term models, the lower means and the higher variability of the results when the variability is higher have also another source: the limitation of flexible-term mechanisms in compensating extreme low demand situations, which are more frequent the higher the demand variability.

Higher levels of demand variability amplify the effects of the project life, maximum project life extension and initial investment. However, it is when the demand variability is set at the lower level (5%) that some important results are obtained. At this level, the patterns presented by the models can be changed.
For the LPVR model, for both the equity investments and the project, and for the LPVNR model, for the project, when the project life is changed from 10 to 15 years the difference between the initial investment and the results’ means is reduced, contrary to the general pattern presented by the models. It can be explained by efficiency of the flexible-term models in scenarios of low demand variability. In such scenarios, the occurrence of extreme low demand situations is highly improbable, reducing the cases in which the compensation provided by the mechanisms is not ideal. Thus, the effect of the distortions described before become more evident, and the flexible-term models show a performance similar to the fixed-term model.

Another important fact linked to low demand variability and the flexible-term models is the maximum project life extension needed. As one can see, the results’ means do not change when the limit for the extension is over 60%. This indicate that it would not be necessary to allow extensions longer than 60% of the project life in projects with low demand variability, as there would be no gains in doing that.

Even considering projects with lower level of investment as extreme cases, it is remarkable the effect of the demand variability on these projects results. When the traffic risk is high, flexible-term mechanisms are unable to compensate some extreme losses and the models present extremely unfavourable results, such as the differences of more than 12%, for the LPVR model, and 13%, for the LPVNR.

One must remember that demand variability of 0.25 is not unlikely. The results presented by Standard & Poor’s (Standard & Poor's, 2004) show that, in a sample of 87 projects analysed, the mean of the actual traffic at the end of the first year in toll road projects was 24% below the forecasts. The coefficient of variation of the results was of more than 0.342 (standard deviation of 0.26)!
5. CONCLUDING REMARKS

The development of flexible-term mechanisms and auctions based on them can be celebrated as an important achievement in public-private partnerships. The use of these models is important in reducing important problems normally experienced in traditional auction mechanisms. But there is a price to pay in adopting such a strategy.

This paper shed some light on the impact of the flexible-term contracts on financial outputs of franchising projects in different scenarios. We have shown that the use of flexible-term contracts produce returns lower than those presented by fixed-term contracts. It is important to remember that this consequence should not be misinterpreted as the gains obtained by the extraction of the information rent when the new auction models developed are used; it stems from the limitation of flexible-term mechanisms in compensating extreme low demand situations.

When analysing the investment in projects with flexible-term contracts, investors would adjust their prices to compensate the skewness in the probability distribution of the returns and reduced means of the results caused by the biggest flexible-term mechanisms weakness. Policy makers involved with concession projects using flexible-term contracts should consider this Achilles' heel, possibly introducing a small increase in the value of the toll. However, it must be also bear in mind that flexible-term contracts have other benefits, such as: the lower incentives for opportunistic bids; reduction in the economic loss due to excessive information collection; simplicity and transparency of the auction mechanisms and contract rules. All of these benefits could be determinant in the decision of using EFG’s or Nombela and De Rus’ models.

Even flexible-term models not eliminating the traffic risk, the variability of their results is lower. Although we have no complete studies about the effects of flexible-term
mechanisms on the cost of capital, the reduction in the results’ variability is a good indicative: it could result in reductions in the cost of capital for the projects. On the other hand, it is necessary to analyse another facet of the flexible-term investments: the variability in the contract term also present some risk for the investors. The determination of the impact of flexible-term contracts on the cost of capital is one of the defying tasks in the development of the models.

Flexible-term contracts are still a recent development. As such, for the fully comprehension of them it is essential to go further in the analysis of the models and in the promotion of their correct use, knowing in which situations it would be better to adopt flexible-term mechanisms.

REFERENCES


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<th>Std Dev (C)</th>
<th>Difference (B-A)/(A)</th>
<th>Coef Variation (C/B)</th>
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<tbody>
<tr>
<td>Project Life</td>
<td>Equity FCF IRR Initial Equity Investment (A)</td>
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<td>LPVR</td>
<td>LPVNR</td>
<td>Fixed</td>
<td>LPVR</td>
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<th>Std Dev (C)</th>
<th>Difference (B-A)/(A)</th>
<th>Coef Variation (C/B)</th>
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<td>Equity FCF IRR Initial Equity Investment (A)</td>
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<td>LPVNR</td>
<td>Fixed</td>
<td>LPVR</td>
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<td>LPVNR</td>
<td>Fixed LPVNR</td>
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<tr>
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<td>R$ 60,000,000</td>
<td>59,696,428.29</td>
<td>57,719,097.96</td>
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Table 2 - Effect of the Maximum Project Life Extension in the results
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<th>Difference (B-A)/(A)</th>
<th>Coef Variation (C/B)</th>
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<td>Equity</td>
<td>FCF</td>
<td>IRR</td>
<td>Initial Investment (A)</td>
<td>Fixed</td>
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<td>28.425.212,60</td>
<td>-0,895% -5,249% -6,284% 0,380 0,224 0,204</td>
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<tr>
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<td>11,00%</td>
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<tr>
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<td>FCF</td>
<td>IRR</td>
<td>Initial Investment (A)</td>
<td>Fixed</td>
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<th>Std Dev (C)</th>
<th>Difference (B-A)/(A)</th>
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<td>IRR</td>
<td>Initial Investment (A)</td>
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</table>

Table 3 - Effect of the level of Initial Investment in the results