

Transaction Costs in the Infrastructure Finance - Literature Review and Proposal for New Studies

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Abstract.

The main objective of this study is to gather the most relevant contributions of the academic literature seizing the transaction costs of the bank financing to the infrastructure, in the search of possible new lines of research. The effort is permeable to the vast literature that deals with the three issues separately - transaction costs, bank financing and infrastructure – but especially the one that grasps them together. A systematic, integrative approach is the methodology in place to get a summary of how transaction costs of infrastructure finance have been studied, presenting, in the end, a reasoned perception that it has been neglected (literature gap) quantitative researches measuring how transaction costs vary in the infrastructure finance contracts (called project finance contracts – PFCs). In addition to positioning itself as central focus, literature revision and the unveil of a gap on it conduct to a proposal of new studies, including suggestions of a theoretical model, of a methodology and a hypothesis test that seek to deepen scientific and practical knowledge regarding the subject. Theoretical model, methodology and hypothesis test close the present study in an indicative way, but not before the reflection on the reasons that justify its persecution. The interest stems from understanding how the transaction costs affect borrowers, lenders and the society in general, since infrastructures like roads, railroads, ports, airports, energy generation and transmission, communication facilities are of public interest. The study also transcends national boundaries, since infrastructure opportunities account for a large part of country-oriented Foreign Direct Investment (FDI).

Keywords: infrastructure, financing, banking, transaction-costs, FDI

I- Introduction

The focus of this research is on transaction costs in infrastructure bank financing. Given the significant amounts that easily exceed tens or even hundreds of millions in financial resources, transaction costs have captured the attention of studies addressing the issue (Jean Tirole, 2007; Cheikrhouchou et al, 2007; Jones, Jones & Hertova, 2008; Sawant, 2009; Annamalai & Jain, 2013). The literary review emphasizes the main inquisitions on the subject, the advances of each of them, as well as topics little or not yet addressed. There is a greater interest in transaction costs related to financing agreements between debtors (also known as investors, borrowers or financed) and banks (also known as lenders or financiers), the financial conditions and any non-financial compliance they require before and after signing the financing contract, which in one way or another affects society as a whole, not only by creating new plants for use, such as roads, hospitals, power transmission routes, etc., but also by environmental and social obligations (anti-corruption safeguards, for example).

The modality (contractual relations) is one of those indicated by the classic literature of transaction costs (Williamson, 1895). Typical infrastructure finance contracts, usually involving multiple lender banks, are known as project finance contracts (PFCs) (Buljevich & Park, 1999; Brealey, Cooper & Habib, 1996; Kleimeier & Megginson, 2000; Kim & Yoo, 2008 (Sawant, 2009). To review and summarize the literature on the subject and open new lines of research, the study will address issues such as reasons why PFCs attract debtors/financed and banks/financiers to establish complex, idiosyncratic contractual relationships, such as, which engines define the conditions for such contracts for both parties and, lastly, what ways to check how the transaction costs of these contracts behave.

The research finds academic and practical justifications. It presents, in the first perspective, a summary and a literary void, and then suggests tools for future studies (theoretical model, methodology and hypothesis testing) to measure how transaction costs of bank financing for the infrastructure segment fluctuate quantitatively. Innovates as most of the literature on the subject assumes the fact of oscillation, without showing exactly what PFCs transaction costs are and how they oscillate. In the second perspective, it allows banks, borrowers and society at large to gain knowledge how the interests of each party are encumbered or not. As already mentioned, given the value of investments, scholars and managers are sensitive to transaction costs related to this aspect.

This study is divided into five movements, (i) the present introduction, (ii) description of the methodology used for bibliographic research and review, (iii) the bibliographic review itself, (iv) conclusions and (v) proposal for further studies. II - Methodology of the literature review

Botelho, Cunha and Macedo (2011) emphasize that the integrative review method enables the systematization of scientific knowledge so that the researcher approaches the problem he wants to appreciate, drawing a panorama on scientific production, knowing the evolution of the theme throughout of time and possible research opportunities.

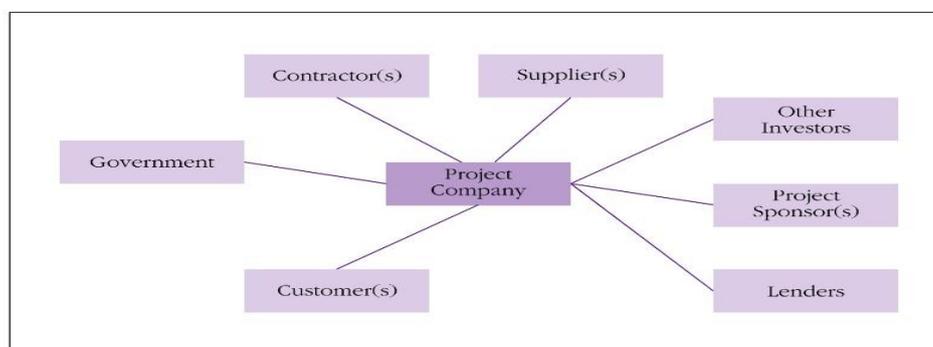
To achieve such results, Botelho, Cunha and Macedo (2011) discuss specificity (of the question), uniformity, criterion and reproducibility (of sources, selection and synthesis).

Any reflection, including a research question, becomes relevant only if the current stage of scientific production on the subject is known (Brizola & Fantin, 2016). The collective form is, par excellence, the way to the production of knowledge (Lèvy, 2000). Consensus, gaps and controversies are the findings (Bizola & Fantin, 2016). One of the crucial points to be well tracked and achieve the expected results is the selection of the best works and their comparison (Mazotti & Gerwandsznajder, 2000). For Brizola & Fantin (2016), already mentioned, a careful bibliographic review allows a better delimitation of a research problem, assisting in its investigation, verifying paths never followed, works already done, starting with new approaches, avoiding doing more of the same and that work therefore becomes irrelevant. In any case, it is important to note that the literature revision work will never be entirely original, because it is based on previous works (Brizola & Fantin, 2016).

The present study, according to the above, intends a systematic, integrative literature review, comprising distinct but correlated steps, (a) identification of stakeholders, (b) delimitation of sources and modes of research, (c) the evaluation of the selected studies, (d) the production of a synthesis of the results and (e) the conclusion of the study (Brizola & Fantin, 2016). Levy & Ellis (2006) propose a similar flow, as Biolchini et al (2007), who summarize the systematic review in three steps, basically planning, execution and analysis of results. In all of them, the intention is to map, critically evaluate, consolidate and aggregate the results of relevant studies of a specific topic, presenting a synthesis or a coherent report (Morandi & Camargo, 2015).

Stakeholders of the literary review (Morandi & Camargo, 2015), conform people, groups or communities to whom the research is echoed, that is, answer current questions or concerns. Participants of a typical PFC are summarized in Figure 1.

Figure 1: participants of a typical PFC



Source: Brealey, Cooper & Habib (1996)

Regarding the delimitation and sources, the research was conducted through an electronic tool on the Internet (Web of Science), where the expressions used were “transaction costs”, (and) “infrastructure finance”, (and) “bank finance”, (and) project finance contracts. The search was restricted to articles related to the Business and Economics areas, and the main topics of the articles (keywords), as presented by the search result in the electronic tool were, in order, infrastructure, economics, finance, project-finance and public-private partnerships. Construction contracts, bank industry, contracts and business also appeared less frequently. The same search procedure was adopted in the Scholar Google tool as redundancy and double-check.

In a first evaluation of the output of the electronic searches, abstracts from 328 articles were considered for an initial reading in order to separate those that joined the main purpose. Of these, 150 were selected for an analytical reading and extraction of the main research trails, described in the next section. A summary of these will be presented in the conclusions. Evidently, as it is not possible and even productive to read all the literature that contains the above expressions, the attachment to the central research question (Brizola & Fantin, 2016), namely, the transaction costs in bank financing for infrastructure, delimited the selection of the 150 articles that form the basis of the present study.

Additionally, previous literary reviews were also used. Seuring & Gold (2012) discuss their usefulness, allowing them to follow revisional paths that were already trodden.

Macher & Richman's (2008) compilation on developments in transaction cost theory in various areas of knowledge was of great use to position its evolution, since the work is a confluence of many authors and problematizations, although authors do not specifically deal with transaction costs in infrastructure projects, but transaction costs in the financial area in general. Kumari & Sharma (2017), also cited, carry out a bibliometric review of articles and other studies on infrastructure and note that one of the recurring topics is the so-called infrastructure financing, one of the expressions searched here.

III - Transaction Costs in PFCs

Seminal works on transaction costs are from Coase (1937), where the author refers to the functioning of markets and their agents (firms), determining cost differences, and from Williamson (1985), where the author incorporates view of three different firm relationships (self-governance, open market buying and selling, and contracting) that also give rise to different transaction costs. According to Martins & de Souza (2014), Coase has established firms as the vehicles through which market relations occur, and institutions as regulators of such relationships. Farina et al (1997), comments that the regulation refers to the imposition of rules to the economic game, rules that, in turn, are part of the set of institutions and the institutional environment. Thus, the different arrangements in which parties, organizations for example, transact within the possibilities envisioned by Williamson (1985) depend, to a large extent, on the institutional environment (Macher & Richman, 2008).

Since its inception, transaction cost theory has led to an increasing number of works in economics and administration, but also in politics and law (Macher & Richman, 2008). As anticipated, from Williamson's (1985) perspective, firms' decisions range from producing something internally to buying on the open market or establishing a contract to regulate the supply of goods, each involving different transaction costs. Jacobides & Winter (2005) propose that in order to understand the firm's integration it is necessary to look at the capabilities of its suppliers, which would explain many vertical movements, the same point addressed by Azevedo (2000). Other authors identify firms' internal

capabilities as responsible for outsourcing decisions (Leiblein & Miller, 2003; Mayer & Solomon, 2006). Although difficult to quantify, if there is no trust in suppliers, a firm may decide to incorporate functions, and the decision is not to be larger, but to reduce costs and achieve efficiency (Zylbersztajn, 2005), as it would be riskier if it decided to depend on suppliers that, for example, interrupt deliveries without warning (Macher & Richman, 2008). Williamson (1985) places that firms could in this case choose to purchase their inputs on the open market, produce them, or establish a contractual relationship with rules to be observed, depending on the frequency, uncertainty of relationships, in addition to the specificity of its assets. Contracts, although incomplete and imperfect, as they cannot anticipate everything that may occur in a relationship, have considered enforcement (depending on the institutional environment) which explains their use in a wide variety of cases (Martins & De Souza, 2014). The legal system plays a key role in this, as its weakness as well as an inappropriate contract reduces borrowers' propensity to pay, which is directly related to encouraging banks to charge higher interest for the resources they make available (Pinheiro & Cabral, 1999).). Opportunistic behavior is therefore a major concern and a major determinant of contractual, market or internalization relationships, which does not mean that agents are always dishonest, but depending on the situation they may behave like that, including lying, stealing and cheating (Pinheiro & Saddi, 2006), giving rise to safeguards and controls (such as contracts) to regulate relations between the parties (Williamson, 1985). For no other reason, studies on transaction costs also concern the relationships of trust between the related parties (Beccerra & Gupta, 1999; Josh & Stump, 1999).

Another widely recognized thought in transaction cost theory is from Hennart (2010) who uses the concept to explain the internationalization model of companies. For Hennart (2010), the decision on how to act internationally, by contract / license, directly or in a hybrid way, depends on the costs involved. Costs like surveillance, reputational, control, value chain investments and financing alternatives, according to the author, go beyond the considerations of other theories, such as those that identify different rates of interest and returns in different markets as major attractions for Foreign Direct Investment (FDI), as if it behaved like portfolio investment (Hennart, 2010). In its conception, the theory of transaction costs is the one that best explains the internationalization strategy of companies, in their attempt to better measure the expenses and benefits arising from each of the alternatives. Although the representativeness and recognition of Hennart's work, the correlation between business internationalization and transaction costs has been explored to some extent (Reid 1983; Andersen 1997; Tan & Mahoney 2006; Contractor 2007).

As already discussed, contracts encompass one of the modalities of agreement between firms envisioned by Williamson (1985) and, of course, involve particular transaction costs. The main benefit of formal agreements is the ability to predict how the other will behave, within a limited rationality environment, opportunistic incentives and a desire for risk mitigation (Chiles & McMackin, 1996). The propensity for such agreements does not mean, however, that relationships are free of any risk, as there may be design flaws or even the possibility that the contractor may not be the best entity to provide a particular service or good, conclude Marques & Berg (2010 and 2011) in two studies on publicprivate partnerships (PPPs). Some alternatives mitigate risks and improve the ability to analyze the viability of contracts, including the presence of other stakeholders, such as banks lenders, who are diligent in a number of ways that may positively affect the fulfillment of obligations, improving the perspective of the contractor (Dupas et al, 2011). Banks can prevent against changes in purpose, opportunistic behaviors, evaluation of various project stages, freeing up new resources only when the prerequisites are met, according to Engel et al (2014), in a study on financing infrastructure projects under the model of PPPs. Transparency, standardization of clauses and information on contract offerings, at least as regards PPPs, also emerge as a means to mitigate risks (Cruz & Marques, 2012).

Gatti et al (2008) evaluate some transaction costs present in a sample of 1000 PFCs signed between 1998 and 2003. As pointed out by the authors, the PFC is the main vehicle for infrastructure financing, especially in developing countries. Controlling the leverage of the projects (percentage of debt, against total investment) and interest rates that, in that study, appear as dependent variables, regarding the existence of non-financial contracts, such as construction, supply, operation and maintenance agreements, instruments that regulate relations between the parties and assume the role of explanatory variables, come to the conclusion that the presence of the latter causes interest rates to decrease and the project's funded percentage to increase (Gatti et al, 2008). In addition, they point out that borrowers are faced with a choice between lower interest rates or higher volume of financing and propose another front for future investigations if borrowers (who they are) influence financing conditions, as traditionally the main risk analysis performed by banks in such operations is the cash flow of projects (Gatti et al, 2008). Cruz & Sarmiento (2017) also pay attention to verifying interest, measured by bank spreads, on PFCs related to road PPPs in Portugal, this time using other independent variables for analysis, such as macroeconomic context.

The choice of the type of infrastructure financing, public, private, debt or combining more than one alternative depends to a large extent on the institutional environment (Estache et al, 2015). According to the authors, the reasons that favor public financing, disadvantage the private, for example, the saving of public resources, passing projects to the private initiative, what can mean higher tariffs to citizens for the use of infrastructure goods (Estache et al, 2015). In a study on highway concession in the United States, the lack of state resources is the main reason for opening opportunities to private enterprise (Ashuri & Mostaan, 2015). Brealey, Cooper & Habib (1996) also note the advance of private

enterprise in infrastructure projects via PFCs. Kumari & Sharma (2017), in a broad bibliometric research, see the same progress since the late 1990s, not without first pointing out that the issue of financing is a universal problem and a very present discussion topic when it comes to infrastructure, proposing including that further studies are warranted. They also capture growing interest from the PPP in the literature (Kumari & Sharma, 2017).

PFCs generally involve several funding banks for each project, the so-called banking syndicate or consortium. The number of banks participating in syndicate is higher than in other types of bank financing, as their purpose is usually to make new, complex, expensive investments viable, which usually longer financing terms (Kleinmeier & Megginson, 2000). Monitoring is among the topics highlighted by Visconti (2010), a necessary but costly factor, especially when considering the long term. They are therefore idiosyncratic (Esty, 2004), bearing characteristics such as long and complex gestation, difficult evaluation, illiquidity, indivisibility, long term live, encompassing large amounts of capital (Visconti, 2010). The specificity is reflected, according to Esty (2004), in the extension (size) of the contracts. The perception is shared in practice by Comer (2001), who considers the costs of information, establishment and monitoring of PFCs more costly than in other financial ways. In any case, the transfer of any loan from one bank to another involves transaction costs, higher or lower depending on its characteristic, as the originator banks will attempt to present such assets as most valuable as possible, contrary to that eventually intend to acquire the loans (Woodward, 1988).

The costs for a bank to lend are directly correlated with the information it has about the borrower, so it is more common for a bank to lend to its own depositors than to potential clients that are not yet known (Woodward, 1988). As far as project finance is concerned, there is always an aspect of novelty (Esty, 2004), so higher transaction costs compared to a common loan to a well-known client (Cole, 1995; Ogawa et al, 2010). Contract debtors, in turn, are impacted, as far as transaction costs are concerned, by banks' perception of them, which leads them to make an effort to present themselves as more bankable, whether by honest means or not (Woodward, 2000). 1988). Alternatively, firms may choose their own financing to escape debt contraction, which is more common when it comes to funding research and development needs (Balakrishnan & Fox, 1993). Macher & Richman (2008) consider finance as one of the most addressed subjects by transaction cost scholars, especially for the wide applicability of the findings.

In another paper, Esty (2003) notes that it is not evident why the PFC structure is chosen over other alternatives, as it usually involves high transaction costs for project analysis, contracting and monitoring. The same author concludes that, despite this, there are gains in terms of agency risk control (divergence between investors and project managers), an idea already mentioned by Brealey, Cooper & Habib (1996), and deviations of projects, such as channeling cash flow for other purposes or even deviations from a social and environmental point of view, aspects where Weber (2015) sees preventive influence, coming from financing providers. Sawant (2009) gives other reasons related to the

safeguards that foreign investors acquire by making projects viable through project finance, including shielding against expropriation of local governments, a perspective also addressed by Kleimeier & Versteeg (2009). Blocking other host country government actions that may render the project deficient or even unworkable also sets up safeguards of PFCs (Brealey, Cooper & Habib, 1996), protecting Foreign Direct Investment. Scannella (2012) points out that the confidentiality of contracts, compared to public transactions, is another benefit of bank financing, which can be discretely renegotiated.

In the case of infrastructure financing, the PFC is a fairly common model (Pinheiro & Cabral, 1999). Among other benefits, PFCs contribute to lessening such asymmetries, adding investment oversight, avoiding moral hazard, adverse selection (Marty & Voisin, 2008), forcing environmental and social impact patterns (Lawrence & Thomas, 2004), mitigate political risks when it comes to Foreign Direct Investment (Mullner, 2017), formalize alliances with stakeholders (Mullner, 2107), and prevent investors from taking over leverage levels (Culp & Forrester, 2009), even though contracts are quite costly from

the point of view of specificity and size (Esty, 2004). As evidenced in the transaction cost literature, they pay their price for use, which in the financing under consideration may mean delays in credit granting, high interest rates (Chan et al 2009), excessive compliance (Jean Tirole, 2007), among others, like institutional limitations (Estache et al, 2015).

Nevertheless, the practice wonders if such costs are not excessive, including all the analytical apparatus necessary to achieve the conditions of agreement and, consequently, contracting (Klein et al, 1996). Despite shielding, the attempt to make contracts as complete as possible logically leads to higher transaction costs, not always offset by the benefits gained (Marty & Voisin, 2008). Mullner (2017) is intrigued by the fact that, at first glance, the option for PFCs does not necessarily reconcile with the economic logic of lowering transaction costs, worrying about what this means for FDI.

The presence of multiple banks in financing and the effects on transaction costs, whether or not directly named as such, is recurrent in the literature. Sufi (2007), for example, assesses the ability of leaders leading banks to reduce information asymmetries, providing credibility and bringing together more banks for operations. The reasons would be due diligence and monitoring, informing other participants but forcing leaders to withhold a large portion of loans (Sufi, 2007). Dennis & Mullineaux (2000) understand that the higher the value of financing, the greater the propensity for the operation to be syndicated among several creditors, a view shared by Maskara (2006). Debtor characteristics are also of great influence in attracting banks to join a consortia, such as the availability of information about them, with the presence or absence of rating agencies or stock-market shares playing a relevant role in the perception at risk (Dennis & Mullineaux, 2000).

Table 1 summarizes the literature review:

Table 1: Summary of literature review in transaction costs of Project finance

1	Martins & de Souza, 2014; Pinheiro & Saddy, 2006; Zhou & Poppo, 2010; Chiles & Macmackin, 1996; Brealey, Cooper & Habib, 1996; Weber, 2015; Sawant, 2009; Kleimeier & Versteeg (2009); Mullner, 2017; Dupas et al, 2011;	Contracts are incomplete and imperfect, but they attract by its enforcement, avoiding opportunistic behavior, for example, protecting FDI (in the case of PFCs) from expropriation or government interference that undermines or even makes infrastructure project unviable;
2	Gatti et al 2008; Brealey, Cooper & Habib, 1996; Kumari & Sharma, 2017; Sufi, 2007; Dennis & Mullineaux, 2000; Sufi, 2007; Dennis & Mullineaux, 2000; Maskara, 2006; Yin & Mathews, 2010; Allan & Gottesman, 2006; Ivashina, 2005; Detragiache et al, 2000; Farinha & Santos, 2002; Engel et al, 2014, Esty, 2003	PFCs are the main vehicle for financing infrastructure, usually through a pool of banks; There is a relationship between project size, leverage, complexity, economic size of the financed and number of financing banks; Number of stakeholders decreases risk of opportunistic behavior. Multibarization provides better transaction costs for borrowers.
3	Kleinmeier & Meginson, 2000; Esty, 2014; Visconti, 2010; Comer, 2001; Cole, 1995; Ogawa et al, 2010; Klein et al, 1996; Chan et al, 2009; Jean Tirole, 2007; Bunduchi, 2008	PFCs involve high transaction costs because they are complex, idiosyncratic, illiquid, indivisible, leading to long gestation and duration and large sums of financial resources; Contract transaction costs can be ex ante (hiring) or ex post (monitoring).

Source: Author

IV – Conclusions

Attention to transaction costs, based on economics and the work of Coase and Williamson, supports countless research in various areas of knowledge. Concerning Administration and Finance, it is no different. With firms as centers of gravity, institutional environment as context, and characteristics such as frequency, uncertainty, and specificity of assets underpinning relationships, the attempt to

reduce transaction costs drives many corporate decisions. However, it is not always clear how this cost management is done, what the selection criteria are, since, as underlined in some research, it is not uncommon to accept higher costs, apparently contrary to the economic logic, provided that others benefits are perceived, even if less obvious ones. As studies cited here suggest, increased safety and risk mitigation may play their role. Among firms' alternatives, contracts, halfway between producing something on its own or subjecting itself to the market - and supply uncertainties - for its acquisition is one of the possible controls and involves inherent costs. PFCs, financing contracts between banks and debtors, share the same logic and therefore involve their own transaction costs. Given the economic and social relevance of the infrastructure, and the associated social and environmental

impacts, its financing conforms a problem beyond the borders of a specific nation, justifying work done and to be done. As noted, PFCs are long and complex in gestation, non-standard, illiquid, indivisible, add up to large amounts of capital, and usually require funding syndicates with several participating banks, demanding a great deal of effort to overcome massive informational asymmetries, but they are nevertheless widely used, especially - but not exclusively - in infrastructure projects, especially when it comes to emerging countries. Several studies presented address or even cite the transaction costs of such contractual modality. Monitoring costs are recurrently pointed out, but other, more quantifiable, such as interest (bank spreads) and leverage also add to the interest of scholars. This is inherent in contracts already signed. In fact, the costs are earlier than they are, since before they already involve selection, negotiation, analysis and possibly delays until the agreements (PFCs) are signed. There are externalities that affect society in each financing, such as environmental impacts. While predicting the behavior of the contracting parties, they require constant follow-up, and are not flawless from their conception, since completeness is difficult, if not impossible, to be achieved. Externally, mitigating the risks of opportunistic actions, including governments, by protecting the FDI, for example, the binding of various stakeholders in ancillary (non-financial) contracts, the possibility of renegotiation, given their mutual dependence and secrecy (compared to capital markets), and the offsetting of a poorly enforced legal system are possible reasons for its use. In a word, financing conditions are mainly defined by the characteristics of the project, with their idiosyncrasies, and the choice of PFCs is also justified by contract factors, as transaction costs are considerable. Despite the last assertion that the costs are considerable, most studies simply cite them and with some generality - such as monitoring - without further elaboration of what they actually represent or how they behave. Adding to the academic and managerial interest in the subject, as well as the social perception about bank financing for infrastructure, we propose here a new way to apprehend the transaction costs in PFCs.

V - Proposal for further studies

V.a - Literature Voids

Directly and briefly, the literature apprehended in the integrative systematic review uses the following propositions or inferences: (1) There are external reasons (basically distrust and uncertainty) that determine the choice of project finance for infrastructure financing; (2) number of stakeholders, size of borrowers / financed, complexity, size of the project, number of funding banks influence the conditions of the PFCs; (3) Project finance, in turn, involves high transaction costs.

This framework, based on Table 1 - which summarizes the literary review - consolidates the source from which new research developments on transaction costs in PFCs are proposed. According to the literature, the choice of PFCs is determined by (1) uncertainty / distrust, while their conditions are influenced by (2) the number and characteristics of counterparties, banks or otherwise, and projects, which (3) results in high transaction costs.

Despite the framework, the studies gathered here are limited to naming the relationships above, without attempts to verify, measure or even describe it in a more profound way. The following questions are voids, or had no further development, or even have taken for granted answers in the literature: Is there a correlation between environments with weak or often non-compliant institutions and the use of PFCs? Do the number and / or size of funded counterparties influence the transaction costs of PFCs? How? Do multiple lenders have effects on transaction costs? Which are? What are the transaction costs, besides bank spreads, maturities and leverage of financing (topics with some qualitative and quantitative literature)? What are the ex ante and ex post costs of the contracts? Are PFCs transaction costs influenced by factors other than project risk, cash flow and leverage? Is it possible to measure them?

V.b - Proposed theoretical model

The theoretical model proposed by the present study is that the number of debtors / financed (or guarantors, co-obligors, since they are also joint debtors of the PFC) is indicative of the uncertainty / distrust of the project. The number of debtors, in turn, will influence the transaction costs of the whole project within the following logic: if the number of debtors / funded / co-obliged increases, it is because the uncertainty / distrust is high and therefore the transaction costs will also increase. In other words, the effects on transaction costs will be directly proportional to the degree of uncertainty / distrust measured by the number of debtors / financed / co-obligated present in the PFCs.

Therefore, according to the classic literature on transaction costs, the reason that explains the effects is uncertainty / distrust. It's assumed here that lenders, from this distrust, will demand that several counterparties oblige themselves as borrowers or guarantors of the contracts, trying to ensure the security of financing and the return on their assets. The transaction costs of PFCs (description of some of them will be proposed in the next methodology section) will be influenced from this initial assumption.

V.c - Suggested methodology

A methodology for verifying the behavior of transaction costs in PFCs involves the identification of those present in contracts, costs that the literature only names in a generic way. Below is a proposal for identifiable and extractable transaction costs of the contracts, as well as measurable. Despite the financial ones, that already comprehend numeric data, others can be quantifiable either by the number of clauses (proposed here) or by the number of words present in each PFCs. Follow a non exhaustive list.

Financing Conditions: Bank Spread; Amount of financing; Percentage financed out of total investment; Total term of the financing; Grace period for financing.

Contracting Conditions: Time elapsed between the financing proposal and the contracting; Number of banks participating in the syndicate; Presence or not of foreign direct investment (FDI).

General Monitoring Conditions: Number of clauses (except guarantees, covenants and early maturity); Number of warranty clauses; Number of covenant clauses; Number of early maturity (acceleration) clauses.

Social and Environmental Monitoring Conditions: Number of environmental clauses; Number of social clauses; Number of anti-corruption clauses.

The principle of each of the above topics, which fall into the four categories, is that their variation reflects variation in transaction costs. These may be financial (larger or smaller spreads, higher or lower percentage of funding), or not (longer analysis time, greater number of contractual clauses, etc.), but all quantifiable, albeit by number of clauses, extractable from contracts. The last three categories are proposed with the objective of consolidating method to analyze contracting costs, monitoring and socio-environmental requirements of project finance instruments, since few studies have proposed to measure transaction costs in contracts of this kind. It is assumed here that the larger number of clauses burden the costs in time, complexity and compliance for all debtors / funded / coobligated and bring consequences for society at large, which is consistent with the literature. Of course, there is compliance by lending banks as well, as PFCs will need to be monitored by them. The correlation between all those quantifiable aspects can be measured by econometric regression or other structural equation.

V.d - Hypothesis test proposal

The following is the initial model for the hypothesis test. As anticipated, the model (Figure 2) involves the effects of [uncertainty / distrust] on [project finance transaction costs]. As anticipated, distrust is greater the more debtors / funded / co-obliged, given the uncertainty and distrust about the project and consequently, their behavior.

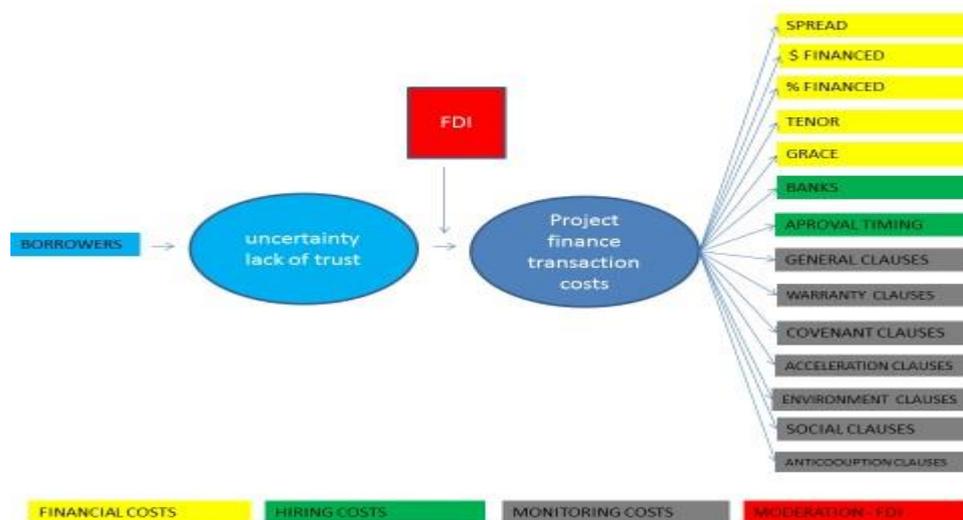
The observable data component of the first construct [uncertainty / distrust] and which serves as an independent variable is [number of debtors / funded / co-obliged]. Multivariate data analysis is assumed, with 1 explanatory data set, 14 explained data sets

and one data set as a moderating variable (or even dummy), here suggested as the presence or absence of Foreign Direct Investment (IED) in the project. Following is a description of the propositions, whose visualization is in Figure 2.

H1: higher the number of debtors, higher the transaction costs of PFCs.

Transaction costs affect by the number of debtors, ie by uncertainty / distrust can be (not exhaustive): the number of financing banks, spreads, the amount financed, the % financed, the tenor, grace period, the approval time, number of general contract clauses; guarantee clauses, covenant clauses, number of due clauses, number of environmental clauses, number of social clauses and number of anti-corruption clauses.

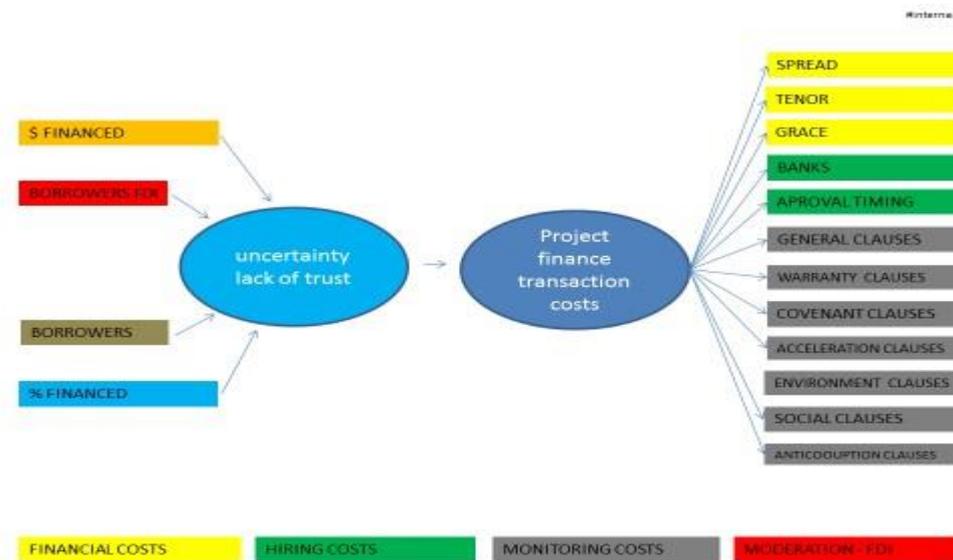
Figure 2: Suggestion of possible correlation and hypothesis test



Source: Author

The development of studies around the theoretical model, methodology and hypothesis testing suggested above aims to increase knowledge about transaction costs in PFCs. In particular, describe which ones go beyond those of a financial nature and how they respond to the number of debtors / financed / co-obligors. It can, indeed, be altered (see Figures 2) if new findings capture other paths of influence, for example, if the ratio debt/equity of the PFC, or the total amount of the project, or even the presence of FDI itself - or all of them together.

Figure 3: Suggestion of other possible correlations and hypothesis test



Source:

Author

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