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**Gearing as a Protection Tool against
the Risk of Value Expropriation by Project Stakeholders:
Evidence from the Global Project Finance**

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ABSTRACT

I analyze whether project gearing can be used as a protection tool against the risk of value expropriation by various project stakeholders, the issue that has not yet received enough of researchers theoretical and empirical attention. In doing so I collect data on 431 successful project entities, which were financed on a project basis and were realized all over the world within the period from 1990 to 2013. The considered projects stakeholders are project management team, project output offtakers and hosting governments. By running several ordinary least square regressions I find empirical support for the positive relationship between project gearing and the risk of value expropriation by all the considered project stakeholders except project management team. I further argue that the development bank involvement can serve as an alternative mitigation tool against the risk of value expropriation by project output offtakers and hosting governments as well. Differentiating the sample by the development bank involvement criteria I empirically find the absence or deterioration of the positive relationship between project gearing and the risk of value expropriation by project stakeholders suggesting that the development banks can serve as a substitute to project gearing in the mitigation of expropriation risk by project stakeholders.

Key words: project finance, gearing, value expropriation, project stakeholders, development banks

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1.0 INTRODUCTION

One of the issues when sponsors initiate new large-scale capital-intensive projects is to decide on whether corporate finance scheme or project finance scheme should be employed. Definitions of project finance scheme vary in the literature, but in the context of this study it is defined as limited or non-recourse financing through the establishment of a special vehicle company. The non-recourse nature of project finance implies that the repayment of project loans depends primarily on project assets and project cash flows and not on the financial strength of project sponsors. To simplify the following text I use a word “project” to notate a special vehicle company, owning newly generated assets and employing project finance scheme.

Three specific features of projects employing project finance scheme are explained by Esty (2004). First, project entities are characterized by highly leveraged capital structures, the average gearing of projects amounts to 70%, while the average gearing of public companies amounts to 35%¹. Secondly, project entities have concentrated ownership structures, a typical project entity has two or three shareholders. Third, project entities also have concentrated debt ownership structures because debt funding is typically provided by a syndicate or a club of banks rather than via issuing project bonds on the financial markets.

On a macro level, the popularity of project finance scheme showed mixed dynamics over the period from 1990 to 2010. According to Esty (2004) the project finance investments over the world grew at a compounded rate of 20% per year since 1990 and peaked in 2001, followed by a steady decline in the project finance activity. According to Morisson (2012), more than 20 percent of global economic activity, as measured by global GDP, is currently structured as project finance deals, while in some emerging markets it exceeds 30 percent. The project finance became especially popular in the developing countries because it is more difficult for the investors to scrutinize large investments financed via traditional corporate finance with respect to their investment performance, whereas project finance provides for a greater transparency, which is of particular value in emerging markets. That puts project finance in a set of important phenomena deserving further academic evaluation.

Looking back into history, the scheme was not widely used until 1940's and 1950's when American oil companies started to develop new oil fields in the North Sea, as

¹ Esty (2004) correctly stated that studies on project finance simply represent the study on companies in the tails of leverage distribution.

described in Kleimeier (1995). Although Kensigner & Martin (1988) pointed out that project finance scheme historically emerged much earlier than corporate financing scheme, the modern form of project finance using a separated special vehicle company, syndicated loan financing and sophisticated risk allocation is a much more recent invention driven by British and US commercial law. This fact emphasizes that what really drives modern project finance deals is its ability to efficiently allocate risks among the project stakeholders. The non-exhaustive list of risks which are considered in the structuring of project finance deal are availability risk, completion (technical and timing risk), counterparty credit risk, country (political) risk, currency risk, force majeure risk, inflation risk, input and throughput risk, market (demand) risk, operating risk, regulatory risk, residual value risk, resource risk, technology risk and other².

Corielli et al. (2010) highlighted that risk allocation requires project entities enter in the contractual relationships with a substantial network of third parties³, and that the quality of signed non-financial contracts are the key factors for the successful project finance deals. Some of the key non-financial contracts include engineering, procurement and construction contracts (EPC), purchasing contracts, selling contracts and operation & maintenance contracts. EPC contracts are typically closed on a turnkey basis to make plant and equipment available to the project entity, usually at predefined prices, times of delivery, and standards of performance (construction risk shifting). Purchasing contracts guarantee the supply of raw materials to the SPV at predefined volumes, prices and quality (availability risk shifting). Selling agreements, often known as take or pay or offtake agreements enable the project entity to sell part or all of its output to a third party that commits to buy unconditionally, again at predefined price formula and for a given period of time (market risk shifting). Operation and maintenance agreements are designed to provide the project entity with efficient and effective plant maintenance, compliant with the predefined service level agreement (operational risk shifting). The entire sets of contracts is coordinated and managed by the board of directors of the project entity, appointed by the sponsoring firms. If the contracts are all secured and negotiated with

² See Introductory Manual on Project Finance for Managers of PPP projects (2001) to find out broad definitions for each risk.

³ The participants in the modern project-financing scheme include sponsors, lenders, managers of special vehicle entity, contractors, suppliers, purchasers of output, government or government agencies, lessors, guarantors, and financial advisers.

qualified contractors, then the reduction of cash flow volatility is achieved and it is well appreciated by project lenders resulting in lower spreads and higher potential gearing.

Smith and Walter (1990) claimed that it is a role of financial advisor to identify project risks and their quantity, to analyze which risks are acceptable to each party and finally to merge the interests of all parties, given the risks, financing sources and hedging tools. The choice of qualified financial adviser may be one of the key factors in making co-alignment of stakeholders' interests less expensive and quick. Financial advisors usually do not lend to the project, but provide sponsors with analysis of lenders propositions and own feasibility studies. If the financial advisor is also a lender to the project then conflict of interests emerges. Nevitt (1983) also states that a key to successful project financing is structuring the financing of a project with as little recourse to sponsor assets as possible, while at the same time providing sufficient credit support through guarantees or undertakings of sponsors or third parties, so that the lenders are satisfied with the assumed credit risk.

The above discussion on the risk allocation process and its essential importance for the successful project finance inspired me to explore the topic more deeply. The initial aim was to select several risks and evaluate the implications for the financial structure of project finance deals depending on how those risks are treated. Additionally, I was surprised that project entities, despite being quite risky, have very high leverage, therefore I hypothesized that project gearing can be a response to some risk related issue. The literature review section enabled me to identify the possible reasons for using high leverage, so I decided to empirically test the guesses by Esty (2004) who claimed that project gearing can be used as a protection tool against the risk of value expropriation by various project stakeholders. I found an empirical support for the hypothesis that project gearing can be used as a protection tool against the risk of value expropriation by the long-term output buyers (output offtakers) and by the hosting governments. However, no empirical support was found for the use of leverage as a protection tool against the risk of value expropriation by project management team. Furthermore, the analysis of the available literature revealed that there could be other mitigating tools, the one of which is the involvement of the development banks and I found empirical support for the hypothesis that project gearing is not sensitive for the increased risk of value expropriation by output offtakers and hosting government when development bank is involved.

To sum up the section, the definition of what is project finance was provided, the specific features of project entities were shortly described, the importance of project finance segment was emphasized, the history of project finance was introduced, the keys for successful project finance deals such as efficient risk allocation via the non-financial contracting and via the involvement of the experienced financial intermediaries were described. Furthermore, the motivation for the research agenda was explained, the hypothesis more broadly uncovered in further sections was briefly noted, and the obtained empirical results were revealed.

2.0 LITERATURE REVIEW

The current section aims to put various academic articles on the project finance topic in a system. Instead of deeply describing the findings of the authors, the goal of the section is to identify the missing perspectives or ideas, which received no or limited academic attention, in order to come up with the research proposition. To start with, the number of published academic articles on project finance topic was growing recently, benefiting to the understanding of project finance sector, since the researchers used a multitude of approaches and looked at project finance from different perspectives.

I first identified several criteria to split the available academic articles into several distinct groups. The first criterion is the researchers approach to studying project finance - some researchers treat project finance as an independent field of research while others treat project finance as a segment of studies on syndicated loans (project finance deals are often called asset based syndicate lending⁴). The second criterion is the type of the study - some researchers focus on theoretical models while others aim to test their ideas empirically. The content of the academic studies is fundamentally a product of merging the described criteria. Table 1 representing the classification matrix is provided in the Appendix.

Some theoretical studies treating project finance as an independent field of research aim to provide answers to why project finance scheme may be preferred over corporate finance scheme. The particular feature of those studies is that project finance is approached from the parent company perspective, and that the project entities are treated as subjects in those studies. I reckon that, from a knowledge generation point of view, those studies are essential because they focus at the fundamental issue of choosing project finance against corporate finance option. Nevertheless, the attempts to test empirically the theoretical models mainly failed because data gathering is quite challenging, especially when one needs to compile together more or less confidential data on projects with the data on parent companies.

With a reference to the empirical studies treating project finance as an independent field of research, the authors circumvent earlier described problem of data compilation by interrelating the characteristics of project finance either with country variables or with stakeholders participation variables. Indeed, country statistics is both easy to collect and to ensure compliance when processing. Regarding stakeholders, the only data required is

⁴ Esty (2004) stated that project finance loans appear to differ dramatically from syndicated loans only with respect to the degree of credit support offered by the borrower.

mainly the names and number of parties that were involved as stakeholders in project finance deals. The subject in those studies is either a project entity or a project finance loan. This type of studies highlights the role of different project stakeholders, including host governments, in structuring project finance deals and focuses reader's attention on the issue of effective risk allocation and how the structure of allocated risks affects the characteristics of project finance deals.

With a reference to the empirical studies treating project finance as a part of syndicated lending field of research, the authors mainly aim to quantify and to compare the specific features of project finance loans against corporate finance loans. Since project finance loans are seen as a part of syndicated lending, the subject in those studies are project finance loans. From the data gathering perspective this approach is the most viable for the empirical research, however the drawback is that a researcher focuses more at details rather than on the fundamental reasoning for using project finance scheme.

The comprehensive analysis of the groups of empirical articles on the project finance topic revealed that no proper attention was given to a wider evaluation of the factors impacting leverage ratios of projects, except for the studies that view high project gearing as a tool to maximize return on sponsor equity. The only article that covers the alternative view on the high project gearing is written by Esty (2004), who provide the following explanations⁵. First, the author reckons that high leverage helps project sponsors to reinforce commercial contracts with project stakeholders because in the presence of high leverage even the small attempts to appropriate value would result in a costly default. Second, high leverage helps project managers to discourage value expropriation by host governments. Thirdly, the author argues that high leverage prevents managers from wasting or appropriating investment cash flows because the incentives to wasting cash are less acute when there is no corporate safety net. Therefore, Esty views highly leveraged structure not only as a tool for project sponsors to maximize return on equity, but as a tool to maintain management discipline and to protect project against possible risks of value expropriation by project stakeholders⁶.

The concept of the study is the following. Although accepting the fact that projects are typically highly levered in order to maximize return on sponsor equity, the current

⁵ Esty (2004) sees significant opportunities to study the relationship among structural attributes (i.e. high leverage, contractual details, and concentrated equity ownership structure), managerial incentives and asset values.

⁶ The view of high gearing as a protection against value expropriation actually is not something new. Earlier Esty (1999) stated that corporate entities may also use high gearing as a tool to deter labor unions from expropriating corporate wealth.

study views high leverage as tool to protect project entity from the risk of value expropriation by project stakeholders, thus it is the successor of the study by Esty (2004). The research questions follow the prepositions of Esty (the issue of enforcing project management discipline, the issue of reinforcing original contracts with project stakeholders including host governments). A set of control factors is introduced in order to isolate the effect of several important project company or project finance deal specific characteristics. Hence, the current study can be classified as the one related to the set of empirical studies treating project finance as an individual field of research. An important remark should be made - contrary to the approach taken by Kleimeier (2001) and Hainz & Kleimeier (2004), in which the loan tranches are treated as individual observations, the current study treats project entities as individual observations, and that is advantageous because the main problem with the loan tranches centered approach is the risk that several tranches are related to the same loan contract and, hence, loan tranches may not represent independent observations. There is no such problem for the project entity centered approach because all observations are independent of each other.

To sum up the section, project finance articles can be classified by several criteria or research approaches; there is some sort of contradiction between theoretical studies and empirical studies on project finance because it is challenging to test the fundamental issues while the empirical evaluation is given to a limited segment of theoretical ideas on project finance; the missing research area is identified and the concept of the current research is proposed, its main conceptual features are highlighted. Since the success of the current empirical research depends crucially on the available data on project entities, the next section provides the evaluation of data on project entities as a prerequisite for the formulation of detailed research questions. Therefore, I structured the paper by describing the issues in data collection first and only then moving to the formulation of the hypothesis and choosing the best proxies for the studies factors.

3.0 DATA COLLECTION

The current section aims to evaluate the available data on project entities as a prerequisite for the next section in which the detailed research questions are provided. In addition, the issue of country financial and macroeconomic data availability is described in the end of the section.

Although more databases on project finance deals had recently appeared, several authors of the articles mentioned in the literature review section that it might be challenging to obtain a representative sample of project records because the amount of disclosed information may differ from project to project. My own investigation of the available sources revealed that it is not the collecting of data, but rather the processing of data is challenging, since it requires tabulating the qualitative data in a more convenient and preferably numerical form. The investigation of several databases revealed that each of them has its pros and cons and that the Project Finance section of the SDC Platinum was considered as the most detailed one. The second best option is Thomson Advanced Analytics software, which actually duplicates Project Finance section of the SDC Platinum, but I found it more challenging to process data using that software. Due to the intensity of data processing (the need to manually tabulate data), I decided to limit the scope of study by selecting only few industry sectors most often employing project finance scheme. In line with the book “Project Financing: Asset-Based Financial Engineering”, the top sectors are power generation, energy transmission, oil & gas and petrochemicals⁷.

The initially obtained projects sample from the Project Finance section of the SDC Platinum contained more than 10.000 records of realized and rumored projects in the selected industry sectors. A further analysis of the projects sample revealed that the dataset is yet exposed to the same problem of incompatibility of information disclosed for each project, because even the basic data such as gearing ratio or start of construction works is not available for many projects. I decided to filter the dataset to leave only projects with as much information as possible in order to enrich this study and to formulate more sophisticated hypothesis with a plan to widen possible methodology strategies. Quite obviously, the analysis of the obtained projects sample revealed that completed projects, on average, have more descriptive information in comparison to

⁷ Other industries that use project finance scheme less often are transportation, mining, telecom, industrials, public-private partnership and leisure & property. Those other industries, however, fall out of the scope of the current study.

rumored projects. Although I then selected only completed projects, the problem of data incompatibility among projects was still present, and a further filtering was required. In the end I came up with only 431 project records that have a full set of information including the most important: project synopsis, technical features of projects, detailed description of the issues related to project finance deals, the countries of projects execution, the dates when the need for project finance loan was announced, the established deadline for when the projects would require finance, the dates when project finance was actually secured, the starting and ending dates of the construction works, total cost estimate in mUSD, gearing ratios, names and lists of lead debt arrangers, the lists of sponsors and corresponding equity shares, the dynamics in sponsors equity shares throughout the project lives. The obtained projects sample covers a period from 1990 to 2013. Although I was aiming to collect as much information as possible, interest rates on project finance debt and maturities were not available as a separate column, making it impossible to investigate their impact on projects gearing in the regression section of the current study⁸.

With a reference to country macroeconomic and qualitative data there are several good sources making it easy to retrieve and process data. The main principle when collecting for country macroeconomic and qualitative data was to minimize the number of databases as to maintain compatibility of variables between countries. The use of several resources such as OECD database and the World Bank database was sufficient. The full list of the resources and their linkages to the proposed regression variables in the next section is provided in the Table 2 of the Appendix.

To sum up the current section, several databases containing statistics on project finance deals were evaluated from the data collection and data processing perspectives; the obtained projects sample was further analyzed and downsized to achieve maximum comparability among project finance deals, other important data sources and the approach of the data collection from those sources were briefly discussed. Since the data on project records is now more fully evaluated, I proceed with the more detailed research questions in the next section.

⁸ If a researcher wants to use tenors and loan interests rates, it requires further downsizing the projects sample since such information is often confidential or only partially disclosed. Moreover, an intensive tabulation of data is required because loan interest rates and maturities are often specified in project synopsis column, which gives a qualitative description of projects.

4.0 STUDIED FACTORS

The current section aims to propose a set of factors which are expected to be related to the high project gearing. Current study views high project gearing not as a tool to maximize return on equity for project sponsors, but rather, in line with Esty (2004), as a protection tool against the risk of possible value expropriation by different project stakeholders⁹. Therefore, the factors proposed in this section aim to account for the incentives of the different project stakeholders to expropriate project value. Current study considers only the following project stakeholders: project output offtakers, project hosting governments and project management team. Additional attention is brought to the issue of well-developed contracts and the issue of contract enforcement because they are of particular importance in the context of project finance. Moreover, the role of the development bank institution participation as a possible factor reducing incentives of project stakeholders to expropriate value is evaluated.

4.1 Protection against the risk of value expropriation by project output offtakers

Many sources on project finance deals emphasize the importance of having long-term output offtakers¹⁰, which are simply one of project stakeholders. Indeed, from a theoretical point of view, having output offtakers enables project entity to resolve market (output) risk. Additionally, offtake agreement represents some sort of collateral to project lenders. Accounting for both factors, project creditors would view lending to project entity as a less risky venture, thus potentially enabling project entity to obtain higher leverage and to maximize return on equity for project sponsors. The positive effect on gearing from the presence of output offtakers was earlier empirically supported by James (2003), who

⁹ Esty (1999) makes an interesting comparison with the corporate entities which also obtain high leverage as a protection tool against possible value expropriation

¹⁰ Negotiations between project sponsors and potential offtakers start in the early stage of a project life cycle. The agenda is to negotiate on quantity and tariff for the output to be sold under a long-term purchase agreement that often takes a form of tolling, take-or-pay contracts, power purchase agreement or energy sales contracts - the contract schemes that typically fix pricing formula and a range of output volume to be purchased by the offttaker. There is often a clause of minimum volume threshold in those contracts, stating that if an offtaker purchases volumes below the pre-specified quantity, then offtaker needs to pay penalties to the project entity. Such a clause exists in order as to preserve the operating capacity of a new project as from the operational point of view it is not so easy to change the volumes of output produced by project facilities. An additional clause to alter base prices in case of output's market price volatility may also be specified.

also controlled for the number of output offtake agreements and for the fact of who owns output offtakers – private or state-owned parties. However, as I earlier stated, the purpose of the current study is not to show what impact the presence of output offtaker has on project gearing, rather I aim to prove that high gearing of project can be used as a mitigation tool against a possible risk of value expropriation by the output offtakers.

Earlier Dailami & Hauswald (2000) raised a question of contractual incompleteness in markets where transactions are characterized by a high degree of uncertainty and relationship specificity conditions. In such situations contracting parties often have to leave many contingencies and provisions out of ex ante agreements, creating incomplete contracts. Therefore, in a high uncertainty environment project offtakers (with special relationship condition) would be incentivized to take advantage from the contractual incompleteness by trying to expropriate some of project value during later stages of project realization, a goal that can be achieved by failing to comply with or by renegotiating the originally stipulated contract¹¹. In line with Esty (2004) I argue that high project gearing serves as a tool to reinforce the original contracts and, hence, to protect project entity against a possible risk of value expropriation by output offtakers, because even small value expropriation would put project in a state of costly default. Therefore, I expect that project gearing would be positively related to the incentives of output offtakers to non-comply (renegotiate) with the original contract, and I assume that the incentives are determined by the degree of uncertainty over future economic situation.

The logical question is what is the best indicator of the uncertainty that specifically incentivizes output offtakers to renegotiate or failing to comply with the original contracts. I argue that a possible indicator of the uncertainty is country inflation rate environment. Assuming that the offtake agreements establish output prices in the currency of country in which the project is realized, the incentives for the offtakers to expropriate some value from the project would be higher under high inflation environment because the project offtakers would be not willing to satisfy the request of project entities to adjust upwards the output price, so that it reflects actualized input costs of the project entity. Therefore, if the output prices remain unchanged because the output offtakers rejected a request from the project entity to approve new prices, then the project would be put in a situation of costly default, assuming that it is substantially levered. Therefore, I argue that the high

¹¹ It is obvious that the likelihood of successful value expropriation by output offtaker would depend on his bargaining power which is determined by different factors including the degree of output market concentration.

project gearing can serve as a mitigating tool encouraging reinforcement of the original contracts that do typically have price escalation clauses – feature that is highlighted by several practitioner-oriented resources. Therefore, I expect that entering in a contractual relationship with the output offtakers while operating in high inflation environment would be positively related to the project gearing.

Earlier Esty (2004) also hypothesized that high gearing helps project entities to reinforce original contracts with project stakeholders because in the presence of high leverage even small attempts to expropriate value would result in a costly default. Gungoraydinoglu & Oztekin (2011), using a sample of public companies from 37 countries, showed that higher standards of country contract enforcement system are associated with lower corporate gearing. The nature of project finance requires that the scope of project as well as the contracts with project stakeholders are sufficiently developed before the financing is secured. The statement is supported by Corielli et al. (2010), who stated that the quality of non-financial contracts and the ability to enforce them determine the success of project finance deals. Therefore, I argue that the relationship between project gearing and quality of country contract enforcement system would be especially pronounced in the project finance context. I expect that higher project gearing would be negatively related to the quality of country contract enforcement system because project stakeholders would find it easier to expropriate value by failing to comply (renegotiating) with the contracts in countries with weaker contract enforcement systems.

4.2 Protection against the risk of value expropriation by host governments

In comparison to project output offtakers, host government is always involved as a project stakeholder. Considering the impact of host government decisions on the project success, Hainz & Kleimeier (2004) earlier provided several examples of the key factors such as policies concerning market regulations¹², industry and regional taxation policies and the restrictions on the ownership of assets by foreigners. Several authors investigated the impact of country political risk in the context of project finance. For example, Kleimeier & Megginson (2001) empirically showed that country political risk is related to credit spreads on project finance loans while Hainz & Kleimeier (2012) empirically showed that country political risk is related to the country share of investments realized via project

¹² Other examples of policies concerning market regulations may include restrictions on the degree of vertical integration, entry barriers and other.

finance scheme¹³. However, no empirical attempts were made in order to check the hypothesis of Esty (2004), who argued that high project gearing serves as a protection tool against possible value expropriation by host governments because even small value expropriation by host government would put the project in a state of costly default. Therefore, it is a first empirical attempt to check for the possibility of such a relationship, and I expect that high project gearing would be positively related to country political risk, which is assumed to incentivize government to expropriate project value.

Although I believe that the issue of the quality of contract enforcement system is more important for the behavior of commercial parties, the government can also be a party in the court process; hence, the quality of contract enforcement system can also have impact on the incentives of host government to expropriate project value assuming that legal process would be held in that country. Therefore, I expect that project gearing would be positively related to a combination of country high political risk and weak contract enforcement system since the incentives of host government to expropriate project value would be higher under those conditions.

4.3 Protection against the risk of value expropriation by project management team

Earlier Esty (2004) claimed that high company gearing prevents company management from wasting or expropriating company value, and that the effect of high gearing on the behavior of management team would be more pronounced in the context of project finance. Indeed, in the corporate finance context, the divisional manager can rely on corporate safety net while, in the project finance context, the project manager has no such support, hence the disciplinary effect of the high gearing on project management would be higher. The discussion on a risk of value expropriation by project management raises a logical question: under which conditions the project management team is more incentivized to expropriate value. I argue that there are at least two factors encouraging project management to expropriate value. The first factor is related to the governance practice of project entities, i.e. to what extent equity holders control the actions of project management team. The second factor is related to the traditions of the host society for taking personal advantages and for personal illegal enrichment, assuming that at least a part of project management team is hired from the pool of local people.

¹³ An alternative study by Subramanian and Tung (2009) revealed that project finance loans are more often used in countries with weak creditor rights and poor protection against insider trading.

According to Shleifer & Vishny (1986) it is a general academic view that concentrated equity ownership is an important governance mechanism preventing the value expropriation or value wasting by the management of corporations. I argue that the same should hold for the project entities, and the concentrated ownership structure would reassure that the actions of project management team are under control of equity holders, thus minimizing a potential risk of value expropriation by project management team. In fact, Esty (2004) earlier pointed out that project entities typically do indeed have concentrated equity ownership structures¹⁴, hence the risk of value expropriation by project management should be minimal. However, the preliminary investigation of the obtained projects sample revealed that some ownership structures are actually more dispersed than others, therefore I argue that the risk is not completely shifted away as more dispersed ownership structures are likely to face weaker governance level. In line with Esty (2004) I argue that high project gearing can serve as a protection tool against possible value expropriation by project management because even small value expropriation would put the project in a costly state of default. Therefore, I expect that projects with more dispersed equity ownership structures (yet more concentrated than public companies) would be more highly levered in order to compensate for weaker governance and the potential risk of value expropriation by project management team¹⁵.

A further evaluation of the issue raises a logical question which is under what conditions the project management team of entity with the dispersed equity ownership structure is more incentivized to expropriate value. Although I recognize that other indicators of project entity governance can have impact on the degree of control over the actions of project management; however the preliminary investigation of the projects sample revealed that comprehensive information on the quality of governance can be hardly collected, if not impossible, given that project entities are not exposed to the same high standards of disclosure as public companies. The best alternative to measure the

¹⁴ Morrison (2013) classifies sponsors in three types: multinational corporations, government-backed enterprises and domestic firms (either supplier of input or consumers of output produced by project). Multinationals also often bring other parties, e.g. construction contractors, equipment manufacturers, which can be called a sub-category of piggybacking sponsors.

¹⁵ Filatotchev & Mickiewicz (2006) claimed that although ownership concentration create entrenchment effect in addition to incentives effect, and, instead of imposing an efficient monitoring and control on managerial discretion, the large block-holders may produce their own set of agency costs. However, since project entities are much more concentrated than corporate entities, I reckon that the argument is not applicable to project entities.

incentives of project management team to expropriate value is to account for the country historically established traditions of individuals to expropriate value (use a situation for personal advantage or enrichment), and I argue that the best proxy is the country corruption level. Indeed, a corruption is a phenomena representing peoples attitude towards illegal value expropriation. I expect that the higher is the level of country corruption, the higher would be the incentives of project management to expropriate project value, and hence the higher would be the gearing of project in order to mitigate such a risk. High gearing guarantees that if the value expropriation by project management happens, then a project would be automatically put in a state of costly default. I also hypothesize that if the project entity has more dispersed ownership structure and the project is realized in a country with high corruption levels, then project management is double incentivized to expropriate the project value, therefore I expect that projects with more dispersed ownership structures and realized in countries with high corruption levels would be more highly levered in order to mitigate the risk of value expropriation by project management team.

The drawback of the logic is that the degree of equity ownership concentration may be determined endogenously, together with the project gearing, and they would both react to the risk of value expropriation by project management team: the project gearing rises and equity ownership becomes more concentrated as a response to the higher risk of value expropriation by project management.

4.4 Role of the development bank institutions

The preliminary evaluation of the obtained projects sample revealed that project finance activity is characterized by a frequent involvement of the development bank institutions¹⁶. Hainz & Kleimeier (2004) empirically showed a positive relationship

¹⁶ The investigation of the obtained projects sample provides the following examples of development bank institutions: DEG of Germany, FMO of Netherlands, IFC, Export-import bank of Japan, Inter-American development banks, African Export-Import Bank, OPIC, OeKB, OND, Hermes, GKA, China Construction Bank. The identified development bank institutions can be split into two types. The first type is multilateral financial institutions, which are established by several countries and, hence, subject to international law. Their owners are generally national governments and other financial institutions. The second type is national export-import banks, which typically act as an intermediary between national governments and exporters to issue export financing.

between country share of project finance loans and the influence of the development bank for that country¹⁷, with the highest shares being recorded in the developing countries.

A more deep analysis of the articles on the role of development banks revealed that the development bank institution participation is often seen as a tool to mitigate country political risk inherited in project finance deals. Hainz & Kleimeier (2012) empirically proved that development bank participation is indeed sensitive to country political risk. In fact the political risk insurance provided by the development bank institutions is simply the ability of development banking institution to exert political pressure on host governments, so that host governments government would not be so successful in project value expropriation. Therefore, I argue that the participation of development bank institutions can be considered as a substitute to high project gearing because both of them represent tools for political risk mitigation.

Notably none of the articles tried to evaluate whether the participation of the development bank institutions helps to mitigate the risk of value expropriation by other project stakeholders, except the country host government. I argue that the participation of the development bank institution can also potentially mitigate the risk of value expropriation by project stakeholders, and thus can serve as a substitute to high project gearing in situations when either project management team or output offtakers are incentivized to expropriate project value.

4.5 Role of the control factors

The preliminary investigation of the obtained projects sample revealed that the following factors can be considered as control. The set of control factors includes the degree of non-recourse to sponsoring firms¹⁸, the degree of monitoring efforts by lenders, the project size effect, the country type effect, the industry sector effect and the time effect.

Considering the degree of non-recourse to sponsoring firms, in the classic project finance scheme lenders recourse is limited only to the assets of project entities and not to

¹⁷ Hainz & Kleimeier (2004) proxied the influence of the development banks by the share of international lending organizations in project finance loan volume for a particular country. Authors found that among considered international lending organizations (IFC, EBRD and national export-import banks), only IFC involvement increases the share of project finance loans significantly.

¹⁸ I noted that there is an indication of confusion in many of the academic articles on project finance scheme resulting in the use of non-recourse project and limited recourse project finance loans as synomims, however it would be more fair to differentiate between non-recourse and limited recourse project finance loans.

the assets of sponsoring firms¹⁹. However, as suggested by Pollio (1998) project finance loans truly become non-recourse only after the project becomes operational and the performance characteristics of plant are in line with the standards stipulated in the project report, while during project's construction and start-up phases the lenders typically require additional guarantees from project sponsors. The preliminary investigation of the obtained projects sample revealed that there are multiple cases in which sponsors of project entities had to provide guarantees, even after the project is operational, resulting in the limited recourse nature of projects. Limited recourse is essentially a way to enhance the quality of project finance loans and to achieve better credit terms potentially resulting in higher leverage ratio. Although non-recourse project finance loans represent the majority of project records in the obtained projects sample, I deem it necessary to check of what are the implications of using limited recourse scheme on project's gearing and use degree of non-recourse as a control factor, which makes the current study one of a few empirical articles that control for that factor. It is expected that degree of non-recourse would be negatively related to project gearing since creditors would see project as a more risky venture and thus would provide less credit funding or at higher interest rate.

Considering the degree of monitoring efforts, Mora (2013) stated that it is the lead arranger's role to act as an agent of the bank syndicate (lenders) and perform monitoring and project entity compliance with the financial covenants²⁰. I believe that monitoring may include checking the actions of project management and whether they spend funds properly, checking the actions of commercial parties (output offtakers) and whether they comply with the original contracts, checking the actions of host government and whether host government keeps stable policies. Therefore, I expect that proper monitoring would help project entity to resist to a risk of value expropriation by project stakeholders. The problem, however, is that monitoring efforts are hardly observable. But, in line with Bolton

¹⁹ Although the composition of project's assets varies throughout the advancement stages in project realization, the core assets are represented by project contracts, licenses and a variety of property rights, the combination of which may represent a substantial value to the creditors.

²⁰ Sufi (2007) described the key assumptions of the mathematical model describing functioning of the syndicated loans market. She stated that firms with limited public information require due diligence and monitoring by the lead arrangers (informed lender) before the syndicate participants (uninformed lenders) invest in the firm. However, there exists a moral hazard problem for the informed lender because the informed lender's due diligence and monitoring effort is unobservable and, in order to ensure uninformed lenders that the sufficient monitoring efforts would be realized during the life of the loan, the informed lender should retain a large stake in the borrowing firm. After informed lender assumes a substantial exposure to the borrowing firm, uninformed lenders are reassured and step in by providing their shares of funding.

& Scharfstein (1996), one can argue that the higher likelihood of proper monitoring is achieved when there are several informed lenders who implement uncoordinated monitoring. The preliminary investigation of the obtained projects sample revealed that it is only possible to evaluate the number of informed lenders (lead arrangers), however it is impossible to judge whether informed lenders (lead arrangers) implement uncoordinated monitoring. Nevertheless, I deem that the number of lead arrangers is a valuable indicator of the potential monitoring efforts level.

Considering project size effects, one can argue that larger projects are perceived by fund providers as more risky since more parties are involved. The best proxy for the project size is the project total cost. It is expected that higher project cost would be negatively related to projects gearing.

Considering country type effects, the data on projects sample enables to classify each project as being executed in developed country or in developing country. It is expected that projects gearing would be higher in the developed countries where the perception of risk by investors is smaller.

Considering industry control factor, although it may be not very correct, I grouped energy transmission and power generation projects into one group, and, in the same manner, I merged together oil, gas and petrochemicals. The basis for such grouping is that qualitative analysis of the sample revealed that many energy projects are actually a combination of power generation and transmission facilities. For the same reason, gas and petrochemical projects can be merged together as well. To simplify the following text I use EPG notation to mark energy transmission and power generation projects and OGCH notation to mark projects in oil, gas and petrochemicals sectors.

Considering time effect factors, I decided not to use time as a separate variable because the preliminary investigation of the obtained projects sample revealed that project finance deals are unevenly distributed over the period from 1990 to 2013. This fact would be later highlighted in the descriptive statistics section.

To sum up the current section, the core factors which are expected to be related to high gearing of project are proposed. The core factors include the one related to the issue of risk of value expropriation by different project stakeholders, including project output offtakers, project host governments and project management. Then, the control factors are proposed. The control factors are related to the project specific factors which are the degree of non-recourse, the degree of monitoring effort by project lenders, project size, industry sector and country type.

5.0 EMPIRICAL METHODOLOGY

The current research aims to test the evidence of the relationships between project gearing and the factors described in the previous section. The methodology for checking the evidence of the relationships is to construct several ordinary least squares regressions and to evaluate the estimated coefficient values and their significance. Each regression would cover a particular project stakeholder (project management team, project output offtakers and project host government) by introducing the core variables representing the incentives of each project stakeholder to expropriate value. Each regression would also contain a set of control factors in line with the one described in the previous section. Finally, the development bank institution was mentioned in the previous section as an important project stakeholder, but instead of constructing a separate regression to measure the effect of development bank institution involvement, I split the whole projects sample in two subsamples basing on whether the development bank institution is involved in project finance deal. Then, each of the regressions is recalculated and updated coefficient values and their significance are reassessed. The section proceeds as following: at first, I provide the specification for each of the regressions in place; secondly I show how endogenous and exogenous core variables of the regressions are constructed.

5.1 Regression specifications

The current subsection shortly highlights 3 specifications of regression equations used in the current study - one for each type of project stakeholders. The core variables are emphasized in the short description for each of the regressions.

Regression 1

The regression aims to check whether the project gearing responses to the increased risk of value expropriation by the output offtakers after controlling for the quality of country contract enforcement system. The particular attention is given to the coefficient value and significance for interaction $OFAINF_i$ variable which is the proxy for the incentives of output offtakers to expropriate project value by not complying with the original contracts and for $RLAWadj_i$ variable which is for the proxy for the weakness of country contract enforcement system:

$$GR_i = \alpha + \beta_1 \times LRF_i + \beta_2 \times PRCL_i + \beta_3 \times SECT_i + \beta_4 \times DVP_i + \\ + \beta_5 \times OFAINF_i + \beta_5 \times RLAWadj_i + \varepsilon_i$$

Regression 2

The regression aims to check whether the project gearing responses to the increased risk of value expropriation by the host government. The particular attention is given to the coefficient value and significance for PRX_i which is the proxy for the incentives of host government to expropriate project value and for interaction $PRXRLAWadj_i$ variable which is the proxy for incentives of host government to expropriate project value under country weak contract enforcement system:

$$GR_i = \alpha + \beta_1 \times LRF_i + \beta_2 \times PRCL_i + \beta_3 \times SECT_i + \beta_4 \times DVP_i + \\ + \beta_5 \times PRX_i + \beta_6 \times PRXRLAWadj_i + \varepsilon_i$$

Regression 3

The regression aims to check whether the project gearing responses to the increased risk of value expropriation by project management team. The particular attention is given to the coefficient value and significance for $COWS_i$ variable which is the proxy for the efficiency of governance, for $CORR_i$ variable which is the proxy for the incentives of individuals to take advantage for personal enrichment and for the interaction $COWSCORR_i$ variable which is the proxy for the combination of individuals incentives to take advantage for personal enrichment under more dispersed and presumably less efficient governance:

$$GR_i = \alpha + \beta_1 \times LRF_i + \beta_2 \times PRCL_i + \beta_3 \times SECT_i + \beta_4 \times DVP_i + \\ + \beta_5 \times COWS_i + \beta_6 \times CORR_i + \beta_7 \times COWSCORR_i + \varepsilon_i$$

5.1 Core variables definition

The current subsection shortly explains how the core variables of the regressions are constructed. I start with endogenous variable and then explain core exogenous variables.

The endogenous core variable of the regressions is the project gearing, the formula for the variable is provided below:

$$GR_i = \frac{D_i}{D_i + E_i}$$

GR_i – gearing ratio of project i

D_i – debt funding of project i

E_i – equity funding of project i

The exogenous core variable is the numeric variable representing the index of country rule of law estimated by the World Governance Indicators. The variable is considered as the best proxy representing *the quality of country contract enforcement system*²¹. It is believed that quality of country contract enforcement system has implications for the risk of value expropriation by project output offtakers. The original variable can take both negative and positive values (from -2 to +2), and the higher is the value of the index the higher is the quality of country contract enforcement system. However, I am rather concerned with the weakness of country contract enforcement system, that is why I adjust the original variable by multiplying it by (-1). Therefore, the adjusted variable can also take negative and positive values (from -2 to +2), but the higher is the value of the index the weaker is the quality of country contract enforcement system.

$$RLAWadj_i = RLAW_i \times (-1)$$

$RLAW_i$ – country rule of law index for project i

$RLAWadj_i$ – country adjusted rule of law index for project i

The exogenous core variable is the numeric interaction variable combining the dummy variable representing the presence of output offtake agreements and the variable representing long-term inflation of country of project realization. The interaction variable is the proxy for *the incentives of project output offtakers to non-comply with the original contracts* having implications for the risk of value expropriation by project output

²¹ Another alternative is the ease of doing business index estimated by the World Bank Research Group. However, it was first calculated in 2003 and the most of the projects in the obtained sample are attributed to the period from 1990 to 2003, making the index of little use to the current study.

offtakers. The country inflation variable is intentionally taken because it is assumed that project output is sold in national currency units. Rather than taking inflation rate at a year when finance for a project was secured I reckon that the long-term expectation of the inflation is more representative of the uncertainty. To come up with the long-term expectation of the inflation I compute the average country inflation over the last three years preceding a year of project finance being secured²².

$$OFAINF_i = OFA_i \times INF_i = OFA_i \times \frac{inf_{i,t} + inf_{i,t-1} + inf_{i,t-2}}{3}$$

$POAINF_i$ – interaction term variable between the presence of having output offtakers and the country inflation expectation for project i

OFA_i – dummy variable standing for the presence of having output offtakers for project i

$$\left[\begin{array}{l} OFA_i = 0 \text{ if project } i \text{ sells output on a merchant basis} \\ OFA_i = 1 \text{ if project } i \text{ entered in output offtake agreements} \end{array} \right.$$

INF_i – average country inflation over last 3 years

The exogenous core variable is the numeric measure of country political risk that proxies *the incentives of host government to expropriate project value*, and it has implications for the risk of value expropriation by host government. Since I found that academic researches do not have a uniform position in regards to what is the best measure of country political risk²³ I propose the following three options. The first option is the country military expenditures as a percentage of country GDP, the second option is the country unemployment rate, the third option is the political stability index estimated by the World Governance Indicators project. Considering the latter option, I am concerned with the degree of country political instability, but the evaluation of the methodology of the index construction revealed that the index is based on the perceptions of the likelihood of political instability, and the higher is the index the higher is the perception of political instability, therefore I can use the original index. As to eliminate ambiguity I later call the index of country political stability as the index of country political instability.

$PR1_i$ – country military expenditures as a percentage of GDP for project i

$PR2_i$ – country unemployment ratio for project i

²² I make the assumption that the long-term inflation expectation is simply based on the historical information.

²³ Hainz & Kleimeier (2012) used the degree of military involvement in the country's government (a deeper investigation of the article revealed that the way to assign scores for each country was not transparent) while Kleimeier & Megginson (2001) used *Euro money* political risk assessment scores which are not freely available.

$PR3_i$ – country political instability rating for project i

The exogenous core variable is the numeric interaction variable that stands for *the incentives of host government to expropriate project value under weak contract enforcement system*, which in turn is related to the risk of value expropriation by host government. The variable is computed for each measure of country political risk.

$$PRXRLAWadj_i = PRX_i \times RLAWadj_i$$

PRX_i – country political risk measure for project i

$RLAWadj_i$ – country adjusted rule of law index for project i

The exogenous core variable is the dummy representing the type of equity ownership structure concentration. The variable is the proxy for *the efficiency of governance* that has implications for the risk of value expropriation by project management team. After the preliminary evaluation of the project entities data I concluded that the obtained project entities have quite concentrated equity ownership structures, so I decided to set the following definition of dispersed equity ownership structure. Dispersed equity ownership structure is when no equity holder has a controlling stake. Alternatively, concentrated equity ownership structure is when project entity has either one equity holder with a share of more than 51% (including 51%), or when project entity has two equity holders with 50% share each (joint venture). The values the dummy variable, representing the dispersed equity ownership structure, can take are specified below:

$$\left[\begin{array}{l} COWS_i = 0 \text{ if project } i \text{ has concentrated equity ownership structure} \\ COWS_i = 1 \text{ if project } i \text{ has dispersed equity ownership structure} \end{array} \right.$$

The exogenous core variable is the numeric variable representing the index of country corruption level estimated by the World Governance Indicators²⁴. The variable is the proxy for *the incentives of project management team to take advantage for personal enrichment* that has implications for the risk of value expropriation by project management team. The variable can take both negative and positive values (from -2 to +2), and the higher is the value of the index the lower is the country corruption level. However, I am rather concerned with high country corruption levels, that is why I adjust the original variable by multiplying it by (-1).

²⁴ The World Governance Indicators project is managed and developed by the World Bank Research Group.

$CORR_i$ – country corruption level in which project i is realised

$CORRadj_i$ – country adjusted corruption level in which project i is realised

The exogenous core variable is the numeric interaction variable between the dummy representing type of equity ownership structure concentration and the numeric variable representing the index of country corruption level. The variable is the proxy for the *incentives of project management team to take advantage for personal enrichment under weaker efficiency of governance*, and it has implications for the risk of value expropriation by project management team.

$COWSCORR_i$ – interaction term between equity ownership structure concentration and country corruption level for project i

5.3 Control variables definition

The exogenous control variable is the dummy representing the control factor is *the degree of non-recourse to the assets of sponsoring companies*. Since the preliminary investigation of the obtained projects sample revealed that projects synopsis does not uncover the total amount of guarantees or percent of recourse to the assets of sponsoring firms I introduce a general dummy variable. The values for the dummy variable are provided below:

$$\left[\begin{array}{l} LRF_i = 1 \text{ if project } i \text{ is completely non – recourse} \\ LRF_i = 0 \text{ if project is limited – recourse} \end{array} \right.$$

The exogenous control variable is the numeric variable representing the degree of monitoring efforts by lenders, and it is proxied by the number of lead arrangers involved in a particular project finance deal.

MEF_i – number of lead arrangers for project i

The exogenous control variable is the numeric variable representing the project size as measured by total project cost. Since the obtained projects sample covers a period from 1990 to 2013 I deem it necessary to covert nominal total cost amounts in real terms in

order to achieve comparability between projects, otherwise nominal amounts would be distorted by inflation. Base year assumption is 1990. Since Project Finance Database has a separate column for debt amount raised in mUSD terms, I reckon that the best option is to use USD deflator coefficient. The next section containing the descriptive stats would reveal that the distribution of project real costs is right-skewed, therefore I deem it necessary to implement logarithmic transformation of project total real cost. The formula for the variable is specified below:

$$PRCL_i = \ln(PRC_i) = \ln(PNC_i \times DEFL_i)$$

$PRCL_i$ = log – converted real total cost amount for project i

PRC_i = real total cost amount for project i

PNC_i = nominal total cost amount for project i

$DEFL_i$ = deflator coefficient for project i

The exogenous control variable is the dummy standing for the country type. The values of the variable are provided below:

$$\left[\begin{array}{l} DVP_i = 0 \text{ if project } i \text{ is executed in the developed country} \\ DVP_i = 1 \text{ if project } i \text{ is executed in the developing country} \end{array} \right.$$

The exogenous control variable is the dummy standing for project industry/sector. The values of the variable are provided below:

$$\left[\begin{array}{l} SECT_i = 0 \text{ if project } i \text{ is EPG} \\ SECT_i = 1 \text{ if project } i \text{ is OGCH} \end{array} \right.$$

6.0 SAMPLE QUANTITATIVE DESCRIPTION

The current section starts with the general investigation of the obtained projects sample composition, the first data being evaluated are the inputs which are used to construct the control factors, and the project gearing ratios. I differentiate gearing ratios by industry sector and country type dimensions in order to come up with more meaningful conclusions. I also provide a brief description of project finance activity over the sample time period (Recall that the obtained sample consists of 431 which were executed in the period from 1990 to 2013). After the evaluation of the control variables I proceed by the evaluation of the core variables for each of the regression consequently. Please note that I do not aim to evaluate descriptive stats of every possible input or variable, but I do aim to make a coherent story basing on the selected variables and inputs.

6.1 Control variables and project gearing

I first start with the evaluation of project finance activity by industry sector and country type, which are two of the control variables. The Table 3 of the Appendix shows the structural features of project finance activity by country type and industry sector dimensions basing on the obtained projects sample. The project finance activity is measured either in terms of number of projects or in terms of total real costs of projects in mUSD, 1990 is the base year. One can conclude that the obtained sample is biased to EPG sector, which represents 81% of projects records, additionally EPG projects were more often realized in the developed countries rather than the developing countries. There is substantially smaller number of OGCH projects with the majority being executed in the developing countries. The situation is slightly different when using total real cost of projects as a basis for measuring project finance activity. First, the share of OGCH projects in the developing countries increases from 13% to 32%, secondly EPG projects activity was actually balanced between the developed and the developing countries.

To finish the discussion on project finance activity by industry sector and country type I describe dynamics of project finance activity by time dimension. The Chart 1 shows the dynamics of project finance activity by time dimension basing on the obtained projects sample. The project finance activity is again measured either in terms of number of project or in terms of total real costs of projects in mUSD, 1990 is the base year. Both charts revealed that project finance activity is exposed to cycles - the strongest cycle started in 1992, peaked at 1996-1998 and declined to bottom levels in 2003-2004. From that

moment, although the number of project realized worldwide restored, the total real cost of projects was rather small relatively to the previous considered 12 year period.

As a next step I investigate the total real cost of projects, which is the input for one of the control variables. The Table 4 shows the structural features of project real cost by country type and industry sector dimensions basing on the obtained projects sample. First, OGCH projects are typically bigger in value than EPG projects. Second, OGCH projects in the developing countries revealed to be the biggest in terms of value since the average real project cost amounts to 851.55 mUSD and the median real project cost amounts to 524.17 mUSD. The variance of project real cost of OGCH projects is much higher than the variance of project real cost of EPG projects. Finally, since the average project real cost is bigger than the median project real cost one can conclude that the distribution of project real cost is right-skewed.

As a next step I evaluate the last control variable, which is the degree of non-recourse of project lenders to the assets of sponsoring firms. The Table 5 of the Appendix represents the descriptive stats for the degree of non-recourse to sponsor assets by project finance deals, which is the last control variable. 91% of projects sample are indeed non-recourse, with the biggest share of non-recourse projects in the subsample of EPG projects in the developed countries and the least share of non-recourse projects in the subsample of EPG projects in the developing countries.

As a next step I evaluate project gearing characteristics by country type and industry dimension characteristics. Table 6 of the Appendix shows the structural features of projects gearing by country type and industry sector dimensions basing on the obtained projects sample. First, the average gearing of the total sample equals 79.62% suggesting that the obtained projects sample indeed represents highly levered deals. Second, the average gearing of projects is higher for the developed countries relatively to the developing countries, the difference is smaller for OGCH projects. Third, the average gearing of EPG projects in the developed countries is higher than the average gearing of OGCH projects in the developed countries by 5.63%. Fourth, the average gearing of EPG projects in the developing countries is only slightly higher than the average gearing of OGCH projects in the developing countries, the difference amounts to 1.20%. The conclusion is that EPG projects have higher gearing capacity relatively to OGCH projects.

I also show the time patterns of the average gearing ratios. The Chart 2 of the Appendix shows the dynamics of average gearing of projects by country type and industry sector dimensions basing on the obtained projects sample. Given that the most of project

finance activity is related to the period from 1992 to 2004 (first sub-period), the average gearing for that period is more representative in comparison to later period from 2005 to 2013 (second sub-period). Over the first sub-period the average gearing of EPG projects for both developed and developing countries revealed to be rather stable, however in the second sub-period the average gearing of EPG projects realized in the developing countries revealed to be quite volatile. With a reference to OGCH projects it is hard to judge any conclusion in regards to the benchmark gearing ratio since average gearing dynamics of OGCH projects revealed to be highly volatile over the whole period from 1990 to 2013.

6.2 Core variables

The subsection with the descriptive statistics is structured in line with the regressions order. Table 7 in the Appendix provides a short summary of the mean values either for the selected core variables or for the inputs used to construct core variables (when it is deemed to be more important). One should note that although the original sample consisted of 431 project records I had to downsize projects sample since there was a lack of input values for some years or countries. Thus, 393 project records would be used when estimating first regression, 394 project records would be used when estimating second regression and 387 project records would be use when estimating third regression. To enrich the descriptive stats section I again differentiate projects by country and industry sector dimensions.

I first start with the evaluation of inputs for the first regression, which aims to check project gearing response to the risk of value expropriation by project output offtakers. Considering the use of output offtake agreements, the highest share of projects that entered in output offtaker agreements is attributed to the subsample of EPG projects in the developing countries (43.4%) followed by the subsample of EPG projects in the developed countries (26.6%). The subsamples of OGCH projects in the developed and the developing countries are characterized by minor share of projects that entered in output offtake agreements. Therefore, one can conclude that output offtake agreements are of bigger importance for the EPG industry relatively to OGCH projects. Additionally, one can conclude that output offtaker agreements are of bigger importance for the projects realized in the developing countries relatively to the developed countries since the share of the projects with output offtakers for both EPG and OGCH projects in the developing countries exceed the corresponding shares in the developed countries. Considering average adjusted

rule of law index, developing countries are characterized by worse rule of law relatively to the developed countries.

I proceed with the evaluation of inputs for the second regression, which aims to check project gearing response to the risk of value expropriation by host governments. Considering the first option for the measure of the political risk, which is military expenditures as a percentage of GDP, it is hard to gauge any conclusions on whether the political risk is higher in the developing or developed countries. The same holds when considering the second option for the measure of the political risk, which is country unemployment ratio. However, when considering average political instability index, the developing countries are on average characterized by higher political instability relatively to the developed countries.

Finally, I evaluate the inputs for the third regression, which aims to check project gearing response to the risk of value expropriation by project management team. Considering equity ownership concentration, 17.6% of the whole projects sample are characterized by a dispersed equity ownership structures. The highest share of projects with the dispersed equity ownership structure is attributed to the subsample of OGCH projects realized in the developing countries (28.3%) while the smallest share of projects with the dispersed equity ownership structure is attributed to the subsample of EPG projects realized in the developed countries (7.9%). One can also conclude that OGCH projects more often have dispersed equity ownership structures when comparing to EPG projects. Considering adjusted corruption index, the average adjusted corruption index is higher for the developing countries relatively to the developed countries. The highest average adjusted corruption index is attributed to the subsample of OGCH projects realized in the developing countries (0.35) while the smallest average adjusted corruption index is attributed to the subsample of OGCH projects realized in the developed countries (-1.69). One can not judge any strong conclusions on whether EPG or OGCH projects are on average realized in more corrupted countries.

Consideration of the development bank participation is important because each of the regressions is re-estimated after differentiating projects by development bank participation criteria. The highest number and share of projects that received the support from the development bank is attributed to the subsample of EPG projects in the developing countries followed by the subsample of OGH projects in the developing countries. Therefore, one can conclude that development bank institutions are more often involved in project finance deals realized in the developing countries, and that their

influence is higher in the developing countries. Although a small share of EPG projects in the developed countries received support of the development bank institutions, none of projects from the subsample of OGCH projects in the developed countries received support of the development bank institutions suggesting that project in the developed countries are not in the center of the development bank institutions support.

7.0 REGRESSION RESULTS

The current section aims to evaluate whether the formulated hypothesis find empirical support. For that purpose coefficient values and significance estimated for each of the OLS regressions. If coefficients are not sufficiently significant, the obtained signs are evaluated. The section is structured as following: first, significance and values of the coefficients of the core variables are evaluated in accept or reject the formulated hypothesis; secondly, significance and values of the coefficients for the core variables are re-evaluated by introducing the development bank participation factor; lastly, significance and values of the control variables are evaluated and further conclusions are provided.

Table 8 of the Appendix describes the estimated coefficient values and significance for the Regression 1, which aims to check gearing response to the risk of value expropriation by project output offtakers after accounting for the weakness of country contract enforcement system. It was earlier assumed that the risk of value expropriation by project output offtakers increases when project output offtaker is incentivized to non-comply with the original contract (as proxied by the interaction variable between presence of output offtakers and country long-term inflation expectation) after accounting for the weakness of country contract enforcement system (as proxied by adjusted rule of law index). In line with the hypothesis, there is an indication that project gearing is positively related to the increased risk of value expropriation by output offtakers as suggested by the positive sign of the estimated coefficient for the interaction variable. Additionally, gearing increases as a response to the weakness of country contract enforcement system as suggested by the significant and positive coefficient for the adjusted rule of law index variable. The introduction of the development bank participation factor and comparison of coefficient values and significance for core variables between two cases (when the development bank is involved and when the development bank is not involved) reveals important implications. The significance of coefficients for two core variables deteriorates when the development bank is involved, especially for the adjusted rule of law index variable. Nevertheless, the sign of coefficient for the interaction variable remains positive

in both cases. The results can suggest that the participation of the development bank helps to mitigate the weakness of country contract enforcement system, so that higher gearing is no longer needed. Additionally, the participation of the development bank slightly helps to enforce the original contracts with the output offtakers, so that project gearing can be set at lower level. To sum up, the hypothesis that increased project gearing serves as a protection tool against possible risk of value expropriation by project output offtakers after accounting for the weakness of country contract enforcement system is empirically supported. Additionally, the participation of the development bank can serve as a substitute to high project gearing as the involvement of the development bank helps to mitigate a possible risk of value expropriation by project output offtakers and by other commercial stakeholders.

Table 9 of the Appendix describes the estimated coefficient values and significance for the Regression 2, which aims to check gearing response to the risk of value expropriation by host government. It was earlier assumed that the risk of value expropriation by host government increases when host government is incentivized to take unfavorable decisions (as proxied by the measure of country political risk), especially in those cases when the incentives of host government coincide with the weakness of country contract enforcement system (as proxied by the interaction variable between the measure of country political risk and the adjusted rule of law index). An assessment of different options for the measure of country political risk revealed that the best measure of country political risk is political instability index by WGI, that is why Table 10 shows only one estimated regression equation²⁵. In line with the hypothesis, project gearing is positively related to the increased risk of value expropriation by host government as suggested by the positive and significant coefficient for political instability index variable and positive coefficient for the interaction between political instability index and adjusted rule of law index variable. The introduction of the development bank participation factor and comparison of coefficient values and significance for core variables between two cases (when the development bank is involved and when the development bank is not involved) reveals important implications. When the development bank is involved, the significance of coefficients for two core variables strongly deteriorates. When the development bank is not

²⁵ When using other measures of political risk such as country military expenditures as a percentage of GDP and country unemployment ratio, it was revealed that the obtained coefficients significance is quite far from the confidence interval benchmark, despite the obtained signs are in line with the expectations. For the military expenditures the developing countries were only considered because, for instance, USA (represented by the major share of projects) is treated as a developed country, but it has military spending ratio close to the developing countries, despite smaller political risk.

involved, the coefficient significance for the country political risk measure improves while the coefficient for the interaction variable between political risk measure and adjusted rule of law index is highly significant. The results can suggest that the participation of the development bank helps to mitigate incentives of host government to expropriate value, so that higher gearing is no longer needed. Additionally, the impact of the development bank participation on the incentives of host government is particularly pronounced when country is characterized by weak contract enforcement system, and gearing can be further relaxed. To sum up, the hypothesis that increased project gearing serves as a protection tool against possible risk of value expropriation by host government, especially in countries with weak contract enforcement system, is empirically supported. Additionally, the participation of the development bank can serve as a substitute to high project gearing as the involvement of the development bank helps to counteract the incentives of host government to expropriate value, especially in countries with weak contract enforcement system.

Table 10 of the Appendix describes the estimated coefficient values and significance for the Regression 3, which aims to check the hypothesis that project gearing increases as a response to the risk of value expropriation by project management team. It was earlier implicitly assumed that the risk of value expropriation increases when the project is characterized by weaker governance practice (as proxied by the dispersed equity ownership structure) and higher incentives of individuals to take advantage for personal enrichment (as proxied by the adjusted country corruption index), especially when the two effects factors coincide together. Contrary to the hypothesis, project gearing is not positively related to the increased risk of value expropriation by project management team when obtained coefficients for the core variables are evaluated. Instead, there is an indication that the relationship actually works in the opposite direction as suggested by the negative coefficient signs for the variable representing the weakness of the governance practice (as proxied by the dispersed equity ownership structure dummy) and for the variable representing the incentives of individuals to take advantage for personal enrichment (as proxied by the adjusted country corruption index) and the negative and significant coefficient for the interaction variable between two. The following conclusions can be derived. The first conclusion is to say that creditors simply view projects with the combination of weaker governance and realized in countries with higher incentives of individuals to take advantage for personal enrichment as a more risky investment leading to the reduction in the project gearing. The second conclusion is to say that equity

ownership concentration and project gearing are indeed endogenously determined (the problem that was mentioned in the studied factors section), hence both react to the same increased risk of value expropriation; therefore higher ownership concentration can be seen as a substitute to project gearing when projects are exposed to higher risk of value expropriation by project management team. Although the hypothesis was initially related to the project management team, one can state that higher ownership concentration can be seen as a substitute to project gearing irrespective of the project stakeholder involved given the negative sign of the ownership concentration variable and the p-value which is not far from the established significance threshold. The introduction of the development bank participation factor reveals that when the development bank is involved the coefficient for the interaction variable becomes more negative and more significant while when the development bank is not involved the coefficient for the interaction variable is not significant. Therefore, one can conclude that when the development bank is involved higher ownership concentration is an efficient substitute to project gearing for the projects those management is exposed to the temptation to expropriate project value. Moreover, the coefficient for the adjusted corruption variable is positive and that is in line with the expected results. Alternatively, when the development bank is not involved there is no significant indication that low ownership concentration serves as a substitute to project gearing, even when project management has higher temptation to expropriate project value. The question why the involvement of development bank changes the relationship between gearing and equity ownership concentration is challenging and requires deeper investigation by other researchers. To sum up, the hypothesis that the increased project gearing serves as a protection tool against the risk of value expropriation by project management team is not empirically supported.

Lastly, when considering the obtained values and significance for the coefficients of control variables the following conclusions can be drawn. At first, project gearing does not respond to the degree of lenders recourse to sponsoring assets suggesting that gearing serves as a protection tool irrespective of the degree of recourse; that is not in line with the expectation that additional guarantees by project sponsors would contribute to the incentives of project stakeholders to expropriate value leading to even higher gearing ratio. Secondly, monitoring efforts variable was introduced to adjust down the risk of value expropriation by project stakeholders when several parties perform un-coordinated monitoring. Although its inclusion in the regression should have resulted in more clean

values and significance of the core variables, the sign of coefficient for the control variable is positive suggesting that the quality of monitoring efforts is positively related to project gearing. The possible explanation is that monitoring efforts and project gearing are endogenously determined and, thus, may serve as substitutes when used as mitigation tools against the risk of value expropriation by project stakeholders. Thirdly, project real cost is negatively related to project gearing suggesting that larger projects are indeed considered more risky by project lenders. Interestingly, the smallest significance of the coefficient for the control variable is achieved when the development bank institution is involved suggesting that the impact of size on project gearing is eliminated when the development bank is involved. Fourthly, industry sector variable revealed to be mainly insignificant suggesting that industry sector plays limited role in the process of project gearing determination. Interestingly, the highest insignificance of the coefficient for the control variable is achieved when the development bank institution is involved suggesting that development bank institution participation eliminates differences in the potential corridor for EPG and OGCH projects. Finally, the obtained coefficient for the country type dummy revealed to be most significant when the development bank institution is involved in project finance deal because most of projects that received support of the development bank institutions were realized in the developing countries.

To summarize, the empirical tests revealed that higher project gearing can be used as a protection tool against a risk of value expropriation by project output offtakers or by host governments, especially when the quality of country contract enforcement system is taken into account. However, the hypothesis that project gearing can also be used as a protection tool against the risk of value expropriation by project management team did not find empirical support. A further evaluation of the role the development bank involvement in the project finance deals revealed that development bank involvement can serve as a substitute to project gearing in mitigation of the risk of value expropriation by output offtakers or by host governments since the development bank involvement helps to ensure the compliance with the original contracts. Finally, several control factors helped to enrich conclusions and to raise a question of additional substitutes to project gearing.

8.0 CONCLUSIONS, DRAWBACKS AND FURTHER RESEARCH AREAS

Most academic or professional articles view highly levered project finance deals as a way to maximize the return on sponsor equity, therefore those articles are focused on exploring the factors that enhance project leverage capacity. Contrary to those articles, the aim of the current study was to examine whether project gearing can serve as a mitigation tool against the risk of project value expropriation by various project stakeholders - the idea that was first noted by Esty (2004), but that received limited attention by researchers. Therefore, the current study represents the first empirical attempt to test the evidence of the relationships between project gearing and the risk of value expropriation by various project stakeholders. Furthermore, the aim was to evaluate whether the involvement of the development bank institutions can serve as a substitute to project gearing as a mitigation tool against the risk of project value expropriation by different project stakeholders. Although the role of development bank institutions in project finance transactions received broad empirical attention in the context of country political risk (most of the studies conclude that development bank involvement is a must for successful projects realization in the countries with high political risk), none of the researchers tried to view the development bank involvement as a substitute to project gearing as a mitigation tool against the risk of value expropriation by project stakeholders. Additionally, the advance of the current research is that the effect of the development bank involvement is viewed not only in the context of host government incentives, but also in the context of the incentives to expropriate value by the commercial parties and project management team.

The obtained results revealed that project gearing can be indeed seen as a mitigation tool against risk of project value expropriation by project output offtakers, by other commercial parties and by host governments, that is in line with Esty (2004). However, no empirical support was found for the use of project gearing as a mitigation tool against the risk of project value expropriation by project management team. Further investigation of the role of development bank involvement in project finance deals revealed that the involvement of development bank institutions can be seen as a substitute to project gearing due to its ability to exert pressure on project output offtakers, other commercial stakeholders and host governments.

There are several potential drawbacks of the study. At first, the empirical results did not find the support for the use of project gearing as a mitigation tool against risk of project value expropriation by project management team. It is suggested to reassess the proxies standing for the risk of project value expropriation by project management team and to

check again for the evidence of the relationship. Secondly, several control factors that were not taken into account are whether project output offtakers or host governments directly invest in a project via equity or debt. If this is the case, then the risk of project value expropriation by those parties is likely to be reduced since the parties have vested interest. Additionally when considering output offtakers, the regional market concentration ratio for the project output should be accounted for when measuring the incentives of project output offtakers to non-comply with the original contracts.

There are several ideas for further research. At first, an improvement to the current research would be to enlarge the projects sample by including more industries and sectors. Recall that the obtained sample consists only of energy generation, energy transmission, oil & gas upstream, downstream and other petrochemical projects. Although mentioned industry sectors represent the major share of project finance deals, there is an opportunity to enlarge the research sample by including project finance deals from other sectors such as real estate, telecommunications and other sectors. Secondly, an interesting approach for the further research would be to obtain not only the data on projects and project gearing, but also data on project finance loan tranches, and to match data on projects with data on project finance loans. It is a challenging exercise, but matching would enable to consider project gearing, interest rates on loans and maturities all together and to formulate more advanced hypothesis on whether project gearing can be used as a protection tool against risk of value expropriation by various project stakeholders and what are the substitutes for such a role of leverage. Thirdly, a more deep analysis of the monitoring efforts realized by lenders as a substitute to the role project gearing plays can be investigated. The researcher is suggested to assess the fact that the whole lendable amount is released in successive tranches of finance against certified documents, or by encouraging the borrower and third parties with a vested interest in the project not to default or renege their contractual agreements by executing some form of formal security or collateral. Please see Holstrom (1979) for the detailed guidance on that idea. Finally, the best recommendation is to conduct an analogous report for the corporate sector and to compare the empirical findings between project finance and corporate finance sector. The proposed research might challenge the implicit assumption of the current study which is that the effect of using gearing as a mitigation tool against the risk of value expropriation by various stakeholders is more pronounced for entities financed on a project basis rather than on a corporate basis.

REFERENCES

- Bolton, P. & Scharfstein D. (1996). Optimal Debt Structure and the Number of Creditors, *Journal of Political Economy*, 104, 1–25
- Boork, J. & Synnerby, J. (2014). The effects on infra debt margins: A study on the components and long-term sustainability of the recent infrastructure debt margin shift. Master Thesis, Stockholm School of Economics
- Corielli, F., Gatti, S. & Steffanoni, A. (2010). Risk shifting through Nonfinancial Contracts: Effects on Loan Spreads and Capital Structure of Project Finance Deals. *Journal of Money, Credit and Banking*, 42(7), 1296-1318
- Dailami, M. & Hauswald, R. (2000). Risk shifting and long-term contracts: evidence from the Ras Gas Project, World Bank Policy Research Working Paper.
- Esty, B. (1999). Petrozuata: a case study of the effective use of project finance. *Journal of Applied Corporate Finance*, 12(3), 26-42
- Esty, B. (2002). The Economic Motivations for Using Project Finance. Unpublished Working Paper
- Esty, B. & Megginson, W. (2003). Creditor rights, Enforcement, and Debt ownership structure: the evidence from the Global Syndicated Loan Market. *Journal of Financial and Quantitative analysis*, 38(1), 37-57
- Esty, B. (2004). Why Study Large Projects? An Introduction to Research on Project Finance. *European Financial Management*, 10(2), 213-224
- Filatotchev, I. & Mickiewicz, T. (2006). Ownership Concentration, Private Benefits of Control and Debt Financing. *Corporate Governance and Finance in Russia and Poland*, 159-176
- Gungoraydinoglu, A., & Oztekin, O. (2011, Dec.). Firm- and country-level determinants of corporate leverage: Some new international evidence. *Journal of Corporate Finance*, 17(5), 1457-1474
- Hainz, C. & Kleimeier, S. (2004). Political risk in syndicated lending: the theory and empirical evidence regarding the use of project finance, LIFE working papers, globalclearinghouse.org
- Hainz, C. & Kleimeier, S. (2012). Political risk, project finance, and the participation of development banks in syndicated lending. *Journal of Financial Intermediation*, 21(2), 287-314

- Holstrom, B. (1979). Moral Hazard and Observability. *Bell Journal of Economics*, 10, 74-91
- Introductory Manual on Project Finance for Managers of PPP projects (2001), available at <http://ru.scribd.com/doc/47027346/Project-Finance-Manual>
- Kleimeier, S. (1995). Limited- and Non-recourse Project Finance: a Survey, Maastricht School of Management, Netherlands
- Kleimeier, S. (2001). An empirical analysis of limited recourse project finance. Unpublished Working Paper
- Kleimeier, S. & Megginson, W. (2001). Are project finance loans different from other syndicated credits? *Journal of Applied Corporate Finance*, 13(1), 75-87
- Kensinger, J. & Martin, J. (1988). Project Finance: Raising Money the Old Fashioned Way. *Journal of Applied Corporate Finance*, 1(3), 69-88
- Morisson, R. (2012). The Principles of Project Finance. Gower Publishing
- Mora, N. (2013). Lender exposure and effort in the syndicated loan market. The Federal Reserve Bank of Kansas City Research Working Paper
- Pollio, G. (1998). Project finance and international energy development. *Energy Policy*, 26(9), 687-697
- Shah, S. & Takor, A. (1987). Optimal capital structure and project financing. *Journal of Economic Theory*, 42, 209-243
- Shleifer, A. & Vishny, R. (1997, Jun.). A Survey of Corporate Governance. *The Journal of Finance*, 52(2), 737-783
- Smith, R. & Walter, L. (1990). Global Financial Services. Harper Business, 191-281
- Sorge, M. (2004). The nature of credit risk in project finance. BIS Quarterly Review
- Sorge, M. & Gadanecz, B. (2008). The Term Structure of Credit Spreads in Project Finance. *International Journal of Finance and Economics*, 13(1), 68-81
- Subramanian, K, F. Tung, and X. Wang, 2009, Law and Project Finance, Working Paper, Emory University.
- Sufi, A. (2007). Information asymmetry and Financing arrangements: evidence from syndicated loans, *Journal of Finance*, vol 62(2), 629-668
- Webb, D. (1999). Long-term Financial Contracts Can Mitigate the Adverse Selection Problem in Project Financing. *International Economic Review*, 32(2), 305-320

APPENDIX

Table 1. Literature review matrix	
1.1 Theoretical studies treat project finance as an independent field of research: ✓ Shah & Takor (1987) ✓ Kleimeier (1995) ✓ Webb (1999) ✓ Pollio (1998) ✓ Esty (1999) ✓ Esty (2002) ✓ Esty (2004)	1.2 Theoretical studies treat project finance as a part of syndicated lending field of research: ✓ Not considered in the current study
1.3 Empirical studies treat project finance as an independent field of research: ✓ Sorge (2004) ✓ Hainz & Kleimeier (2004) ✓ Gorelli, Gatti & Stefanoni (2010) ✓ Boork & Synnerby (2014)	1.4 Empirical studies treat project finance as a part of syndicated lending field of research: ✓ Kleimeier (2001) ✓ Esty & Megginson (2003) ✓ Sorge & Gadanecz (2008) ✓ Hainz & Kleimeier (2012)

Table 2. Data sources for the inputs to construct variables			
	Set of variables	Databases/web-sites	Treatment of input data
1.	Project gearing	Project Finance Database	Leverage ratio is available for each project
2.	Value expropriation by project management	Project Finance Database	Manual classification by screening the available data on equity shares of investors
		The World Bank Database	Corruption index estimate is provided for each country
3.	Value expropriation by output offtakers	Project Finance Database	Manual classification by screening projects synopsis
		The World Bank Database	GDP deflator time series are provided for each country
4.	Value expropriation by host governments	The World Bank database	Country military expenditures as a percentage of GDP time series Unemployment as a percentage of total labor force Political stability index, World Governance Indicators project
5.	Value expropriation by project stakeholders due to failure to enforce contract	The World Bank Database	Rule of law index estimate is provided for each country
6.	Development bank participation	Project Finance Database	Manual classification by screening projects synopsis Manual collection of direct loan amounts and guarantee cover amounts
7.	Degree of no-recourse	Project Finance Database	Manual classification by screening project synopsis
8.	Monitoring efforts	Project Finance Database	Manual investigation of the number of lead arrangers by screening the list of lead arrangers and roles of advisors
9.	Project size	Project Finance Database	Total nominal cost in USD is provided for each project
10.	Country type	Project Finance Database	Manual classification by screening country of projects available as a separate column
11.	Industry type	Project Finance Database	Industry sector is available as a separate column

Table 3. Project finance activity by country and sector dimensions							
By number of projects, num.				By total real cost of projects, mUSD			
Country type				Country type			
Sector	Developed	Developing	Total	Sector	Developed	Developing	Total
EPG	204	143	347	EPG	45 881	44 334	90 215
OGCH	27	57	84	OGCH	15 199	48 539	63 737
Total	231	200	431	Total	61 080	92 872	153 953
By number of projects, perc. of total				By total real cost of projects, perc. of total			
Country type				Country type			
Sector	Developed	Developing	Total	Sector	Developed	Developing	Total
EPG	47%	33%	81%	EPG	30%	29%	59%
OGCH	6%	13%	19%	OGCH	10%	32%	41%
Total	54%	46%	100%	Total	40%	60%	100%
Table 3 shows project finance activity by number of newly realized projects and by total real cost of newly realized projects. EPG stands for energy generation and energy transmission projects while OGCH stands for oil&gas upstream, downstream and petrochemical projects.							

Table 4. Average real cost of project, mUSD					
	EPG - Developed	EPG - Developing	OGCH -Developed	OGCH -Developing	All
Max	1255,80	2217,25	2886,55	3336,01	3336,01
Min	6,51	3,36	22,81	15,39	6,51
Average	224,91	310,03	562,92	851,55	357,20
Median	152,97	189,37	247,39	524,17	190,77
Std.	285,67	232,09	748,58	906,13	502,55
Table 4 shows average real cost of projects by sector and industry type dimensions. EPG stands for energy generation and energy transmission projects while OGCH stands for oil&gas upstream, downstream and petrochemical projects.					

Table 5. Degree of non-recourse				
Number of non-recourse projects				
Section A.	Country type			
	Sector	Developed	Developing	Total
	EPG	196	119	315
	OGCH	25	53	78
	Total	221	172	393
Percentage of non-recourse projects of total sample				
Section B.	Country type			
	Sector	Developed	Developing	Total
	EPG	96%	83%	91%
	OGCH	93%	93%	93%
	Total	96%	86%	91%
Section A of Table 5 highlights the number of projects with no-recourse to sponsors differentiating by sector and country type. Section B of Table 5 provides the share of projects with no-recourse to sponsors by sub-sample (For instance, 96% of EPG projects in the developed countries are considered as non-recourse).				

Table 6. Gearing of projects by country and sector dimensions					
	EPG - Developed	EPG - Developing	OGCH -Developed	OGCH -Developing	All
Max	100,00%	100,00%	100,00%	100,00%	100,00%
Min	35,00%	33,00%	30,00%	14,00%	14,00%
Average	84,60%	74,98%	78,97%	73,74%	79,62%
Median	85,30%	75,00%	84,00%	76,00%	80,00%
Std.	16,55%	15,83%	20,98%	20,82%	17,92%
Table 6 shows the descriptive statistics of the gearing of projects by country type and sector dimensions. EPG stands for energy generation and energy transmission projects while OGCH stands for oil&gas upstream, downstream and petrochemical projects.					

Table 7. General descriptive statistics for selected core variables

A. Selected exogenous core variables for the Regression 1					
	EPG - Developed	EPG - Developing	OGCH -Developed	OGCH -Developing	All
Number of obs.	184	136	26	48	394
Number of projects with offtakers	49	59	3	7	118
<i>Perc. of project with offtakers by sub-sample</i>	26,6%	43,4%	11,5%	14,6%	29,9%
Average adjusted rule of law index WGI	-1,46	0,08	-1,52	0,32	-0,72
Number of projects received support from the DBI	16	69	0	13	98
<i>Perc. of project that received support from the DBI by sub-sample</i>	8,7%	50,7%	0,0%	27,1%	24,9%
B. Selected exogenous core variables for the Regression 2					
	EPG - Developed	EPG - Developing	OGCH -Developed	OGCH -Developing	All
Number of obs.	178	136	25	48	387
Average military expenditures as a perc. of GDP	2,56%	2,44%	2,95%	3,08%	2,61%
Unemployment ratio	7,11%	6,39%	6,42%	6,66%	6,76%
Average political instability index WGI	-0,80	0,41	-0,74	0,57	-0,20
Number of projects received support from the DBI	15	69	0	13	97
<i>Perc. of project that received support from the DBI</i>	8,4%	50,7%	0,0%	27,1%	25,1%
C. Selected exogenous core variables for the Regression 3					
	EPG - Developed	EPG - Developing	OGCH -Developed	OGCH -Developing	All
Number of obs.	178	137	25	53	393
Number of projects with dispersed ownership structures	14	23	7	15	69
<i>Perc. of project with dispersed ownership structures by sub-sample</i>	7,9%	16,8%	28,0%	28,3%	17,6%
Average adjusted corruption index WGI	-1,57	0,18	-1,69	0,35	-0,71
Number of projects received support from the DBI	15	69	0	15	99
<i>Perc. of project that received support from the DBI by sub-sample</i>	8,4%	50,4%	0,0%	28,3%	25,2%

Table 8. Regression 1 “High project gearing as a response to a risk of value expropriation by output offtakers”								
Total sample								
	Alpha	LRF	MEF	PRClog	SECT	DVP	OFAINF	RLAWadj
<i>Coefficients</i>	<u>81,97</u>	1,42	<u>1,57</u>	<u>-1,52</u>	-0,84	-2,59	0,16	<u>3,41</u>
<i>P-value</i>	0,00	0,65	0,06	0,06	0,73	0,45	0,18	0,06
R Square 0.08, Adj. R Square 0.06, Num. of obs. 394								
DVP = 1 (development bank is involved)								
	Alpha	LRF	MEF	PRClog	SECT	DVP	OFAINF	RLAWadj
<i>Coefficients</i>	<u>78,58</u>	2,52	<u>2,29</u>	-1,30	-1,14	-7,67	0,13	-0,28
<i>P-value</i>	0,00	0,60	0,09	0,40	0,84	0,32	0,34	0,94
R Square 0.07, Adj. R Square 0.01, Num. of obs. 98								
DVP = 0 (development bank is not involved)								
	Alpha	LRF	MEF	PRClog	SECT	DVP	OFAINF	RLAWadj
<i>Coefficients</i>	<u>84,35</u>	0,66	1,59	<u>-1,47</u>	-2,53	-1,55	0,39	2,46
<i>P-value</i>	0,00	0,88	0,13	0,12	0,36	0,69	0,12	0,28
R Square 0.05, Adj. R Square 0.03, Num. of obs. 296								
Table 8 shows estimated coefficient values and significance for the introduced variables. The significant coefficients (P-value <= 0.10) are highlighted.								
Control variables:								
LRF – limited recourse to project sponsors (0 = no-recourse, 1 = limited-recourse)								
MEF – monitoring efforts by project lenders (the higher is the value, the more monitoring efforts is applied)								
PRClog – logarithm of project real cost (the higher is the value, the higher is the project real cost)								
SECT – sector type variable (0 = EPG projects, 1 = OGCH projects)								
DVP - country type variable (0 = developed country, 1 = developing country)								
Core variables:								
OFAINF - interaction variable between long-term inflation and presence of output offtakers (the higher is the value, the higher is the long-term inflation assuming ouputofftaker is present). The variable proxies for the uncertainty of the initial contract.								
RLAWadj –World Governance rule of law adjusted index (the higher is the value, the higher is the country non-compliance with law). The variable proxies for the difficulty to enforce of originally stipulated contract.								

Table 9. Regression 2 “High project gearing as a response to a risk of value expropriation by host government”								
Total sample								
	Alpha	LRF	MEF	PRClog	SECT	DVP	PR3	PR3RLAWadj
<i>Coefficients</i>	<u>81,30</u>	1,82	<u>1,59</u>	<u>-1,54</u>	-1,47	-1,25	<u>3,20</u>	2,29
<i>P-value</i>	0,00	0,56	0,06	0,05	0,54	0,65	0,03	0,13
R Square 0.08, Adj. R Square 0.06, Num. of obs. 387								
DVP = 1 (development bank is involved)								
	Alpha	LRF	MEF	PRClog	SECT	DVP	PR3	PR3RLAWadj
<i>Coefficients</i>	<u>80,96</u>	1,82	2,08	-1,52	-1,20	-5,41	1,06	-2,13
<i>P-value</i>	0,00	0,70	0,13	0,32	0,83	0,55	0,75	0,60
R Square 0.07, Adj. R Square 0.01, Num. of obs. 97								
DVP = 0 (development bank is not involved)								
	Alpha	LRF	MEF	PRClog	SECT	DVP	PR3	PR3RLAWadj
<i>Coefficients</i>	<u>82,36</u>	0,49	1,72	-1,45	-3,66	1,16	1,92	<u>3,51</u>
<i>P-value</i>	0,00	0,91	0,11	0,12	0,18	0,70	0,28	0,04
R Square 0.06, Adj. R Square 0.04, Num. of obs. 290								
Table 9 shows estimated coefficient values and significance for the introduced variables. The significant coefficients (P-value <= 0.10) are highlighted. Control variables: LRF – limited recourse to project sponsors (0 = no-recourse, 1 = limited-recourse) MEF – monitoring efforts by project lenders (the higher is the value, the more monitoring efforts is applied) PRClog – logarithm of project real cost (the higher is the value, the higher is the project real cost) SECT – sector type variable (0 = EPG projects, 1 = OGCH projects) DVP - country type variable (0 = developed country, 1 = developing country) Core variables: PR3 - World Governance political stability adjusted index (the higher is the value, the higher is the country political instability). The variable proxies for the risk of project value expropriation by host government. PR3RLAWadj – interaction variable between World Governance political stability adjusted index and World Governance rule of law adjusted index (the higher is the value of the latter, the higher is the country non-compliance with law assessment). The variable proxies for the risk of project value expropriation by host government in country in which it is difficult to enforce originally stipulated contracts.								

Table 10. Regression 3 “High project gearing as a response to a risk of value expropriation by project management”

Total sample									
	Alpha	LRF	MEF	PRClog	SECT	DVP	OWS	CORRadj	OWSCORRadj
<i>Coefficients</i>	<u>84,82</u>	1,35	<u>1,49</u>	<u>-1,63</u>	-1,57	-2,95	-3,72	-1,61	<u>-3,91</u>
<i>P-value</i>	0,00	0,67	0,07	0,04	0,50	0,37	0,18	0,30	0,09
R Square 0.08, Adj. R Square 0.06, Num. of obs. 393									
DVP = 1 (development bank is involved)									
	Alpha	LRF	MEF	PRClog	SECT	DVP	OWS	CORRadj	OWSCORRadj
<i>Coefficients</i>	<u>78,76</u>	2,53	<u>2,51</u>	-1,17	-1,09	-7,49	-2,82	2,75	<u>-11,92</u>
<i>P-value</i>	0,00	0,57	0,05	0,44	0,83	0,32	0,53	0,41	0,04
R Square 0.11, Adj. R Square 0.04, Num. of obs. 99									
DVP = 0 (development bank is not involved)									
	Alpha	LRF	MEF	PRClog	SECT	DVP	OWS	CORRadj	OWSCORRadj
<i>Coefficients</i>	<u>87,76</u>	-0,48	1,33	<u>-1,58</u>	-3,81	-0,84	-1,59	-1,43	-1,93
<i>P-value</i>	0,00	0,91	0,21	0,10	0,16	0,82	0,68	0,43	0,51
R Square 0.05, Adj. R Square 0.02, Num. of obs. 294									

Table 10 shows estimated OLS coefficient values and significance for the introduced variables. The significant coefficients (P-value ≤ 0.10) are highlighted.

Control variables:

LRF – limited recourse to project sponsors (0 = no-recourse, 1 = limited-recourse)

MEF – monitoring efforts by project lenders (the higher is the value, the more monitoring efforts is applied)

PRClog – logarithm of project real cost (the higher is the value, the higher is the project real cost)

SECT – sector type variable (0 = EPG projects, 1 = OGCH projects)

DVP - country type variable (0 = developed country, 1 = developing country)

Core variables:

OWS – equity ownership concentration (0 = concentrated, 1 = dispersed equity ownership structure). The variable proxies for the risk of value expropriation by project management team in case of less efficient governance under dispersed equity ownership structure.

CORRadj – World Governance corruption adjusted index (the higher is the value, the higher is the corruption level). The variable proxies for the incentives of project management team to expropriate value for personal enrichment.

OWSCORRadj – the interaction variable between equity ownership concentration and World Governance corruption adjusted index. The variable proxies for the combined effect of non-efficient governance and temptation of project management team to expropriate project value.

Chart 1. Dynamics of project finance activity

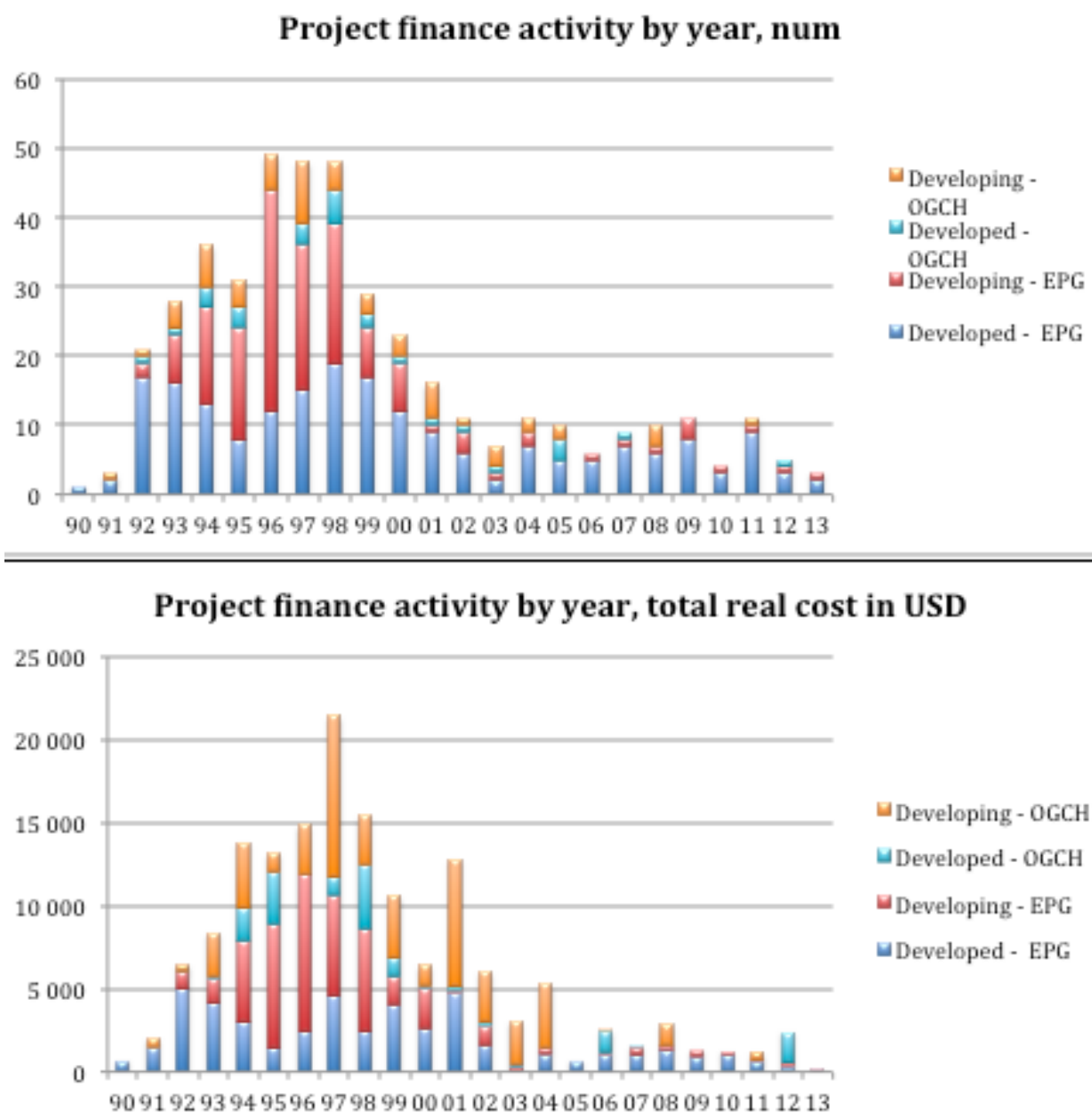


Chart 1 shows the dynamics and structure of project finance activity. The upper section measures project finance activity in terms of number of projects while the lower section measures project finance activity in terms of total real cost in mUSD.

Chart 2. Dynamics of average gearing of projects

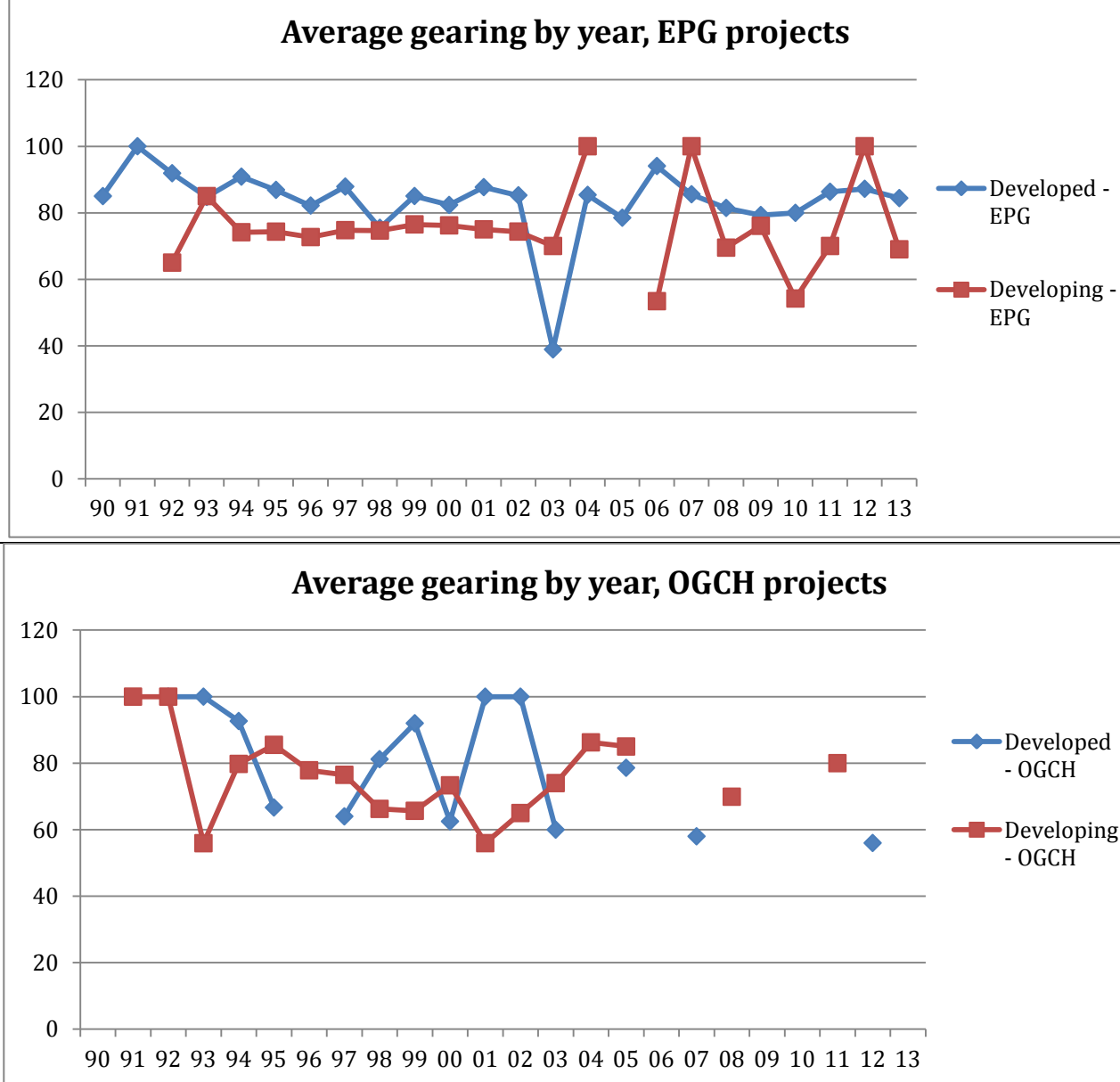


Chart 2 shows the dynamics in the average gearing of newly financed projects (sample) by industry sector over the period from 1990 to year 2013. The line is omitted where no newly financed projects were recorded.