Risk mitigation through contracts in project finance

Master thesis

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Abstract

This study researches the ability of contracts to reduce risk in project finance and to explore the effects of rule of law on these contracts. Agency theory is used to determine which contracts can be used. Institutional economics outlines the effects rule of law can have on contracts. Hypotheses are that five different contracts will differ in effect due to the level of rule of law in a country. A cross-sectional study using ordinary least squares regression is used to test these relationships in 580 projects. Results show that purchase agreements are present in projects with lower risk. Government guarantees, sponsorship experience, retaining ownership and multilateral support do not have a relationship with risk. This indicates that the risks of these contracts are already accounted for in the credit agreement. Arguing from this perspective, the relationship of purchase agreements with less risky projects is because purchase agreements are sometimes left out of the agreement. The credit agreement is not efficient in purchase agreements implying the off-taker is not always known beforehand.

Content

Chapter 1: Introduction

Infrastructure costs around the world are rising. Higher costs are due to infrastructure being an input to a variety of industries and therefore a driver of long-term growth. Another driver of higher costs is that infrastructure is needed to counter the effects of climate change. Risk of flooding is increasing in the world's deltas and large investments in flood defense is needed to mitigate this danger (Tessler, Z. D. et al., 2015). If spending does not rise it will have large social and economic costs as a result. Ehlers (2014) expects that, worldwide, infrastructure spending has to reach 5.6% of the GDP from 3.8% at this moment. In developing countries, lack of sufficient infrastructure is holding back growth. These countries will need to spend even more, up to a trillion dollars a year extra to keep up with other countries. Economic growth is held back if this does not happen (Ehlers, 2014).

A large increase in infrastructure spending cannot be paid for by a similar increase in tax revenue and creates a financing gap (Ehlers, 2014). It is paramount that private financing fills the financing gap in order for investments in infrastructure to continue. A potential solution to the finance gap is if institutional investors are utilized. In 2013, institutional investors had around 80 trillion dollars in assets. However, they only invest one percent in infrastructure (World Bank, 2015). Insurers and pension funds are bound to a strict risk profile. Infrastructure projects are subject to higher political and project risk and therefore institutional investors mostly steer clear from infrastructure investments (Kynge & Ralph, 2018). Investors are uncertain if infrastructure projects will become profitable and fear they will fail. Uncertainty about risk increases when projects are located in countries with high political risk and low legal protection (Ehlers, 2014). In countries with higher political risk the chance is higher the government will expropriate the project or breach contracts (Jensen, 2008). Low legal protection decreases trust in contracts as counterparties are not certain they will be enforced (Clague et al., 1999). Clearly, barriers exist which decrease the appetite of institutional investors to invest in infrastructure projects.

However, innovative constructs are being created in order to allow institutional investors to invest in infrastructure projects. An example is the IFC (International Finance Corporation), who managed to raise six billion dollars from insurance companies in the last five years. Insurance companies agreed to this because the IFC provided guarantees to cover a percentage of possible losses (Kynge & Ralph, 2018). Another example is a 400 million dollar water project in Australia. Institutional investors decided to invest due to an offtake agreement which was in place (Beyer, 2018). This shows that risk reducing contracts are available in order to attract financing of institutional investors.

A type of financing mechanism in which contracts play a large role is project finance. Project finance is the structured financing of an independent special-purpose vehicle (project company) with repayment based on the future cash flows of the project. Key to project finance is that the willingness of investors to finance the project is in accordance with the likelihood that the project will repay the loans at a rate consistent with the risk which is incurred. Trust of investors is based on likelihood of future cash flows. The project and its cash flows depend to a great extent on a network of contracts (Gatti, 2008). Contracts distribute risk among the partners of the project. Contracts can manage part of the project or distribute full or partial ownership of project components. Investors base their trust on these contracts (Gatti, 2008).

The goal of this study is to gain more insight in the relationship between contracts and risk of a project company. Also, research will be done on the effect of a country's ability to enforce laws on the relationship between contracts and risk. The following question is answered in this study: To what extent is there a difference in effect in how contracts in project finance mitigate risk between

countries with a low rule of law classification and high rule of law classification? This question is answered by focusing on agency and contract theory as a predictor for the different kinds of contracts in a project company and to what extent they decrease risk. Institutional economics is used to hypothesize about the effect of a country's ability to enforce laws on contracts. Contracts are the basis of project finance and are the instrument which attempts to decrease agency costs (Esty, 2004). Principal-agent theory is used to outline the possible conflicts which can occur in project finance which have to be solved by contracts. Two types of principal-agent relationships are explained. The relationship between the investors (principal) and the special-purpose vehicle (agent) is the first relationship. The other relationship is between the special-purpose vehicle (principal) and their counterparties (agents). If the latter's agency costs are very low then agency costs will decrease in the first relationship as well, lowering overall risk for the project. Effectiveness of contracts in reducing risk can be impaired by a low score for law enforcement.

Project finance is a relatively under-developed research field which has much potential for further research (Esty, 2004). It is very suited to study agency conflicts and how they can be solved. This is due to project companies being independent entities. In project finance, managerial decisions are focused on increasing value or decreasing risk of the project. Managerial decisions in corporate finance settings are generally more self-serving and focused on different priorities (Esty, 2004). As a result, decisions around contracts in project finance are made with profitability and risk mitigation in mind. This study seeks to give a practical and theoretical contribution.

The practical relevance of this study is to gain more insight into which mechanisms decrease risk of projects in order to make projects viable. By doing this it contributes to a greater amount of studies done by RoyalHaskoningDHV on large-scale water system infrastructure projects. Institutional and financial constraints prohibit these projects from happening. Studies of RoyalHaskoningDHV on technical aspects, institutional and finance contexts of these projects try to find what can make these projects successful. The scope of this study is narrowed to risk mitigation and the effect of contracts. With more insight of the correct mechanisms to decrease risk, creditors will sooner be inclined to finance projects. Insights of this study on the wider context of project companies can be utilized in the flood defense sector as well.

Theoretical relevance of this study is its contribution to agency theory and institutional economics. Agency theory looks into the different agents in a project finance setting and analyses agency problems. Some studies have shown that project finance reduces agency costs (Kleimeier & Megginson, 2000; Vaaler et al., 2008). Kleimeier and Megginson (2000) establish it on an abstract level and do not analyze further what reduces agency costs. Vaaler and others (2008) make a framework for determining risk. Agency theory fills part of that framework by testing for the effect of ownership concentration. This study builds on their work by looking more in detail at what determines this reduction of agency costs. Results show that the presence of purchase agreements reduce agency costs. Presence of purchase agreements decreases moral hazard. This result agrees with Byoun and Xu (2014) who use agency theory to determine agency problems of the sponsor. They provide the purchase agreement as solution to certain agency costs. However, they argue this is less likely to work when political risk is present as project companies are afraid of government takeover (Byoun & Xu, 2014). This paper researched if a relationship between law enforcement and contracts exist but did not find this relationship. On that level it does not agree with Byoun and Xu (2014).

This paper also contributes to studies on contracts. Some studies argue that contracts eliminate all company-specific risk (Blanc-Brude and Strange, 2007; Dailami & Hauswald, 2007; Corielli, Gatti, & Steffanoni, 2010). The first study finds that banks only price the systematic market risk and trust on

contracts to eliminate all other types of risk. This implies that risk should vary only marginally between projects. The second study finds in a case study that all company-specific risks are accounted for in the contracts. The third study finds that contracts reduce risk of the project and are efficiently arranged in contracts. Results of this quantitative study indicate that their notion is confirmed. Many contracts had no effect in decreasing the debt/equity ratio and presumably this risk is already accounted for in the credit agreement.

Lastly this paper gives a contribution to institutional economics. Studies have determined that the effectiveness of contracts depend on the quality of law enforcement and legal institutions (North, 1993; Zhou & Xu, 2012; Shou, Zheng & Zhu, 2016). This study researched the relationship between quality of law enforcement and the effectiveness of contracts. All contracts, besides tax deductions, were not influenced by the quality of rule of law. Indicating that this relationship does not exist or that project companies have a unique way dealing with this type of risk.

Data for the research is taken from the Private Participation in Infrastructure Database of the World Bank (2017). It is a dataset on 6,400 infrastructure projects in 139 low- and middle-income countries. The dataset ranges from 1990 to 2017. It provides information of the project on what type of public private partnership, type of contracts with governments, type of multilateral and bilateral support, sponsors and debt/equity ratio. Data is also taken from a database on the Worldwide Governance Indicators (World Bank, 2018). This database gives information on country classifications of rule of law.

The research problem is answered by a quantitative empirical study. An ordinary least squares regression is estimated to see what type of contracts have an effect on agency costs. The moderator, rule of law, is analyzed by including an interaction effect.

The study proceeds by providing a theoretical framework in chapter two. Hypotheses are formulated at the end of the framework, built on agency, contract and institutional economics studies. Methodology is the topic of the third chapter. Starting this chapter, a description is given about the dataset which is used. Next the concepts of the hypotheses are operationalized. Finally, a description is done of the methods used to obtain the results. The fourth chapter is the analysis of the research and aims to test the hypotheses. First the data is described. Next the hypotheses are tested and results are explained. Chapter five consists of the conclusion and discussion. An answer to the research question is provided and the limitations of the research are discussed. Suggestions for future research are given as well.

Chapter 2: Theoretical Framework

Project finance is the subject of study in this research. Project finance is structured financing of an independent special-purpose vehicle, which can also be named a project company. The project company is created by sponsors of the project. Sponsors are typically industrial corporations, public organizations, contractors or investors (Gatti, 2008). Project finance is an attractive form of finance because risk is shared between parties by contracts. Therefore, project finance offers potential to decrease the financing gap in infrastructure. Its unique characteristics provides an excellent environment to study the effect of contracts on limiting agency costs. Project finance is unique because it establishes a project company with one purpose, to build and/or operate a project. All decisions which are made are done with the purpose to complete the project. If the project would be done by the sponsor on their own balance sheet, then decisions concerning the project would be influenced by other decisions the sponsor has to make (Esty, 2004).

A defining aspect of project finance is the high debt/equity ratio it can achieve. Sponsors provide equity, but most investments come from creditors. The willingness of creditors to finance the project is in accordance with the likelihood the project will repay the loans at a rate consistent with the risk which is incurred. Therefore, investment in project finance is independent of the trust of creditors in the sponsors (Gatti, 2008). Trust is based on the ability of the project to pay back its debt and that the project's return matches the degree of risk. Due to the independence of the project company from its sponsors, lenders to the project have little or no recourse. Lenders are still interested in lending money because project risks are divided among the participating parties in the project who can best manage the respective risks. Priority of the project is to establish the project and therefore cash flows which are generated by the project are primarily used to repay the lenders. The only contribution of the sponsor is equity, which functions as collateral, so that the project company can borrow sufficient money (Gatti, 2008).

Project finance is attractive to use as finance mechanism because it reduces costs and risks. Project finance is mostly utilized for complex, risky projects where a high level of asymmetric information exists (Gatti, 2008). This is the case even though it is expensive and it takes time to create a separate, independent project company. Not seeing this as an obstacle is due to the reduction of costs and risks for the sponsor because the project is isolated in a separate project company. The risks associated with the project are separated from the sponsor. If the project would go bankrupt then the sponsor company would have a limited liability (Esty, 2003). Not only does project finance reduce risk for the sponsor, its unique structure lowers the risks and costs of the project company itself. Its structure allows agency costs to be reduced. Risks of the project are shared because the project company consists of contracts. Separate aspects of the project are contracted out to different parties, generally to the parties best able to manage the respective risks. For example, construction companies are contracted and are responsible for a certain section of construction. This gives ownership and responsibility to these companies and aligns their incentives with the sponsors. The assumption is that the incentives of contracts are formed in such a way that the construction company gets rewarded if it finishes in the time limit and if it's done correctly. This example illustrates how risk can be reduced by contracts (Esty, 2003; Corielli et al., 2010).

Contracts are very suitable to reduce risks. Contracts have the task to state which roles the counterparty has. As well as outlining the rights and responsibilities from both parties in the relationship (Gatti, 2008). Mostly contracts also state what happens when problems occur in the relationship. The existence of contracts allows companies to enter into transactions with each other and coordinate their business (Shou, Zheng, & Zhu, 2016). Contracts are very important for companies and the whole structure of the company revolves around contracts. A company is not an

individual entity but a collection of contracts. The project company typifies the idea of a company as a nexus of contracts with contracts covering every section of the project (Gatti, 2008). The project company exists due to internal and external contracts which form the company (Jensen & Meckling, 1976). In project companies the lines between internal contracts and external contracts are blurred. A contractor can construct the plant, be sponsor of the project company and operate the plant at the same time. This is exemplified in the credit agreement. A credit agreement contains all contracts which exist in the project company. Creditors agree to provide founds based on the credit agreement (Gatti, 2008.

Trustworthiness and effectiveness of contracts depend on the enforcement of contracts by institutions (Zhou & Xu, 2012). This is the realm of institutional economics. Institutional economics believes that institutions are important in decreasing the costs that people make in order to transact with each other. Institutions exist to reduce uncertainty of contracts between parties to ensure that the rights of each party are safeguarded (North, 1993). Institutions are crucial for project finance. Project sponsors enter into contracts with construction companies, governments, creditors and off-takers. The project sponsor does not have certainty that the counterparties will fulfill their contracts. If certainty exists it is due to the government enforcing the contracts. Property rights economics, a subsection of institutional economics, focuses on this. Property rights are broader than only outlining the rights of ownership of property. Property rights are all contracts which detail the rights to do or use an aspect of the project (Kim & Mahoney, 2005). This can consist of outlining ownership of the end product as well as assigning responsibility to the construction company building the project. In the latter case the construction company has the right to assign ownership of a resource or asset to a certain party. In project finance, when constructing an infrastructure project for example, property rights are divided between different parties. This bundle of contracts outlining property rights are presented as a credit agreement to possible investors in project finance.

When institutions and property rights are not functioning then low information transparency and low legal enforcement are found to be two causes of failing contracts (Shou, Zheng & Zhu, 2016). Zhou and Poppo (2010) find that if contracts cannot be enforced then contracts lose their effectiveness. You can't be certain that the court in the country will uphold the contract so it has less effect. Low information transparency is a problem as it is far more difficult to design the contract. In order to design an efficient contract which decreases agency costs then you have to have information of the counterparty in order to outline the right provisions (Shou, Zheng & Zhu, 2016). Shou, Zheng and Zhu (2016) found that emerging markets have low information transparency and low legal enforcement. As this is the case it is more likely that written contracts will be less effective in countries with low rule of law. This study will research to what extent the level of legal enforcement has effect on the performance of contracts. The contracts measured will be purchase agreement contracts, contracts with experienced sponsors, government guarantee contracts, contracts with multilateral development banks and contracts outlining retained ownership.

Agency theory outlines on why these contracts are selected. It has its origins in literature which explored risk sharing between groups or individuals which are cooperating with each other. Risk-sharing problems occur when parties which work together want to take different levels of risk (Arrow, 1971; Wilson, 1968). Project companies have this characteristic. Risk has to be shared between sponsors, constructors, creditors and other counterparties. Agency theory built on this preliminary work by including agency problems in the relationship between two cooperating parties (Eisenhardt, 1989). This relationship between two parties formally got named the principal-agent relationship. Jensen and Meckling (1976) define the agency relationship as: "... a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some

service on their behalf which involves delegating some decision-making authority to the agent" (Jensen & Meckling, 1976, p.308). Both the principal and the agent have their own goals and want to maximize their benefit of the relationship. Principal-agent relationship occurs at two levels in project finance. The project sponsor, who instigates the project, has to obtain money from creditors. In this relationship the project sponsor is the agent and the creditor is the principal. Crucial for the project sponsor is to decrease the agency costs as much as possible in order to obtain the money of the creditor. A credit agreement is at the center of this relationship. Everything in the project is mentioned in the credit agreement. Another principal-agent relationship exists between the project company and its counterparties, the company being principal and counterparties being the agent. The amount of agency costs between the creditor and company depends on the amount of agency costs between the company and counterparties. Contract details of the project company with the counterparties are in the aforementioned credit agreement. While creditors and the project company have a credit agreement which functions as contract, the project company and contractors have a contract which outlines their agreement (Eisenhardt, 1989). In order to understand what constitutes these agency costs the underlying assumptions of the theory must be known. These are self-interest, bounded rationality and risk aversion (Eisenhardt, 1989). These lead to problems in the relationship which the aforementioned contracts solve.

The assumption of self-interest exists as assumption from the beginning of economics (Stroebe & Frey, 1982). An individual acts in his own interests because that will provide him with the most gain. Self-interest plays a large role in project finance as there are many parties involved. Counterparties to the project company will not deceive the project company as it is not in their interest to do that. The counterparties will have to work with the project company in the future so it is in their interest to keep the relationship intact. An individual might look as if he does something for the good of another person but that is only to establish a better relationship in order to receive gain in some manner. The idea is that self-interest leads to the most gain for everybody. As everybody acts out of self-interest, balance is obtained (Stroebe & Frey, 1982).

Applied to the principal agent theory, it is important to realize that counterparties are led by self-interest (Jensen, 1994). Self-interest implies that counterparties do actions which are of best interest to them. While in some cases it could be in the counterparties interest to adhere to the project company, it can also occur that the counterparties will deviate from the project company. When counterparties get influenced by their own self-interest you partly predict what the counterparty will do. In order to ensure the counterparty acts in the project company's interest you can utilize incentives. Incentives are a key part of an organization and cooperation. There are also incentives which could encourage the agent to deviate even farther. It is important in the principal-agent relationship to find out which incentives influence the self-interest of the agent in such a way that he follows the principal's lead (Jensen, 1994).

Self-interest requires the project company to make a perfect contract which anticipates the self-interested behavior of the counterparty. If perfect rationality would be possible, which most economists assume in their models, this would be possible (Arthur, 1994). The project company can logically look at the self-interest problem and deductively analyze what the best solution is to the problem. However, the rationality of the project company or individual is very limited. Once a problem becomes slightly more complex the project company cannot analyze the situation anymore. Adding to this problem is when two counterparties cooperate with each other. In this case the counterparties have to make decisions based on what they expect the other to do. This leads to a situation in which an imperfect rational entity infers for another imperfect rational entity what they will do. In this case perfect rationality is even further removed from reality (Arthur, 1994).

Bounded rationality is a more realistic assumption of the rationality of a party in a principal-agent relationship. Bounded rationality assumes the project company looks at the information which is before them when they make decisions. There is no exhaustive appraisal of the possible options which could be performed (Kahneman, 2003). Bounded rationality therefore demonstrates that it is impossible that the project company has all possible information about the counterparty. It cannot know what the best incentives are to motivate or control the agent.

Though it is impossible to know all information about the counterparty you may assume that the counterparty is risk-averse. The counterparty, project company, will avoid risk because the principal, creditor, has most control in negotiating the contract. The counterparty has little choice of investor and therefore will want to facilitate the credit agreement to the creditor. By being risk averse the counterparty will have less chance of antagonizing the principle. Less risk of the project company will increase the chance that the project company can comply to the credit agreement and increase its chance of getting financed. The other assumption is that the creditor is risk neutral and it has the possibility to diversify the projects it invests in. This shows that risk preferences differ between the creditor and the project company. These risk preferences have to be solved by sharing risk in a way that both parties are satisfied (Grossman & Hart, 1983).

The assumptions of self-interest, bounded rationality and differences in risk preferences lead to problems in the creditor-project company and project company-contractor relationship. These problems are moral hazard, adverse selection and risk sharing (Eisenhardt, 1989). In the following section arguments are given how these problems can be decreased. Decreasing moral hazard can be done by purchase agreement contracts and contracts with experienced sponsors. Adverse selection can be decreased by government guarantee contracts and contracts with multilateral banks. Lastly, risk sharing can be decreased by having a contract in place that the project company may retain ownership.

The first problem, moral hazard is an agency problem which occurs due to information asymmetry and self-interest between the contract holders. Creditor's willingness to finance the project company are dependent on the cashflows the project company can generate. The moral hazard in this situation is that the creditor has no idea how much cash flow will be generated by the project company. As the project company is risk averse and self-interested it will take actions which are in its own interests and not in the creditor's interest. It could be possible that the project company will suffer losses. If the creditor is able to fully monitor the project company, moral hazard could be decreased. As complete information would enable the creditor to establish a credit agreement with the correct expectations of project company. However, due to bounded rationality the creditor will not be able to obtain perfect information of the project company. This leads to an incomplete contract which does not cover all moral hazard issues (Holmström, 1979).

As the creditors aren't sure that the project has the capacity to repay their loans, they make very detailed credit agreements. This binds the project company to the wishes of the creditor and binds its flexibility (Esty, 2002). To increase the trust of creditor in the project company's ability to repay loans, project companies agree to purchase agreements. Purchase agreements or off-take agreements are contracts which ensure that the project company will receive revenue from its projects. The agreement can include that a mandatory percentage of the product produced by the project is bought. They also take the form that a certain percentage of revenue is guaranteed (Gatti, 2008). If this is present moral hazard should decrease because revenue is guaranteed.

The purchase agreement is a contract and thus is dependent on the legal environment. When a country has poor enforcement of contracts then contracts will be less effective. If this is the case

there is less guarantee that the purchase agreement will be enforced if the counterparty does not honor the purchase agreement (Zhou & Poppo, 2010). The following hypothesis is formulated.

H1: *The presence of purchase agreements will lower the risk of the project less in countries with a low rule of law compared to countries with a high rule of law.*

By utilizing a purchase agreement, you can guarantee a certain outcome and focus on output. Another way to decrease moral hazard is focusing on the input side of the relationship. Moral hazard occurs due to contracts which have incomplete information. Any increase in information about what the agent does makes the contract a better one. With this additional information it is easier to predict how the agent will behave. When a project company obtains more information about the contractor, counterparties moral hazard decreases. If the project company has more information a better contract can be formed (Holmström, 1979). Sponsor companies which have performed projects before will have gained valuable experience. It is an advantage for creditors to work with sponsor companies which have had experience before. Companies will utilize the best practices they learned from earlier projects and this will increase their performance (Perkins, 2014). As sponsors of the project company learn from previous experience this leads to the conclusion that they gain more information about which contracts make the best partners. If creditors enter into contract with experienced sponsor companies this will decrease moral hazard as they are more ensured of a good outcome.

The expectation is that in countries with low rule of law, risk will be decreased more, compared to countries with high rule of law, due to experienced sponsor companies. Having experience with a country with political risk and legal uncertainty will allow a company to be more strategic in this context (Perkins, 2014). As contracts are expected to be less effective in countries with a low enforcement of rule of law, having experience with this type of context will increase the effectiveness of doing business.

H2: *The presence of sponsor experience will lower the risk of the project more in countries with low rule of law compared to countries with high rule of law.*

The second problem discussed in the principal-agent relationship is adverse selection When two parties enter into a contract, adverse selection occurs (Akerlof, 1970). When the creditor enters into a contract with the project company the creditor does not know the capabilities of the creditor. Adverse selection is that the project company has more information than the creditor about his skills. The creditor does not have complete information and therefore cannot validate if the project company can deliver what the project company claims to deliver. In the worst-case scenario, the creditor will not lend money to the project company because of the uncertainty of the repayment of the project company. A problem occurs, as project companies which can repay creditors, get punished as well (Akerlof, 1970).

Adverse selection can be decreased by contracts. Guarantees are a type of contract which can reduce adverse selection. An example is the use of mutual loan-guarantee societies. This is an initiative which offers collateral guarantees for its members. By providing guarantees, members are able to receive credit. Members would normally not receive credit by banks due to adverse selection. Banks would request a large amount of collateral which members cannot pay. Combined, the group can offer collateral for its members (Busetta & Zazzaro, 2012). In project finance the same effect can be achieved if a guarantee is provided. When a government provides a guarantee on the loan then the

creditors will be more inclined to loan money to the project company. Selecting the wrong project will have less effect on creditors as they will receive money from the government anyhow.

However, if political risk and legal uncertainty are present than this effect will be less. Creditors cannot be as certain that they will receive repayment if the legal environment is uncertain. If governments choose not to honor the guarantee then creditors cannot be sure that courts will rule in their favor (Zhou & Poppo, 2010).

H3: *The presence of government guarantees will lower the risk of the project less in countries with low rule of law compared to countries with high rule of law.*

In order to decrease adverse selection, creditors want to obtain as much information as possible. Creditors have to determine which projects are worth investing in. They have little information available about the agents but have to choose. Also, creditors will want to be sure that their information is correct. A contract with a multilateral development bank can give legitimacy to the project. Contracts with multilateral development banks can decrease political risk to the project. Also, governments are less likely to expropriate the project if multilateral development banks are involved (Hainz & Kleimeier, 2006).

If the project company has a contract with a multilateral development bank, then this effect should be larger in countries with low rule of law. The involvement of multilateral development decreases political risk in a country. Political risk includes legal-system failures. Development banks have this effect because they are associated with the country's host government in many ways. This allows the development bank to exert influence on the host government in order to avoid or solve the political risk present (Hainz & Kleimeier, 2006). The presumed effect of multilateral development banks on rule of law is that they will influence governments in countries with low rule of law. Countries with high rule of law do not need to be influenced, so will have less effect of the multilateral development bank.

H4: *If the project company has a contract in place with a multilateral development bank then the risk of a project will decrease more in countries with low rule of law compared to countries with high rule of law.*

The third problem which occurs in the principal-agent relationship is the problem of risk sharing. Risk sharing stems from the difference in risk preferences between the creditor and project company. When two parties enter into a contract, the project company has to deliver or perform a product or service which the creditor wants. The concept is explained by Sappington (1991) and works in the following way. In project finance, the creditor as principal expects the project company as agent to perform. Risk will have to be shared between them. If all the benefits of the project would go to the creditor then the project company would have less incentive to perform. All the risk would be for the creditor and this would not provide the project company with the right incentive. If the project company would be solely responsible for performance and bound to a certain monetary compensation to the creditor, then the project company would carry all risk. However, the project company is not responsible for all the risk. External factors can contribute risk as well. So, the creditor and project company need to find an equitable distribution of risk sharing which suits both parties.

A solution for this problem can be found in outcome-based contracts. Outcome-based contracts are contracts which focus on the outcome of what the agent has done (Eisenhardt, 1989). This type of

contract will be used if you cannot observe the behavior the agent. As you have no information about the actions and motivation of the agent you cannot base rewards on this. Outcome based rewards simply look at what the result is of the actions of the agent. This type of contract compensates for not being able to monitor the behavior of the principal. However, it does have as a result that the project company has to bear more risk. This added risk is because outcomes are not always completely dependent of the agent. External factors could influence the result (Eisenhardt, 1989).

An outcome-based contract which could solve risk-sharing is a provision for retaining ownership. The project company has to retain ownership of the company if the output is under a certain quota. The agent then will work harder because, if its output is not according to standard, the company would change hands into the agent. As a result, the project company would have an underperforming company. By working harder, the company will do better (Demski & Sappington, 1991). Continuing in this line of thought it can be expected that if a project company retains ownership of the company regardless of output, that its performance will increase. The agent will be motivated to work hard because the company will be in its own hands.

This effect will most likely be different in countries with low rule of law. Contract provisions are less likely to be enforced (Zhou & Poppo, 2010). Incorporating this provision in the contract could have less effect influencing the agent to perform as the agent sees possibilities to break the contract.

H5: *If the project company retains ownership of the project then risk should decrease less in countries with low rule of law compared to countries with high rule of law.*

Chapter 3: Methodology

Sample

Data for the research is taken from the Private Participation in Infrastructure Database of the World Bank (2017). It is a dataset on 6,400 infrastructure projects in 139 low- and middle-income countries. The dataset ranges from 1990 to 2017. All years are taken into account with the data. The economic crisis was in this period as well, years will be added as dummy variables to control for crises. What influenced the choice for this database is because it includes data on many different contract forms. It provides information about contracts outlining ownership, contracts with governments, and contracts with banks. As contracts are the focus of this research this information is crucial. The interaction variable, rule of law, is added by including data from the Worldwide Governance Indicators project (World Bank, 2018).

The Private Participation in Infrastructure Database provides information of the project on what type of public private partnership, type of contracts with governments, type of multilateral support, the sponsors and debt/equity ratio (World Bank, 2017). All of the possible sectors are used, these can be split into Energy, Information and Communication Technology, Transport and Water and Sewage. All possible countries are added to the project database: low income, lower middle income and upper middle income. A selection has been made based on the type of public private infrastructure (PPI). The focus of this studies is on Greenfield Projects. Greenfield projects are chosen because they have the possibility to pass ownership on to the sponsor company. Brownfield projects, management and lease projects and divestitures do not fall in the scope of this study. By selecting only Greenfield projects the observations decrease from 6,400 to 4,695. Worldwide Governance Indicators data gives countries scores, by experts, for their rule of law capabilities (World Bank, 2018). It measures the quality of contract enforcement, property rights and courts, among others.

Operationalization

Dependent variable

The dependent variable in this study is the debt/equity ratio and is used to measure risk. Vaaler and others (2007) use debt/equity ratio in order to measure risk. The argument is based on that when a company has high risk it has a lower likelihood of paying back debt. In turn, creditors are less inclined to issue credit to the company. High risk companies have low debt/equity ratios and low risk companies have high debt/equity ratios. Esty (2004) argues that debt/equity ratio is lower in projects with high risk. Projects in countries with high market and sovereign risk have a very low debt/equity ratio. Banks are unwilling to loan money to these projects. Therefore, a high debt/equity ratio indicates low risk and low debt/equity ratio indicates high risk.

Independent variables

The first independent variable which also serves as interaction variable is the rule of law variable. The variable consists of the index of rule of law. La Porta, Lopez-de-Silanes and Shleifer (1998) use indices to measure rule of law in a country. Also, Vaaler and others (2007) use a legal index to measure the law and order of a country. Rule of law measures the quality of contract enforcement, property rights, the police, and the courts (World Bank, 2018). The rating of a country is between -2.5, low rule of law, and 2.5, high rule of law.

Presence of purchase agreements is the second independent variable, measured by the variable main revenue source. This variable indicates the main revenue source for the project. Distinction is made between projects which have purchase agreements in place, projects which do not and other forms of main revenue. A purchase agreement makes sure that a certain amount of the product is bought by consumers or the government. This guarantees an amount of revenue for the project

company. No purchase agreements indicate that the project sells to the market without purchase agreements. Other forms of main revenue sources consist of annuity payments. Main revenue source will be split into three dummy variables: No purchase agreement, purchase agreement, and other.

The third independent variable is sponsor experience. Sponsor experience is measured by looking at the amount of times a sponsor works in a project. A sponsor has experience when it has worked in more than one project. The reference is the dataset, if the sponsor occurs in another project in the dataset then it has experience. Experience of a sponsor will be measured by a continuous variable indicating how many times they have worked in another project. A similar methodology is used by Vaaler and others (2007) to represent sponsor experience.

Government guarantees is the fourth independent variable and occurs in the variable indirect government support. Indirect government support consists of different sorts of guarantees that the government can offer projects. Government guarantees are given on debt, payments, revenues, tariff rates and construction costs. Indirect government support also consists of tax deductions. Tax deduction consists of specific tax incentives for the project. Indirect government support is split into three dummy variables: guarantees, tax deductions and absence of indirect government support. The variable is measured by splitting it into dummy variables. Guarantees, tax deductions and absence of indirect government supports are the three dummy variables.

The fifth independent variable is multilateral development bank involvement. This is measured by the variable multilateral development support. All observations which receive financial support from multilateral development banks are grouped together. Two dummy variables are created, one with multilateral development support and one without multilateral development support. The variable does not measure the extent of the support, this is irrelevant as the presence of multilateral development support should decrease political risk.

The last independent variable which is operationalized is to determine if a company retains ownership of the construction project. Retained ownership is measured by type of ownership. Distinction can be made between companies which keep ownership of the project, companies which transfer ownership back to the government, or other. Other consists of rentals, not available and merchant. Three dummy variables are created to distinct the categories from each other.

Control variables

The first control variable is the total investment in the project. The size of the project could have influence on the riskiness of the project. Vaaler and others (2007) include project size as a control variable. They expect that smaller projects will have more debt as it is less risky. Esty (2004) states that larger projects can be perceived as riskier. By including the variable, total investment, in the regression, the size of the project can be controlled for. Total investments are the sum of investments notated in dollars.

Second, years are included as a control variable. Years can control for crises which occur in certain years. If it is not included it could distort the results as observations could differ strongly in these years.

Lastly, regions are added as a control variable. The context of regions could influence the riskiness of projects. Controlling for this effect will increase the accuracy of the model.

Data preparation

In order to run the regression model accurately the dataset has to be prepared. The first screening focuses on the debt/equity ratio as it is the dependent variable. All observations with missing values

for debt/equity ratio are removed from the dataset, which leads to 3431 observations removed. Besides missing values for the debt/equity ratio the Worldbank labels some cases “Not Available”. These observations are also not useful so are removed as well. Removing these observations results in 151 observations being removed. Another eight values do not correspond with other values and are therefore removed. By filtering the dependent variable, a total of 1105 observations are left.

Next, the control variables are filtered. Total investment has ten missing values which are removed. No missing values occur in regions and years. After filtering the control variables 1095 observations are left.

Next the independent variables are inspected. Starting with Indirect Government Support 459 observations are removed due to the variable being ‘Not Available’. Indirect government support is changed into dummy variables. This results in three variables indicating guarantees, tax credits or no guarantees. Main revenue source is the next variable inspected. The variable is transformed into three dummy variables consisting of: No purchase agreement, Purchase agreement and Other. Next, missing values are removed from the variable multilateral support, this leads to three observations being deleted. Two dummy variables are created with one indicating the presence of multilateral support and the other noting the absence of it. Type of ownership is the last independent variable which is inspected. Three dummy categories are created indicating if the projects’ ownership is transferred, is retained or other.

Determining if the continuous variables agree with a normal distribution is the last step in restructuring and transforming the data. Debt/equity ratio, total investment and sponsor experience are all not normally distributed. All three variables are log transformed. Nine values are removed due to the transformation of sponsor experience. No values are removed due to the transformation of sponsor experience. Log transforming debt/equity leads to a choice between two methods. Log transformation of the dependent variable debt/equity ratio without adding or subtracting a constant comes at a cost as 44 observations are removed due to the transformation. These are due to 100% debt or 100% equity projects which cannot be transformed. All observations with these values have to be removed. The alternative is to subtract and add a constant. All values of the percentage debt to total capital are decreased by 1. Then they are transformed to debt/equity ratios. A project with zero debt percentage will have a negative value in this case. As negative values cannot be transformed, 0.5 is added to the calculated debt/equity ratio. This number is chosen because it leads to homoscedasticity. A large downside of this measure is that low debt/equity ratios are inflated. Due to the downside of adding a constant, the main method of this study will be to remove values which cannot be transformed. The less conservative method will be used to do a robustness test. Transforming the continuous variables gives a far better normal distribution of the variables. The final number of observations is 580.

Model

The research problem will be answered by a cross-sectional study. A linear regression will be estimated to see what type of contracts have an effect on agency costs. The moderator, rule of law, will be added as well in order to see its effect. A cross-sectional study is done because the debt/equity ratio of a project is established in the beginning of a project. It is not likely to change during the duration of the project. If this occurs it is most likely due to refinancing of loans due to phases of construction being completed. Therefore, it is only possible to measure the projects at one point in time. Subscript ‘i’ in the model accounts for this by indicating the unique observation each project is.

The model consists of the dependent variable debt/equity ratio, the independent variables, control variables and interaction variables. Variations of this model will be tested as well.

Model:

$$(\log)\frac{Debt}{Equity}ratio_i = \beta_{0i} + \beta_{1i}\, Main\ Revenue\ Source + \beta_{2i}\,(\log)Sponsor\ Experience + \beta_{3i}Indirect\ Government\ Support + \beta_{4i}\, Mulilateral\ Support + \beta_{5i}\, Type\ of\ Ownership + \beta_{6i}\, Rule\ of\ law + \beta_{7i}\, Main\ Revenue\ Source * Rule\ of\ law + \beta_{8i}\,(\log)Sponsor\ Experience * Rule\ of\ law + \beta_{9i}Indirect\ Government\ Support * Rule\ of\ law + \beta_{10i}\, Multilateral\ Support * Rule\ of\ law + \beta_{11i}\, Type\ of\ Ownership * Rule\ of\ law + \beta_{12i}Year + \beta_{13i}Region + \beta_{14i}(\log)Total\ Investment + e_i$$

Chapter 4: Results

Descriptive statistics

In order to give insight into the data, descriptive statistics are given. When looking at the region of the projects it is relatively diverse. The geographical region with the smallest number of observations in the dataset is the combined region of Middle East and North Africa. 7.59% of the projects are located there. Second smallest is the combined region of Europe and Central Asia which has 7.76% of the distribution. Sub-Saharan Africa accounts for 12.07% of the geographical locations. Next is the combined region of East Asia and Pacific where 13.79% of the projects are located. South Asia has 23.79% of all projects. The largest share of projects is located in the combined region of Latin America and the Caribbean with 35.00% of the project. Most regions consist of developing economies as the focus of the dataset is on low and middle-income countries (World Bank, 2017).

In sectors, Energy accounts for 89.66% of all projects. In light of this the results have to be seen as mostly applying to the Energy sector. Information and communication technology accounts for only 0.86%. Water and sewage slightly more with 2.76%. The sector with most representation besides energy is transport with 6.72% of all projects.

Next an overview of the years will be given. No projects occur before 2006. And only 5 exist in the years from 2006-2009. It seems sufficient information about the variables is not existent between 1990-2006. 2011-2013 account for 52.07% of the projects. 39.65% of the projects occurred between 2014 and 2017. The remainder 8.28% of the projects occur between 2010 and 2006.

Table 1: Descriptive statistics control variables

Panel A. Geographical location of project	***# of observations***	***Percent***	***Cumulative percent***
East Asia and Pacific	80	*13.79%*	*13.79%*
Europe and Central Asia	*45*	*7.76%*	*21.55%*
Latin America and the Caribbean	*203*	*35.00%*	*56.55%*
Middle East and North Africa	*44*	*7.59%*	*64.14%*
South Asia	*138*	*23.79%*	*87.93%*
Sub-Saharan Africa	*70*	*12.07%*	*100%*
Panel B. Industrial sector of project			
Energy	*520*	*89.66%*	*89.66%*
Information and communication technology	*5*	*0.86%*	*90.52%*
Transport	*39*	*6.72%*	*97.24%*
Water and sewerage	*16*	*2.76%*	*100%*

Panel C. Year of the project			
2006	*1*	*0.17%*	*0.17%*
2007	*1*	*0.17%*	*0.34%*
2008	*1*	*0.17%*	*0.52%*
2009	*2*	*0.34%*	*0.86%*
2010	*43*	*7.41%*	*8.28%*
2011	*87*	*15.00%*	*23.28%*
2012	*127*	*21.90%*	*45.17%*
2013	*88*	*15.17%*	*60.34%*
2014	*58*	*10.00%*	*70.34%*
2015	*68*	*11.72%*	*82.07%*
2016	*59*	*10.17%*	*92.24%*
2017	*45*	*7.76%*	*100%*

Next, descriptive statistics are given of the original continuous variables. Debt/equity ratio, the dependent variable, has a mean of 3.16 which indicates that most projects have around 70% debt and 30% equity. Standard deviation is around 5.26. This is relatively high, so it indicates there is quite high variation from the mean. When a log transformation is done on the debt/equity ratio the outliers decrease and the variable is roughly normally distributed. Some values are still quite high but due to the large sample this has a small effect (Wooldridge, 2012). The continuous independent variable, rule of law, has a mean of -0.24. The measure of the WGI index is from -2.5 to 2.5. The mean of -0.24 and a low standard deviation of 0.33 shows that most observations have lower then average governance rating on rule of law. Most likely this is due to the countries being primarily low and middle income. The control variable, total investment in projects, has a mean of 349.20 million dollars. With a very large standard deviation of 855.80 million dollars. This is due to the largest project being 14.8 billion dollars and the smallest being 2.4 million dollars. By transforming total investments in log form a normal distribution is achieved.

Table 2: Descriptive statistics continuous independent variables

Variable name	***# of observations***	***Mean***	***Standard deviation***	***Minimum***	***Maximum***
Debt/Equity ratio	580	*3.16*	*5.26*	*0.11*	*99*
Rule of law	*580*	*-0.24*	*0.33*	*-1.23*	*0.55*
Total Investment (US$ millions)	*580*	*349.20*	*855.80*	*2.4*	*14,800*

Next, descriptive statistics are given of the dummy variables in Table 3. The independent variable, main revenue source, indicates that most projects have a purchase agreement. 85.69% projects contain a purchase agreement. Only 10.69% of the projects do not have a purchase agreement. 3.62% of projects have other types of main revenue sources.

Descriptive statistics of indirect government support show that government guarantees are very widely utilized. 57.24% of all projects have a government guarantee in place. Another 5.34% of the projects have indirect government support in the form of tax credits. The rest, 37.42% of the projects, have no indirect government support.

Type of ownership shows that project companies retain ownership in 65.69% of the observations. 31.38% of projects transfer ownership of the project after it is built. 2.93% have other mechanisms in place. These projects have merchant or rental constructs in place.

Table 3: Descriptive statistics dummy independent variables

Panel A. Main Revenue Source	***# of observations***	***Percent***	***Cumulative percent***
No Purchase Agreement	62	*10.69%*	*10.69%*
Purchase Agreement	*497*	*85.69%*	*96.38%*
Other	*21*	*3.62%*	*100%*
Panel B. Indirect Government Support			
No Guarantee	*217*	*37.42%*	*37.42%*
Guarantee	*332*	*57.24%*	*94.66%*
Tax Credit	*31*	*5.34%*	*100%*
Panel C. Type of Ownership			
Transfer Ownership	*196*	*31.38%*	*31.38%*
Retain Ownership	*381*	*65.69%*	*97.07%*
Other	*17*	*2.93%*	*100%*
Panel D. Multilateral Support			
Multilateral support not present	*403*	*69.48%*	*69.48%*
Multilateral support present	*177*	*30.52%*	*100%*

It is useful to compare this dataset with other articles which also focus on contracts and its effects on debt/equity ratio. The geographic regions are slightly more diverse then other articles (Corielli et al., 2010, Esty & Megginson, 2003; Byoun, Kim, & Yoo, 2013). With respect to sectors it is less diverse as the energy sector is the majority of the observations. However, other articles in project finance also have a majority of projects in the utility sector. This indicates project finance is utilized often in the energy sector. It is in line with expectations that the Energy sector is the majority of the

observations. The size of the projects is in accordance with other articles which have the mean at around 450 million dollars. Debt/equity ratio of the projects are also very comparable, other articles also have a high debt/equity ratio, around 70% debt and 30% equity (Corielli et al. 2010; Esty & Megginson, 2003; Byoun, Kim, & Yoo, 2013).

Regression

In order to make the right analysis the variables need to agree with the requirements for ordinary least squares regression. All variables which are continuous are linear. These variables are (log) debt/equity ratio, (log) sponsor experience, (log) total investment and rule of law. By using scatter plots this can be visualized. The rest of the independent variables are added to the regression as dummy variables. Homoscedasticity has to be addressed as well. Testing is done by regressing the dependent variable on the independent variables and doing a Cameron & Trivedi test on the regression (Williams, 2015). Cameron & Trivedi's test is significant when heteroskedasticity is present. This test is not significant when running the tests indicating homoscedasticity. Using the debt/equity ratio is better than using the percentage of debt to total capital. A percentage allows for an upper and lower bound which leads to heteroscedasticity. Debt/equity as a ratio circumvents this problem and gives homoscedasticity. The other continuous variables are homoscedastic as well. Another important requirement is multicollinearity between variables. A correlation matrix is estimated on the basis of all variables (see table 5 in appendix), leaving out one dummy variable by each variable determined by dummies. There are some high correlations which are due to interaction variables. The interaction variable Main revenue source: Purchase agreement*Rule of law has a 0.9488 correlation with rule of law and a 0.7915 correlation with the interaction term Type of ownership: Retain*Rule of law. Also, indirect government support: tax deduction*rule of law has some high correlations. It correlates with tax deduction at 0.9665. When regressing these interaction terms on all the independent variable and calculating the Variance Inflation Factor the result indicates multicollinearity exists. Respectively a VIF of 14.8 and 15.8 exist, while a VIF of under the 10 indicates no multicollinearity (Wooldridge, 2012). However, as the variables are a crucial part of hypotheses they are left in the model. Multicollinearity does not violate the assumptions of OLS but it does make the variance of the variable larger.

Multiple regressions are run. First, a regression is run with all independent variables and all interaction effects. Next, five regressions are run which each include a different interaction of rule of law and an independent variable together with all other independent variables.

Table 4: Regression results

***Dependent Variable**: (log) D/E ratio*	***All contracts*** *Reg 1.*	***Main rev. source*** *Reg 2.*	***Sponsor exp.*** *Reg 3.*	***Ind. gov. support*** *Reg. 4*	***Type of ownership*** *Reg. 5*	***Multilateral support*** *Reg. 6*
Intercept	*0.65*** (2.97)*	*0.635*** (2.92)*	*0.558*** (2.61)*	*0.580*** (2.72)*	*0.544** (2.53)*	*0.554*** (2.57)*
Dummy main revenue: Purchase agreement	*0.204* (1.90)*	*0.187* (1.73)*	*0.219** (2.05)*	*0.222** (2.09)*	*0.224** (2.09)*	*0.214** (2.00)*
Dummy main revenue: Other	*0.230 (1.31)*	*0.242 (1.37)*	*0.287* (1.65)*	*0.302* (1.75)*	*0.300* (1.71)*	*0.299* (1.71)*

(log) Sponsor experience	*0.000 (0.01)*	*0.043 (0.16)*	*-0.03 (-0.11)*	*-0.000 (-0.01)*	*-0.001 (-0.05)*	*0.000 (0.03)*
Dummy indirect government support: Government guarantee	*0.017 (0.24)*	*0.028 (0.37)*	*0.023 (0.31)*	*0.019 (0.26)*	*0.019 (0.25)*	*0.025 (0.34)*
Dummy indirect government support: Tax deduction	*1.620*** (3.27)*	*-0.163 (-1.12)*	*-0.162 (-1.12)*	*1.663*** (3.35)*	*-0.164 (-1.13)*	*-0.166 (-1.15)*
Dummy type of ownership: Retain ownership	*0.096 (1.37)*	*0.089 (1.28)*	*0.096 (1.39)*	*0.086 (1.26)*	*0.091 (1.31)*	*0.093 (1.31)*
Dummy type of ownership: Other	*-0.014 (-0.08)*	*-0.038 (-0.21)*	*0.007 (0.04)*	*-0.000 (-0.00)*	*0.017 (0.09)*	*0.001 (0.01)*
Dummy multilateral support: Present	*-0.013 (-0.19)*	*-0.019 (-0.27)*	*-0.022 (-0.32)*	*-0.007 (-0.10)*	*-0.008 (-0.11)*	*-0.010 (-0.15)*
Rule of law	*0.051 (0.15)*	*0.216 (0.66)*	*-0.101 (-1.03*	*-0.073 (-0.52)*	*-0.200 (-1.23)*	*-0.104 (-0.15)*
(log) Total Investment	*0.039* (1.69)*	*0.038 (1.63)*	*0.047** (2.04)*	*0.049** (2.16)*	*0.045* (1.94)*	*0.046** (2.01)*
Dummy year: 2011-2013	*-0.246** (-2.17)*	*-0.217* (-1.91)*	*-0.205* (-1.81)*	*-0.244** (-2.16)*	*-0.207* (-1.81)*	*-0.212 (-1.86)*
Dummy year: 2013-2017	*-0.222* (-1.85)*	*-0.169 (-1.40)*	*-0.163 (-1.36)*	*-0.199* (-1.66)*	*-0.151 (-1.25)*	*-0.155 (-1.28)*
Dummy region: Eur. Central Asia	*-0.066 (-0.46)*	*-0.056 (-0.39)*	*-0.018 (-0.13)*	*-0.012 (-0.09)*	*-0.008 (-0.06)*	*-0.008 (-0.06)*
Dummy region: Lat. Am. & Carib.	*-0.114 (-1.10)*	*-0.129 (-1.27)*	*-0.131 (-1.29)*	*-0.138 (-1.36)*	*-0.127 (-1.24)*	*-0.131 (-1.27)*
Dummy region: Mid. East & North Africa	*0.337** (2.25)*	*0.301** (2.04)*	*0.293** (1.99)*	*0.290** (1.97)*	*0.320** (2.14)*	*0.284* (1.91)*
Dummy region: South Asia	*-0.040 (-0.39)*	*-0.037 (-0.36)*	*-0.035 (-0.34)*	*-0.036 (-0.35)*	*-0.023 (-0.22)*	*-0.026 (-0.25)*
Dummy region: Sub-Saharan Africa	*0.194 (1.55)*	*0.181 (1.46)*	*0.186 (1.50)*	*0.171 (1.39)*	*0.182 (1.46)*	*0.180 (4.43)*
*Main revenue source: Purchase agreement*Rule of law*	*-0.349 (-1.02)*	*-0.346 (-1.04)*				
*Main revenue source: Other*Rule of law*	*0.910 (1.32)*	*0.814 (1.17)*				

*(log) Sponsor experience*Rule of law*	*-0.115 (-1.54)*		*-0.131 (-1.78)*			
Indirect government support: Government guarantee Rule of law*	*0.038 (0.20)*			*0.009 (0.05)*		
*Indirect government support: Tax deduction*Rule of law*	*-11.69*** (-3.73)*			*-12.069*** (-4.26)*		
*Type of ownership: Retain ownership*Rule of law*	*0.184 (0.94)*				*0.150 (0.77)*	
*Type of ownership: Other*Rule of law*	*0.578 (1.13)*				*0.629 (1.22)*	
*Multilateral support*Rule of law*	*0.009 (0.05)*					*0.050 (0.26)*
R^2	*0.11*	*0.08*	*0.08*	*0.10*	*0.08*	*0.07*
N	*580*	*580*	*580*	*580*	*580*	*580*

Notes: Significance at respectively 99%, 95% and 90% levels are indicated by ***, **, and *.

The bases for the dummies are the following: Main revenue source 'No purchase agreement', Indirect government support 'No guarantee', Type of ownership 'Transfer ownership', Multilateral support 'No multilateral support', Year '2006-2010', Region 'East Asia and Pacific'

Table 4 shows the regression results. The R^2 of the regressions, between 0.08 and 0.11 show that the regressions have weak explanatory power. Proof is found for the underlying idea of hypothesis one. The dummy variable for main revenue source: purchase agreement is significant in all regressions. If purchase agreements are present the debt/equity ratio is 20.4% higher. However, the interaction term rule of law with main revenue source is not significant. This indicates that the level of a country's rule of law has no effect on the relationship between a purchase agreement and debt/equity ratio. Therefore, hypothesis one is rejected. Hypothesis two also finds no proof to support it's claim. Results give no indication that experience of the project sponsor has an effect on the debt/equity ratio of a project. Hypothesis three is rejected. No support is found that guarantees have an effect on the debt/equity ratio. Also, rule of law does not influence the effect of guarantees. Another result is found regarding indirect government support. Two forms of indirect government support were included in the regressions: guarantees and tax deductions. The presence of tax deductions does have a significant effect. This effect is conditional on the significant interaction term with rule of law. When rule of law is held constant at its mean of -0.25%, tax deductions, compared to no indirect government support, increase the debt/equity ratio by approximately 160%. This result

does not lend support to any hypotheses but is relevant to mention. Hypothesis four, which looks at the relationship between the type of ownership in a project and the debt/equity ratio finds no support in the results. No proof is found for the fifth hypothesis which indicates that multilateral support has an effect in increasing the debt/equity ratio. Also, no interaction effect between multilateral support and rule of law is found.

Furthermore, results point that the years 2011-2013, compared to 2006-2010, have a lower debt/equity ratio of 24.6%. This points to higher risk occurring in these years. Also, projects in the Middle East and Africa, compared to East Asia and the Pacific show a 33.7% higher debt/equity ratio. This indicates that projects in Middle East and Africa were seen as less risky than projects in East Asia and Pacific.

Results are explained by a reflection on the theories used. First a reflection will be given on agency costs and how they predict the contracts used. In the case of sponsor experience, government guarantees, retaining ownership and presence of multilateral support there is no evidence to point out their effect on limiting risk. However, it cannot be said that agency costs do not predict a reduction of risk. It lends credence to the papers which argue that the credit agreement contains all contracts needed to contain risk. They argue that when a risk is present in the project, the credit agreement will contain contracts which account for this. If the risk is not present, the contract will not be added (Dailami & Hauswald, 2007; Byoun, Kim, & Yoo, 2013). This implies that project finance is a very efficient way of handling risk (Kleimeier & Versteeg, 2010). However, purchase agreements do have an effect on the risk of a project. This is surprising due to the other contracts which are contained in the credit agreement. It could indicate that it is not always possible to implement a purchase agreement even if risks, solved by a purchase agreement, exist. This argument implies that the off-taker of the product is not always known beforehand. The significance of tax deduction can be explained by the positive effects of tax deduction on debt/equity ratio. It is profitable for companies to have a high debt/equity ratio as taxes on debt can be deducted, in contrast to taxes on equity (Esty, 2003). That the presence of tax deduction has a higher effect in countries with low rule of law can be explained by their goals to attract investment. It is important for developing countries to attract investment and giving tax incentives is used often (Tanzi & Zee, 2000).

Second a brief reflection is given on institutional theory. Results do not point to an effect of institutional quality on the effectiveness of contracts. Most likely this is due to the high debt/equity ratios. A high debt/equity ratio mitigates risk in itself. Due to the high leverage, almost all cash flows are immediately returned to the debtholders (Esty, 2002). This protects the company from interference from the government as it has little profit.

On a practical level, to determine the viability of project finance, the study has some results. It shows that project finance efficiently deals with risks. Most risks are already contained in the credit agreement which is presented to creditors. Furthermore, risk mitigation can be obtained by being ensured of purchase agreements. If promises can be obtained beforehand that the products of the project are purchased, the project will be less risky and could obtain finance easier. Also, in developing countries, tax deductions give a large reduction of risk. In the case of flood defense, it is crucial to establish if guarantees and tax deductions can be offered by the host country. If this is the case, risk will most likely be decreased.

A robustness test is done by doing a regression with a less conservative debt/equity ratio (see table 6 in appendix). Although the regression has 44 more observations it subtracts and adds a constant to the debt/equity ratio in order to transform the variable. Subtracting and adding a constant distorts the real debt/equity value and inflates lower debt/equity values. Therefore, it is less trustworthy. The

test does not confirm all results. No proof is found for the effect of purchase agreements. Also, results show that government guarantees and multilateral support do have a relationship with debt/equity ratio in this regression. These results do not agree with the results of table 4. Caution is therefore advised in interpreting the effect of purchase agreements on debt/equity ratio. The result of tax deduction and its interaction effect with rule of law are confirmed in this regression.

In conclusion, the basis of hypothesis 1 is significant. However, due to the inclusion of the effect of rule of law in the hypotheses this hypothesis has to be rejected as well. The underlying effect is there, but no interaction with rule of law exists. Results point that the absence or presence of rule of law has no significant effect on the contracts which are present. Indirect government support in the form of tax deductions does find this effect but is not present in the hypotheses.

Chapter 5: Discussion and Conclusion

This paper has done an attempt to answer the following question: To what extent is there a difference in effect in how contracts in project finance mitigate risk between countries with a low rule of law classification and high rule of law classification? Results indicate that there is no proof to indicate this. The paper hypothesizes that reducing agency costs in the creditor-project company relationship would decrease risk of the project thus increasing the debt/equity ratio. First, purchase agreements, as main revenue source should decrease agency costs and reduce risk. Results confirm this expectation. In the presence of purchase agreements, compared to projects with no purchase agreements, the debt/equity ratio increases by 20.4%. Although this is a significant effect, no proof is found of an effect of rule of law on the effect of the purchase agreement. Second, when the creditor has a contract with experienced sponsors it should decrease agency costs. No evidence supports this so it seems unlikely experience of sponsors has an effect on debt/equity ratio. Third, indirect government support, and specifically, government guarantees should decrease agency costs. This hypothesis is rejected as no evidence is found of a relationship between government guarantees and the debt/equity ratio. Also rule of law has no effect on the relationship of government guarantees with the debt/equity ratio. A finding on indirect government support which is not hypothesized is the effect of tax deduction. When a country has low enforcement of contracts, due to a low rule of law rating, the presence of tax deductions signifies a 160% increase in the debt/equity ratio. Fourth, the underlying expectation that multilateral banks have an effect on the debt/equity ratio finds no support. Also, no proof is found of a possible effect of rule of law on multilateral banks. Lastly, retaining ownership or transferring ownership also has no effect on the debt/equity ratio.

This study has some limitations. First, some discussion exists if the debt/equity ratio is a good proxy for risk. Studies have shown that risk can be seen in a high or low debt/equity ratio (Vaaler et. al., 2007; Esty, 2002; Byoun, Kim, & Yoo, 2013). The first two studies indicate high risk leads to lower debt/equity ratio and the third study indicates vice versa. Another limitation is that the test for robustness, with a different transformation of the debt/equity ratio, indicates that purchase agreements does not have an effect on debt/equity ratio. Also, the regression results have a very low score for explaining the variance which gives low explanatory power. This can indicate that variables, that should be included, are left out.

In conclusion this study has given more insight into the possibility of agency costs outlining which contracts are used and the effect of this on risk. This study tried to find a reason for why credit spreads are lower in project finance compared to others (Kleimeier & Megginson, 2000). It isn't certain that contracts are responsible for this. It could be that the full package of contracts does reduce credit spreads, but they do not increase debt/equity ratios. By delving into agency problems and linking it to project finance this study contributes to determining agency costs which can occur in project finance. This link builds on the work of Byoun and Xu (2014) and Vaaler et al. (2007) who make limited use of agency theory to determine agency costs in project finance.

Also, this study builds on studies which focus more on contracts. Against the expectations of the hypotheses, results agree with Blanc-Brude & Strange (2007) and Dailami & Hauswald, (2007) who determine that company-specific risks are eliminated by contracts. Though results did not agree with the formulated hypotheses it does give insight into how contracts relate with the debt/equity ratio.

Suggestion for further study is to determine if contracts cover all company-specific risk. A possible research method could be to pair projects with very similar characteristics but different contracts and see if this effects risk. Another avenue of research is to do a similar study with another proxy for risk. If this gives different results then more insight can be achieved which measures give a better indication of project risk.

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Appendix 1: Correlation table

Table 5: Correlation coefficients: Part 1

Variable name	(log) Debt/ Equity	Main R: PA	Main R: O	(log)Sponsor Exp.	Ind. Gov: Guarantee	Ind Gov: Tax deduc.	Type Own: Retain	Type Own: Other	Multilateral sup.	Rule of law	Tot invest	Year: 2011-2013	Year: 2014-2017	Region: Eur. Cent. Asia
(log) Debt/equity	*1.000*													
Dummy main revenue: Purchase agreement	*0.0992**	*1.0000*												
Dummy main revenue: Other	*0.0120*	*-0.4743**	*1.0000*											
(log) Sponsor experience	*0.0059*	*0.0207*	*0.0097*	*1.0000*										
Dummy indirect government support: Government guarantee	*0.1153 **	*0.2638**	*-0.0937**	*-0.1098**	*1.0000*									
Dummy indirect government support: Tax deduction	*-0.0888*	*0.0971**	*-0.0461*	*0.0721*	*-0.2749**	*1.0000*								
Dummy type of ownership: Retain ownership	*0.0935**	*0.3477**	*-0.1710**	*-0.0734*	*0.1902**	*-0.0059*	*1.0000*							
Dummy type of ownership: Other	*-0.0119*	*-0.1625**	*0.0758*	*-0.0953**	*-0.0151*	*-0.0413*	*-0.2404**	*1.0000*						
Dummy multilateral support: Present	*0.0530*	*-0.0072*	*0.0319*	*-0.0163*	*0.1338**	*-0.1575**	*0.0925**	*-0.0486*	*1.0000*					
Rule of law	*0.0009*	*0.0196*	*0.0233*	*0.1482**	*-0.0340*	*0.1075**	*0.1014**	*-0.0120*	*-0.1874**	*1.0000*				
(log) Total Investment	*0.0696*	*-0.1814**	*0.0238*	*0.2827**	*-0.0175*	*0.0046*	*-0.1243**	*-0.0087*	*-0.0438*	*-0.0079*	*1.0000*			
Dummy year: 2011-2013	*-0.0517*	*0.0317*	*-0.0357*	*0.0360*	*0.2451**	*-0.2477**	*0.0336*	*-0.0583*	*-0.0387*	*-0.0425*	*-0.0330*	*1.0000*		
Dummy year: 2014-2017	*0.0113*	*-0.0210*	*0.0316*	*-0.0184*	*-0.2896**	*0.2775**	*0.0365*	*0.0472*	*0.1057**	*0.0758*	*-0.0572*	*-0.8449**	*1.0000*	
Dummy region: Eur. Central Asia	*-0.0227*	*-0.2312**	*0.1163**	*-0.1393**	*0.0943**	*-0.0689*	*-0.0076*	*0.1024**	*0.0457*	*0.1404**	*0.0098*	*0.1105**	*-0.0770*	*1.0000*
Dummy region: Lat. Am. & Carib.	*-0.1702&*	*-0.1130**	*0.0126*	*0.2006**	*-0.4325**	*0.3238**	*-0.1930**	*-0.0632*	*-0.1174**	*-0.1214**	*0.0698*	*-0.0195*	*0.0776*	*-0.2128**

Dummy region: Mid. East & North Africa	*0.1347*	*0.1171**	*-0.0555*	*0.0788*	*0.2081**	*-0.0681*	*0.0425*	*-0.0112*	*0.3192**	*0.1285**	*-0.0267*	*-0.2335**	*0.2869**	*-0.0831**
Dummy region: South Asia	*0.0201*	*0.1474**	*-0.0433*	*-0.1592**	*0.1310**	*-0.1328**	*0.1650**	*0.0229*	*-0.0450*	*0.0433*	*-0.1249**	*-0.0231*	*-0.1053**	*-0.1621**
Dummy region: Sub-Saharan Africa	*0.1017*	*0.0909**	*-0.0435*	*0.0402*	*-0.0221*	*-0.0880**	*0.1340**	*0.0611*	*-0.0042*	*0.1587**	*0.0168*	*0.1436**	*-0.0948**	*-0.1074**
Main revenue source: Purchase agreement*Rule of law	*-0.0261*	*0.0038*	*-0.0018*	*0.1589**	*-0.0449*	*0.1116**	*0.0792*	*-0.0408*	*-0.1841**	*0.9488**	*-0.0206*	*-0.0354*	*0.0671*	*0.0533*
Main revenue source: Other*Rule of law	*0.0856**	*-0.0761*	*0.1605**	*-0.0722*	*0.0124*	*-0.0074*	*-0.0264*	*0.1005**	*0.0287*	*0.1424**	*0.1376**	*-0.0485*	*0.0629*	*0.1389**
(log) Sponsor experience*Rule of law	*-0.0703*	*0.0689*	*-0.0843**	*-0.0537*	*0.0144*	*0.0008*	*0.0467*	*0.0044*	*-0.0668*	*-0.1189**	*-0.0004*	*0.1217**	*-0.1230**	*-0.0692*
Indirect government support: Government guarantee* Rule of law	*0.0060*	*-0.0101*	*0.0277*	*0.1197**	*-0.0175*	*0.0048*	*0.0455*	*0.0330*	*-0.1071**	*0.7691**	*-0.0019*	*-0.0031*	*0.0624*	*0.1398**
Indirect government support: Tax deduction*Rule of law	*-0.1233**	*0.0939**	*-0.0445*	*0.0742*	*-0.2657**	*0.9665**	*-0.0125*	*-0.0399*	*-0.1522**	*0.1108**	*0.0174*	*-0.2394**	*0.2547**	*-0.0666*
Type of ownership: Retain*Rule of law	*0.0046*	*-0.0038*	*-0.0045*	*0.1489**	*-0.0557*	*0.0707*	*0.0449*	*-0.0108*	*-0.2539**	*0.8002**	*0.0309*	*0.0185*	*0.0014*	*0.0844**
Type of ownership: Other*Rule of law:	*0.0351*	*-0.0735*	*0.0783*	*0.0285*	*0.0560*	*0.0026*	*0.0151*	*-0.0629*	*-0.0421*	*0.1786**	*0.0580*	*-0.0070*	*-0.0190*	*0.1204**
Multilateral support*Rule of law	*0.0146*	*-0.0191*	*0.0500*	*0.0239*	*0.0195*	*0.0310*	*-0.0702*	*-0.0140*	*-0.1971**	*0.6669**	*-0.0330*	*-0.0129*	*0.0393*	*0.1458**

Table 5: Correlation coefficients: Part 2

	Reg: Lat. Am. & Carib	Reg: Mid East & North Af.	Reg: South Asia	Reg: Sub-Sah. Afr	Main R: PA*Law	Main R: O*Law	(log) Sponsor Exp.*Law	Ind. Gov: Guarantee*Law	Ind. Gov: Tax deduc.*Law	Type Own: Retain*Law	Type Own: Other*Law	Multilateral Sup.*Law
Dummy region: Lat. Am. & Carib.	*1.0000*											
Dummy region: Mid. East & North Africa	*-0.2102**	*1.0000*										
Dummy region: South Asia	*-0.4100**	*-0.1601**	*1.0000*									

Dummy region: Sub-Saharan Africa	*-0.2719**	*-0.1061**	*-0.2070**	*1.0000*								
Main revenue source: Purchase agreement*Rule of law	*-0.0783*	*0.1334**	*0.0240*	*0.1658**	*1.0000*							
Main revenue source: Other*Rule of law	*-0.1004**	*-0.0089*	*0.0336*	*0.0148*	*-0.0003*	*1.0000*						
(log) Sponsor experience*Rule of law	*0.0490*	*-0.0631*	*-0.0429*	*0.0748*	*-0.0896**	*0.0047*	*1.0000*					
Indirect government support: Government guarantee* Rule of law	*-0.0635*	*0.1611**	*-0.0107*	*0.1357**	*0.7749**	*0.0426*	*-0.2009**	*1.0000*				
Indirect government support: Tax deduction*Rule of law	*0.3130**	*-0.0658*	*-0.1283**	*-0.0851**	*0.1152**	*-0.0071*	*0.0092*	*0.0047*	*1.0000*			
Type of ownership: Retain*Rule of law	*-0.1348**	*0.0059*	*0.0685*	*0.1703**	*0.7915**	*0.0475*	*-0.0915**	*0.6347**	*0.0699*	*1.0000*		
Type of ownership: Other*Rule of law:	*-0.0056*	*-0.0642*	*-0.0199*	*-0.0171*	*0.1582**	*0.0742*	*-0.0647*	*0.1015**	*0.0025*	*0.0007*	*1.0000*	
Multilateral support*Rule of law	*-0.1671**	*0.2086**	*-0.0309*	*0.0247*	*0.6329**	*0.1164**	*-0.1107**	*0.5588**	*0.0300*	*0.5593**	*0.0936**	*1.0000*

Note: '*' indicates significance at the 95% level.

Appendix 2: Robustness test

Table 6: Robustness regression results	
***Dependent Variable**: (log) D/E ratio*	***All contracts** Reg 1.*
Intercept	*1.09*** (3.62)*
Dummy main revenue: Purchase agreement	*0.197 (1.31)*
Dummy main revenue: Other	*0.147 (0.61)*
(log) Sponsor experience	*-0.004 (-0.11)*
Dummy indirect government support: Government guarantee	*0.222** (2.14)*
Dummy indirect government support: Tax deduction	*1.056*** (2.78)*
Dummy type of ownership: Retain ownership	*0.094 (0.95)*
Dummy type of ownership: Other	*-0.162 (-0.62)*
Dummy multilateral support: Present	*-0.186* (-1.85)*
Rule of law	*0.485 (1.03)*
(log) Total Investment	*0.026 (0.82)*
Dummy year: 2011-2013	*-0.193 (-1.21)*
Dummy year: 2013-2017	*-0.167 (-0.99)*
Dummy region: Eur. Central Asia	*-0.041 (-0.21)*

Dummy region: Lat. Am. & Carib.	*-0.072 (-0.51)*
Dummy region: Mid. East & North Africa	*-0.006 (-0.03)*
Dummy region: South Asia	*-0.217 (-1.51)*
Dummy region: Sub-Saharan Africa	*-0.179 (-1.02)*
*Main revenue source: Purchase agreement*Rule of law*	*-0.504 (-1.06)*
*Main revenue source: Other*Rule of law*	*-0.617 (-0.65)*
*(log) Sponsor experience*Rule of law*	*-0.085 (-0.80)*
Indirect government support: Government guarantee Rule of law*	*0.081 (0.30)*
*Indirect government support: Tax deduction*Rule of law*	*-9.52*** (-4.11)*
*Type of ownership: Retain ownership*Rule of law*	*0.070 (0.25)*
*Type of ownership: Other*Rule of law*	*0.054 (0.07)*
*Multilateral support*Rule of law*	*-0.110 (-0.41)*
R^2	*0.07*
N	*624*

Appendix 3: Do file

```
clear
cd "C:\Users\Jacco\Dropbox\Studie\Master Corporate Finance and Control\Master thesis\Stata data"
use projectfinance.dta

*dperc_n is percentage of total capital which is debt
destring deratio_n, gen(dperc_n)
tab dperc_n
hist dperc_n

*Missings dropped again, wrong input by World Bank
drop if mi(dperc_n)

*Control variable total investment
rename TotalInvestment totinvest
destring totinvest, generate(totinvest_n) ignore ("Not Available")
drop if mi(totinvest_n)
hist totinvest_n

*Control variable sector
rename Primarysector sector
encode sector, gen(sector_n)
tab sector_n, generate(sector_n)

*Country and region
encode Country, gen(country_n)
tab country_n
encode Region, gen(region_n)
tab region_n, generate(region_n)

*Year
rename Financialclosureyear year
gen year_n1=year
gen year_n2=year
gen year_n3=year
recode year_n1 min/2010=1 2011/max=0
recode year_n2 2011/2013=1 min/2010=0 2014/max=0
recode year_n3 2014/max=1 min/2013=0

*Independent variable indirect governemt support (guarantee)
rename InDirectGovtSupport igovs
encode igovs, gen(igovs_n)
gen igovs_n1=igovs_n
tab igovs_n1
tab igovs_n1, nolab
drop if igovs_n1 == 5
```

```
gen igovs_n2=igovs_n1
gen igovs_n3=igovs_n1
recode igovs_n1 1/3=1 6/10=1 11=0 4=0
label define igovs_nx 0 "No Guarantee or Tax Credit" 1 "Government Guarantee"
label values igovs_n1 igovs_nx
tab igovs_n1
tab igovs_n2
tab igovs_n2, nolab
recode igovs_n2 1/10=0 11=1
tab igovs_n2
label define igovs_ny 0 "No Guarantee or Guarantee" 1 "Tax Deduction"
label values igovs_n2 igovs_ny
tab igovs_n2
tab igovs_n3
tab igovs_n3, nolab
recode igovs_n3 1/3=0 4=1 5/11=0
label define igovs_nz 0 "Tax Deduction or Guarantee" 1 "No Guarantee"
label values igovs_n3 igovs_nz
tab igovs_n3

*Independent variable main revenue source
rename MainRevenueSource mrevs
encode mrevs, gen(mrevs_n)
gen mrevs_n1=mrevs_n
tab mrevs_n1
tab mrevs_n1, nolab
gen mrevs_n2=mrevs_n1
gen mrevs_n3=mrevs_n1
recode mrevs_n1 1/3=0 4/6=1 7/9=0
tab mrevs_n1
label define mrevs_nx 0 "No Purchase Agreement and Other" 1 "Purchase Agreement"
label values mrevs_n1 mrevs_nx
tab mrevs_n1
tab mrevs_n2
recode mrevs_n2 1/3=1 9=1 7/8=0 4/6=0
tab mrevs_n2
label define mrevs_ny 0 "No Purchase Agreement and Purchase Agreement" 1 "Other"
label values mrevs_n2 mrevs_ny
tab mrevs_n2
tab mrevs_n3
recode mrevs_n3 1/3=0 9=0 7/8=1 4/6=0
label define mrevs_nz 0 "Other and Purchase Agreement" 1 "No purchase agreement"
label values mrevs_n3 mrevs_nz
tab mrevs_n3

*Independent variable multilateral support
rename MultiLateralSupport mlats
encode mlats, gen(mlats_n)
```

```
gen mlats_n1=mlats_n
tab mlats_n1, nolab
drop if mi(mlats_n1)
gen mlats_n2=mlats_n1
recode mlats_n1 1/155=1 156=0 157/162=1
tab mlats_n1, nolab
label define mlats_nx 0 "No support" 1 "Multilateral support"
label values mlats_n1 mlats_nx
recode mlats_n2 1/155=0 156=1 157/162=0
tab mlats_n2, nolab
label define mlats_ny 0 "Mulilateral support" 1 "No Support"
label values mlats_n2 mlats_ny
tab mlats_n2

*Independent variable type of ownership
rename SubtypeofPPI sppi
encode sppi, gen(sppi_n)
gen sppi_n1=sppi_n
gen sppi_n2=sppi_n1
gen sppi_n3=sppi_n1
tab sppi_n1
tab sppi_n1, nolab
recode sppi_n1 1=0 4/6=0 2=0 3=1
tab sppi_n1
label define sppi_nx 0 "Transfer Ownership and Other" 1 "Own"
label values sppi_n1 sppi_nx
tab sppi_n1
tab sppi_n2
tab sppi_n2, nolab
recode sppi_n2 1/2=0 4/6=1 3=0
tab sppi_n2
label define sppi_ny 0 "Transfer Ownership and Own" 1 "Other"
label values sppi_n2 sppi_ny
tab sppi_n2
tab sppi_n3
tab sppi_n3, nolab
recode sppi_n3 1/2=1 4/6=0 3=0
tab sppi_n3
label define sppi_nz 0 "Own and Other" 1 "Transfer Ownership"
label values sppi_n3 sppi_nz
tab sppi_n3

*Interaction variable Ruleoflaw
rename Ruleoflaw rulelaw
drop if mi(rulelaw)
destring rulelaw, gen (rulelaw_n)
tab rulelaw_n
hist rulelaw_n
```

```
*Transform variables
hist dperc_n
gen adjdperc_n=dperc_n-1
gen adjdebtequity=adjdperc_n/(100-adjdperc_n)
gen addebtequity=adjdebtequity+.5
gen adlogdebtequity=log(addebtequity)

hist sponsexp
gen logsponsexp=log(sponsexp)
drop if mi(logsponsexp)
hist logsponsexp
hist totinvest_n
gen logtotinvest=log(totinvest_n)
hist logtotinvest

*Check for heteroscedasticity of robustness test
twoway (scatter adlogdebtequity logsponsexp)(qfit adlogdebtequity logsponsexp)
regress adlogdebtequity logsponsexp
rvfplot, recast(scatter)
estat hettest
estat imtest
twoway (scatter adlogdebtequity logtotinvest)(qfit adlogdebtequity logtotinvest)
regress adlogdebtequity logtotinvest
rvfplot, recast(scatter)
estat hettest
estat imtest
regress adlogdebtequity rulelaw_n
rvfplot, recast(scatter)
estat hettest
estat imtest

*Create interaction term
summarize rulelaw_n, meanonly
gen rulelawcent=rulelaw_n-r(mean)
summarize logsponsexp, meanonly
gen logsponsexpcent=logsponsex-r(mean)
summarize rulelawcent
gen inmrevs1rule=(mrevs_n1*rulelawcent)
gen inmrevs2rule=(mrevs_n2*rulelawcent)
gen inlogsponsex=(logsponsexpcent*rulelawcent)
gen ingovs1rule=(igovs_n1*rulelawcent)
gen ingovs2rule=(igovs_n2*rulelawcent)
gen insppi1rule=(sppi_n1*rulelawcent)
gen insppi2rule=(sppi_n2*rulelawcent)
gen inmlats1=(mlats_n1*rulelawcent)

*Correlations and checking for multicollinearity
```

```
pwcorr adlogdebtequity mrevs_n1 mrevs_n2 logsponsexp igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelaw_n logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs1rule ingovs2rule insppi1rule insppi2rule
inmlats, star(.05)

*Robustness test: Dummy variables left out (mrevs_n3=No Purchas Agreement, igovs_n3=No
Guarantee, sppi_n3=Transfer Ownership, mlats_n2=No Multilateral support, region_n1=East Asia
and Pacific)
regress adlogdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs1rule ingovs2rule insppi1rule insppi2rule
inmlats
regress adlogdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 inmrevs1rule inmrevs2rule
regress adlogdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 inlogsponsex
regress adlogdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 ingovs1rule ingovs2rule
regress adlogdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 insppi1rule insppi2rule
regress adlogdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2
mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 inmlats


*Descriptive statistics robustness test
tab1 region_n sector_n year
tab1 mrevs_n igovs_n sppi_n mlats_n
summarize addebtequity totinvest_n sponsexp rulelaw_n, detail

*Transforming dependent variable
gen debtequity = dperc_n/(100-dperc_n)
hist debtequity
drop if mi(debtequity)
gen logdebtequity = log(debtequity)
drop if mi(logdebtequity)
hist logdebtequity

*Check for heteroscedasticity
twoway (scatter logdebtequity logsponsexp)(qfit logdebtequity logsponsexp)
regress logdebtequity logsponsexp
rvfplot, recast(scatter)
estat hettest
estat imtest
```

```
twoway (scatter logdebtequity logtotinvest)(qfit logdebtequity logtotinvest)
regress logdebtequity logtotinvest
rvfplot, recast(scatter)
estat hettest
estat imtest
regress logdebtequity rulelaw_n
rvfplot, recast(scatter)
estat hettest
estat imtest

*Main regression: Dummy variables left out (mrevs_n3=No Purchas Agreement, igovs_n3=No Guarantee, sppi_n3=Transfer Ownership, mlats_n2=No Multilateral support, region_n1=East Asia and Pacific)
regress logdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs1rule ingovs2rule insppi1rule insppi2rule inmlats
regress logdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmrevs1rule inmrevs2rule
regress logdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inlogsponsex
regress logdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 ingovs1rule ingovs2rule
regress logdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 insppi1rule insppi2rule
regress logdebtequity mrevs_n1 mrevs_n2 logsponsexpcent igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelawcent logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmlats

*Correlations and checking for multicollinearity
pwcorr logdebtequity mrevs_n1 mrevs_n2 logsponsexp igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelaw_n logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs1rule ingovs2rule insppi1rule insppi2rule inmlats, star(.05)
regress inmrevs1rule logdebtequity mrevs_n1 mrevs_n2 logsponsexp igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelaw_n logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmrevs2rule inlogsponsex ingovs1rule ingovs2rule insppi1rule insppi2rule inmlats
regress insppi1rule logdebtequity mrevs_n1 mrevs_n2 logsponsexp igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelaw_n logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs1rule ingovs2rule insppi2rule inmlats
regress ingovs1rule logdebtequity mrevs_n1 mrevs_n2 logsponsexp igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1 rulelaw_n logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5 region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs2rule insppi2rule inmlats
```

```
regress ingovs2rule logdebtequity mrevs_n1 mrevs_n2 logsponsexp igovs_n1 igovs_n2 sppi_n1
sppi_n2 mlats_n1 rulelaw_n logtotinvest year_n2 year_n3 region_n2 region_n3 region_n4 region_n5
region_n6 inmrevs1rule inmrevs2rule inlogsponsex ingovs1rule insppi2rule inmlats

*Descriptive statistics final data
tab1 region_n sector_n year
tab1 mrevs_n igovs_n sppi_n mlats_n
tab1 mrevs_n1 mrevs_n2 igovs_n1 igovs_n2 sppi_n1 sppi_n2 mlats_n1
summarize debtequity totinvest_n sponsexp rulelaw_n, detail
```