Cost Deviations in MDB Funded Transport Infrastructure Projects

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Abstract

Transport infrastructure is one of the most important obstacles to economic development as countries in the developing world have generally low standards of transport infrastructure. Furthermore, these countries lack the financial capabilities to invest in better transport infrastructure. They therefore often turn to multinational development banks (MDBs) to get the financial help they need in order to improve their transport infrastructure. One such bank, is the Asian Development Bank (ADB), who uses almost a third of its budget on funding transport infrastructure projects (TIPs).

The issue how well MDBs are at making precise budgets for TIPs has not received much scholarly attention. This despite research on national governments ability to do so has shown, that this is a major obstacle in delivering better transport infrastructure to their citizens.

This thesis therefore attempts to answer the question: Why do ADB funded transport infrastructure projects (TIPs) have differing cost deviations? This question is answered drawing on literature on both MDB projects and nationally funded TIPs to identify two theoretical answers to this question: Cost deviations differ because of the policies and institutions of the country in which projects are build; And cost deviations differ because the borrowers are strategically misrepresenting costs. These theories are tested on a sample of 179 TIPs, which the ADB has provided funding for. Data on these projects are collected and used in a series of quantitative methods to analyze the correlation between independent variables representing the theories and projects' cost deviation.

The analyses conducted in this thesis shows, that there is no correlation between cost deviations and ratings of countries' policies and institutions. This leads to the conclusion, that cost deviations do not differ because of differences in countries' policies and institutions, unless budgets are adjusted according to these. Contrary, there are some correlation between how much of a project a borrower finances on its own and the size of cost deviations. This leads to the conclusion, that cost deviations partly differ due to borrowers strategically misrepresenting costs. Furthermore, the thesis found, that there were very large differences between the cost deviations of different countries, which could not be explained by either theory. Therefore, additional research should be made in an effort to identify why these differences between countries exist.

The conclusions in this thesis are rather aimed at spurring additional research into the causes of cost deviations, than leading to practical implications, as this thesis only points at some causes, which needs to be better understood.

Table of Contents

List of Figures and Tables

List of Abbreviations

ADB	Asian Development Bank
CPIA	Country Policy and Institutions Assessment
EIB	European Investment Bank
MDBs	Multilateral Development Banks
TIPs	Transport Infrastructure Projects
WGIs	Worldwide Governance Indicators

1. Introduction

Large projects are difficult both to plan and manage in terms of time plans and budgets, why they often result in cost overruns[1] and delayed delivery. Transport infrastructure projects[2] (TIPs) are one particular type of large projects, which are often subject to delays and cost overruns. This leads to headlines such as "EU Transport Projects face €40bn overrun" (Barber, 2008), causing public mistrust in the sector. Furthermore, cost deviations[3], both over- and underruns, create long term planning issues, as available funds are either insufficient or underutilized.

TIPs are interesting for both academics and the general public for several reasons: First, because they are primarily financed by public funds (Saha, et al., 2020). This puts the primary risks associated with cost overruns on the general public. Secondly, because transport infrastructure is of significant importance for economic development (Hong, et al., 2011, pp. 745-746; Nijkamp & Ubbels, 1999, p. 23) furthering the interest of the general public in the field. Furthermore, it is interesting from a development perspective, as developing countries lack, not only proper transport infrastructure, but also the funds to invest in improvements of transport infrastructure (Trebilcock & Rosenstock, 2015, p. 335).

This lack of national funding makes TIPs interesting from an international relations perspective, as developing countries turn to international sources of funding (Trebilcock & Rosenstock, 2015, p. 335). This is reflected by the high proportion of funds from Multilateral Development Banks (MDBs) that goes into this type of projects. In an evaluation of its support to the transport sector, the Asian Development Bank (ADB) states, that the sector accounts for 32% of approved lending, making it the sector receiving most funds from them (ADB, 2018b, p. 1). Likewise, the European Investment Bank (EIB) reported in their Investment Report 2018/2019, that the transport sector has received most funding of all sectors in every single fiscal year since 2005 (EIB Economics Department, 2018, p. 67).

This should lead to research in the precision of appraisals of TIPs receiving funding from MDBs, both to understand if MDBs are better at appraising costs than national governments, and why budgets are either over- or underrun. Therefore, it is disappointing to find, that research looking particularly at cost overruns of TIPs funded by MDBs are almost non-existent, at least according to the findings of this thesis' author[4]. Instead, literature on MDBs and development projects has primarily focused on the outcomes of projects, rather than on the inputs. Furthermore, it has failed

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[1] Defined as actual project costs being higher, than budgeted costs.
[2] Defined as projects which construct land-based transport infrastructure.
[3] Defined as the difference between actual costs and budgeted costs.
[4] Search terms include: 'MDB'; 'Transport Infrastructure'; 'Cost overruns'; 'Development Aid'; "Development Banks" etc.

to look at particular types of projects in isolation, but pool them together (See Isham & Kaufmann, 1999; Burnside & Dollar, 2000; Dollar & Levin, 2005; Denzier, et al., 2013; Bulman, et al, 2017).

1.1. Research question

Because of this lack of research into the cross-field of TIP cost overruns and MDBs, the author of this thesis wishes to close this gap by conducting statistical analysis on cost deviations of MDB funded TIPs. During the initial research phase, the author found data availability to be a significant issue in TIP research (See below literature review). Therefore, it was decided to narrow the scope from MDBs in general to ADB projects in particular, as more time would be needed to adequately find data on a representative sample of MDB TIPs. The ADB was chosen, as it was discovered that it makes evaluation reports, which contained much of the relevant information, publicly available (Bulman, et al., 2017, p. 340).

The author proposes the following research question, which the remainder of the thesis will be structured around:

Why do ADB funded TIPs have differing cost deviations?

Answering this research question contributes in several ways to research on both TIPs and MDBs. For TIP research it provides another statistical analysis of cost deviations, while for MDB research it will introduce new perspectives on their role as financial institutions who need to plan investments long term. In a broader sense, it aims to help alleviate the issues of cost deviations in delivery of transport infrastructure. The thesis will use the combined insight from the two different strands of research to answer the research question.

Furthermore, it raises the question of whether or not there are actual differences in the cost deviations of ADB funded TIPs. This was at first assumed, as there was no previous data on ADB TIP cost deviations available. Once data was gathered for this theses, the assumption that ADB funded TIPs have differing cost overruns was supported. In fact, with a sample of 178 projects, not two projects had the exact same cost deviation (Appendix 1).

To answer this research question, the thesis will be structured accordingly: First, a literature review of the literature on the performance of MDB projects and on TIP cost overruns will be conducted to identify different theories of why cost deviations occur. Based on this literature review, two theories are chosen, which will be presented and discussed in the theoretical chapter of the thesis. After the theoretical arguments of the two theories have been made, the methodological foundations of the thesis will be discussed, including a presentation of the analytical methods used to test hypotheses based on the theories. On this background, a series of statistical analyses and results will be presented and discussed in order to answer the research question. Finally, the thesis will present its conclusions and suggestions for further research.

2. Literature Review

The purpose of this literature review is two-fold: First, it enables an informed identification of theoretical explanations of why there are differences in cost deviations and how to analyze their influence on cost deviations; secondly, it provides a background review of how vast the issue of cost deviations in TIPs and MDB projects is.

Below the review of the little literature on cost deviations of MDB-funded TIPs will be presented, followed by a review of the causes of differences in project outcomes in MDB research. Finally, research on cost deviations in TIPs in general will be reviewed.

2.1. MDB Literature

The first part of the literature focuses on MDB related research and will present how big the issue of cost deviations are in TIPs with international funding and furthermore identify some of the common causes of outcome deviations in MDB projects.

On Cost Deviations of TIPs

Despite the disappointing lack of research into the cost deviations of TIPs funded by different MDBs, two articles have made progress towards improving our understanding of how well MDBs control costs in TIPs. The final section of the literature review will include their findings in relation to the causes of cost overruns, as their theoretical frameworks are based on literature on TIPs in general.

The first article investigates issues with EU-funded TIP appraisals comparing ex-ante and ex-post Cost-Benefit Analyses of ten TIPs funded through the EU Cohesion and Instrument for Structural Policies for Pre-Accession funds. The comparisons show that nine out of the ten projects ended up with cost overruns (Kelly, et al., 2015, p. 88).

Secondly, an article on 89 TIPs funded by the World Bank has been reviewed. The article is based on the 'Implementation Completion Reports' published by the World Bank itself. Using analysis of variance across different groups and regression analyses the study found that 59% of projects finished under budgeted costs, while 39% incurred cost overruns (Gamez & Touran, 2010, pp. 368-369).

On Project Outcomes

Because the majority of the literature on MDB funded projects focus on project efficiency or outcomes, the review of MDB funded projects will focus on explanations of variation in project efficiency. There are two broad categories of explanations: Country-level explanations and project-level explanations (Bulman, et al., 2017, pp. 335-336).

The first explanation is that GDP-growth leads to better outcomes. Two studies included this, and both found that fast-growing economies lead to higher success rates (Denzier, et al., 2013, p. 292; Bulman, et al., 2017, p. 345).

Geography is another country-level explanation. Dalgaard, et al. found that having a large portion of land in the tropics highly reduces aid effectiveness (2004, p. 201). Dollar & Levin also tested the effect of geography, first replicating the analyses by Dalgaard, et al., where they found an insignificant effect. Secondly, they used a dummy variable labelled Sub-Sahara, which was found to influence the effect of other variables on project outcomes, but not affect project outcomes on its own (2005, p. 8).

In the literature reviewed, one country-level variable was found to have more impact than others: The quality of a country's institutions and policies. Although measured in different ways, several articles found that strong institutions and 'better' policies lead to better project outcomes (Isham & Kaufmann, 1999; Burnside & Dollar, 2000; Collier & Dollar, 2001; Dollar & Levine, 2005; Denzier, et al., 2013; Bulman, et al., 2017) Especially rule of law was found to be important, while measures related to civil liberties was found insignificant for investment projects, which includes TIPs (Dollar & Levin, 2005, pp. 7-8+11). Contrary, Guillaumont & Chauvet found, that better policies resulted in lower aid effectiveness (2001, p. 77). While, Bulman, et al. found that Freedom House's civil liberties and political rights index was negatively correlated with Asian projects success rates. But on worldwide projects, there was no effect of this institutional measure (Bulman, et al., 2017, pp. 345-347). As such, there is some discussion on which institutions and policies affect project outcomes, and how they affect them.

Project-level explanations are mostly related to project characteristics, where different studies have found different results. Two studies include project sizes, measured as project costs, in their analyses. The first study found that smaller projects have greater chances of success (Denzier, et al., 2013, p. 294). While the second study found that larger projects have greater chances of success (Bulman, et al., 2017, p. 347).

In relation to implementation length, the two studies including this found that shorter projects had better outcomes (Denzier, et al., 2013., p. 294; Bulman, et al., 2017, p. 347). The latter also included implementation delays in their analysis and found that delayed projects are less successful (Bulman, et al., 2017, pp. 346-348).

Denzier, et al. included a long range of project level variables, of which the period between project approval and the first financial disbursement and a dummy for projects being labelled 'problem projects' in the first half of the project had significant, but small effects (Denzier, et al., 2013, pp. 296-297).

Project managers obviously play an important role in projects, and therefore some studies have analyzed the effect of project managers in different ways. Studies found that project managers with successful track records tend to have more successful projects and that projects with high project manager turnover are less successful (Denzier, et al., 2013, pp. 299-301; Bulman, et al., 2017, pp. 349-352).

2.2. Literature on TIPs in general

The final part of the literature review will center on the vast literature on cost deviations in TIPs in general. First, it is clear that cost overruns are a predominant issue within TIPs. In the literature reviewed, four studies involving a high number of cases was found, all of which show that a majority of TIPs had cost overruns, with the propensity ranging from 89,47% (Huo, et al., 2018, p. 5) to 'only' 52,4% (Odeck, 2004, p. 48). This is also backed by the mean cost deviation being positive in all studies, ranging from 28% (Flyvbjerg, et al., 2002, p. 282) to 7,88% (Odeck, 2004, p. 48). Another common theme is that the means are associated with high standard deviations. So even though cost overruns are common, there are large differences in how much projects overrun their budgets.

When looking at explanations, many studies divided them into three groups. First, technical explanations. The first of these is that forecasters do not have sufficient data or techniques to properly predict costs. The explanation has been tested in several ways and with mixed results. Two articles reject this explanation, as they argue this would lead to cost deviations distributed more evenly around zero and that cost estimates would become more precise over time as techniques are refined (Flyvbjerg et al., 2002, pp. 286-287; Huo, et al. 2018, p. 5). Siemiatycki found, that auditors highlight a lack of proper learning mechanisms within public agencies (Siemiatycki, 2009, p. 151). This could counter the argument above, as techniques does not become refined, unless there is learning within the agencies. Meanwhile, Wu, et al. investigated the causes of change orders and found that unforeseen geological issues was the most common cause (Wu, et al., 2005, pp. 560-561), which could be understood as a result of insufficient data. Finally, Lind & Brunes interview project managers, who highlight insufficient data and details as a cause of cost overruns, as unforeseen technical issues lead to increased inputs in either material or man-hours (2015, p. 563).

The second technical explanation is that the future is inherently difficult to predict. As such, the forecasts are associated with some degree of uncertainty, leading to cost changes (Nijkamp & Ubbels, 1999, pp. 27-28). This explanation has also been addressed in multiple ways: Nijkamp and Ubbels found a strong correlation between cost overruns and both price changes and implementation length (1999, p. 44). On the other hand, it was rejected by Flyvbjerg, et al. due to the biased distribution in cost overruns, as they argue that uncertainty should equally lead to over- and underruns (2002, p. 286). Bruzelius, et al. reject it on basis of reviewed mega projects being too one-sided in favor of cost

overruns (2002, p. 145). Finally, Lind & Brunes reject it, as project managers rejected bad luck, which was associated with the uncertainty of the future, as a cause (2015, p. 564).

The third technical explanation, scope/design changes, is somewhat interconnected to the two above, as design changes often occur due to unforeseen geological issues (Wu, et al., 2005, pp. 560-561), or to changes in safety and environmental regulations (Siemiatycki, 2009, pp. 149-150). All studies, irrespective of research design, analyzing the effect of scope/design changes on cost overruns, support that more scope/design changes lead to increased cost overruns (Nijkamp & Ubbels, 1999; Siemiatycky, 2009; Kelly, et al., 2015; Lind & Brunes, 2015; Love, et al., 2017).

The second group is a psychological theory called 'Optimism Bias' in the literature. This explains cost overruns, as a result of predictions being overly optimistic (Flyvbjerg, et al., 2002, p. 288). This has been rejected by two articles using different arguments. First, by Flyvbjerg, et al. due to the lack of improvement over time. As "forecasters would indeed have to be an optimistic group to keep their appraisal optimism throughout the 70-year period" (Flyvbjerg, et al., 2002, pp. 288-289). Secondly, by Flyvbjerg, et al. who makes a theoretical argument for why strategic misrepresentation, presented below, is more likely to explain cost overruns (Flyvbjerg, et al., 2009, pp. 180-182). Lind & Brunes, on the other hand, support optimism bias as a cause, again based on responses from project managers (Lind & Brunes, 2015, p. 564).

The final group of explanations are a mix of economic and political explanations. The most dominant theory within economic and political explanations can be termed 'Strategic Misrepresentation'. This theory claims, that cost overruns happens because forecasters face political and economic incentives to underestimate costs during planning processes (Flyvbjerg, et al., 2002, pp. 287-288). This cause has also been addressed with both mixed methods and results. First, Flyvbjerg, et al. supports this, since the alternative explanations they analyze are rejected (2002, p. 287). Secondly, it was supported by theoretical arguments in Flyvbjerg, et al. (2009, pp. 180-182) and based on unreported reviews of mega-projects (Bruzelius, et al., 2002, pp. 145-146). Lind & Brunes reject it as a small majority of project managers reject strategic deception (2015, p. 563). Finally, a very interesting finding, in research on Taiwanese highway construction, is that changes initiated by contractors provided a net-positive effect on embankment road and viaducts in one of the projects. (Wu, et al., 2005, p. 561). This seem to contradict the theory, that contractors are strategically misleading procurers.

Another political explanation is lack of proper stakeholder involvement. Wu, et al. found, that complaints from civilian and organizational stakeholders caused 25-30 percent of cost overruns (Wu, et al., 2005, pp. 560-561), which could support, that lack of stakeholder involvement leads to cost overruns, as they then later obstruct the construction process.

On top of these explanations, many of the articles reviewed have, like the literature on MDB projects, conducted statistical analysis on different project characteristics. Their results are summarized in Table 1:

Table 1: Effect of project characteristics on cost overruns

Variable	Studies
Project Type	No Effect: Flyvbjerg, et al. (2002; 2003; 2004), Cantarelli, et al. (2012) Huo et al. (2018)
Project Size	Significant Effect: Odeck (2004), Gamez & Touran (2010) Limited Effect: Flyvbjerg, et al. (2004) No Effect: Love, et al. (2017), Huo et al. (2018)
Project Year	No Effect: Flyvbjerg, et al. (2002; 2003), Garmez & Touran (2010)
Location	Significant Effect: Flyvbjerg, et al. (2002; 2003), Odeck (2004), Cantarelli, et al. (2012)
Implementation Length	Significant Effect: Nijkamp & Ubbels (1999), Flyvbjerg, Holm & Buhl (2004), Odeck (2004), Huo et al. (2018) No Effect: Gamez & Touran (2010)

These findings suggest that particularly location and implementation length needs to be accounted for, when comparing TIPs. This is in line with the findings in the literature review on outcomes of MDB projects, where both geographical variables and implementation length were found to influence outcomes.

There are two main conclusions drawn from the review of literature on TIPs in general: The number of causes is quite large; and that operationalization of causes is a very significant issue in

analyzing causes of TIP cost overruns. Because of this, a great deal of evaluation is necessary in relation to the validity of the different operationalizations. Two articles have addressed this particular issue in relation to the support of strategic misrepresentation. In more or less polemical fashion, they use the same argument: The variables and research designs used to support strategic misrepresentation have no clear relation to strategic misrepresentation (see Osland & Strand, 2010; Love & Ahiaga-Dagbui, 2018). Siemiatycki also conclude that differences between academics and auditor perspectives on cost overruns can be explained by their different methodological backgrounds, in the form of scope, approaches and data-availability (Siemiatycki, 2009, pp. 151-152). The issue of how dependent findings are of methods are noted a wide range of the studies reviewed (Lind & Brunes, 2015, p. 560; De Jong, Annema & Van Wee, 2014, p. 217; Love et.al, 2017, p. 1083; Cavalieri et al., 2019, p. 783). This suggests, that much of the research on TIPs have entered an old methodological issue: you find what you search for.

2.3. Literature Review Conclusion

The two different strands of research, this thesis draws upon in answering the research question allows the thesis to focus on particular theories in answering the research question. Furthermore, it has highlighted some particular issues to be given attention in the theoretical and methodological chapters of the thesis.

MDB literature points towards one particular source of differences in project outcomes, which are particularly interesting in relation to MDB funded TIPs: Country policies and institutions. These are interesting for this thesis, because they have not been adequately addressed in the literature on TIPs, even though it seems very likely, that cost deviations are dependent on the policies and institutions of particular countries. Furthermore, the research on MDB projects have not investigated their influence on cost deviations. Addressing this allows an understanding of, whether issues of cost deviations and bad outcomes stem from the same causes.

A very prominent theory of cost overruns in TIPs, strategic misrepresentation, have generally not been used in analyses fitting with the theoretical framework, but have mainly been supported by theoretical arguments or lack other proper explanations. The thesis will therefore attempt to provide a more theoretically embedded analysis of the effect of strategic misrepresentation on cost overruns in TIPs. Furthermore, strategic misrepresentation has not been addressed by literature on MDBs, despite some of the theoretical arguments being valid for projects receiving funding from these as well.

Finally, the literature on TIPs in general have highlighted a number of important methodological issues to be addressed. First, actually getting data on TIPs is a very time-consuming endeavor (see Flyvbjerg et al., 2002, 2003; Siemiatycki, 2009; Love et.al, 2017). Flyvbjerg, Holm and Buhl spend

four years collecting the data for their dataset (Flyvbjerg, et al., 2002, p. 293), while Huo et al. spend six months collecting their dataset (Huo, et al., 2018, p. 3). As a reflection of this, the author of this thesis decided to limit the number of explanations and variables included in the analysis.

Another important issue was to adequately address why a certain explanation was operationalized through the variables that were used. The same variables are used to test very different explanations for why cost deviations occur. Furthermore, the same explanation is operationalized in different ways, making it difficult to compare results across studies. One possible reason for this confusion, could be that a large portion of the studies are more or less inductive and that most theories are either vaguely or broadly defined, leaving much room for interpretation in how and why these explanations lead to cost deviations.

2.4. Research Question Revisited

Following this literature review, a brief revisit to the research questions allows for some initial discussion of how this can be answered. As mentioned, the thesis will answer the following research question:

Why do ADB funded TIPs have differing cost deviations?

Such a question assumes that there are identifiable causes for these differences. The implicit goal in answering this research question is to identify these causes. The literature review allows the thesis to focus in on specific potential causes, rather than using an inductive approach. As mentioned in the summary, particular two explanations were found to be of particular interest for this thesis: institutions and policies; and strategic misrepresentation. Therefore, the thesis narrows its analysis to these two explanations. As such the thesis is rather answering the following questions: Are differences in ADB funded TIPs' cost deviations the results of the institutions and policies of the country in which they are built; and are differences in ADB funded TIPs' cost deviations the result of strategic misrepresentation?

The ensuing theoretical chapter will present and discuss the two explanations in detail. Following the theoretical chapter, the thesis will discuss a wide range of methodological considerations, including the research design and operationalizations of the theories. Based on these theoretical and methodological considerations, the collected data on ADB projects will be analyzed in order to discuss, if the theories are supported or must be rejected. Finally, the conclusions of the thesis will be presented.

3. Theory

In this chapter, the two theories are presented and discussed in order to argue for their applicability on the particular issue of cost deviations in ADB funded TIPs.

3.1. Institutions and Policies

The first section is related to why and how policies and institutions could affect cost deviations. As mentioned development research has identified an empirical relationship between a receiving country's policies and project outcomes, i.e. the better a country's economic policies and institutions are, the more likely it is to produce positive project outcomes (Bulman, et al., 2017, p. 345). Although such literature is related to project outcomes, and not cost deviations, some of the theoretical arguments are applicable to cost deviations as well. Furthermore, investigating if this theory also explains cost deviations is beneficial from a practical point of view, as it helps practitioners understand if issues with cost deviations and outcomes have different causes.

The theory is based on three arguments, which predicts cost deviations to happen due to changes in output and changes in input prices. So, cost deviations can occur due to two different types of cost changes: The cost of each measure of output, e.g. the cost of one square kilometer road; or the amount of outputs, e.g. how many square kilometer roads are built.

The first argument is that, policies affect the predictability of the needed output. If the economy of a country is distorted, then demand is more difficult to predict, which could result in the wrong output choice (Isham & Kaufmann, 1999, p. 155). If the wrong output is chosen, then the project would need to undergo design changes in order to be adjusted to accommodate actual needs. Such changes would result in cost deviations, as seen in the literature review on TIPs.

Secondly policies and institutions ensure, that more reliable knowledge is available on costs of inputs, because good policies and institutions ensure more predictability in costs. Bad policies and institutions can result in volatile economies, where prices change drastically. Specifically, good policies and rule of law institutions creates stronger accountability in economic transactions, which reduces the risk of economic actors increasing prices of project inputs, for instance due to monopolies (Isham & Kaufmann, 1999, p. 155). The higher risk there is of unexpected cost changes, the more likely a project is to have cost deviations, and therefore the volatility from bad policies increase the risk of cost deviations.

Finally, if import is restricted, this could lead to market shortages, which in turn increases prices (Guillaumont & Chauvet, 2001, p. 68). In the case of large infrastructure projects, this is particularly important, as it is unlikely that local economies can supply both the labor and materials needed for the construction of such infrastructure.

An important assumption in relation to this thesis, is that budgets are not adjusted, at least adequately, based on the policy and institutional environment of the project. From the information available in the reports and found on the ADB website, this does not seem to be the case. Therefore, the arguments presented above are expected to be applicable to the research question. If there would be an adjustment based on policy quality, this would mean that the correlation between policy and cost deviations are underestimated in the analysis.

Another important aspect of the relationship between institutional and policy quality and cost deviations is, that the arguments lead to both larger cost over- and underruns in bad institutional and policy environments. The uncertainty associated with outputs and input prices can both lead to under- and overestimations of project costs.

3.2. Strategic Misrepresentation

The following section will first present the theory of strategic misrepresentation and how the risk of strategic misrepresentation can be reduced. The theory can be summarized as follows: Project promoters have incentives to underestimate costs, as this increases their chance of getting funded and because they suffer no consequences from incurred cost overruns (Flyvbjerg, et al., 2002, pp. 289-290).

To explain the theory in detail, it is useful to present the organizational diagram of a theoretical project. Flyvbjerg, et al. presents a diagram drawing on principal-agent theory, which is shown below.

Figure 1: Principal-Agent Relationships in TIPs
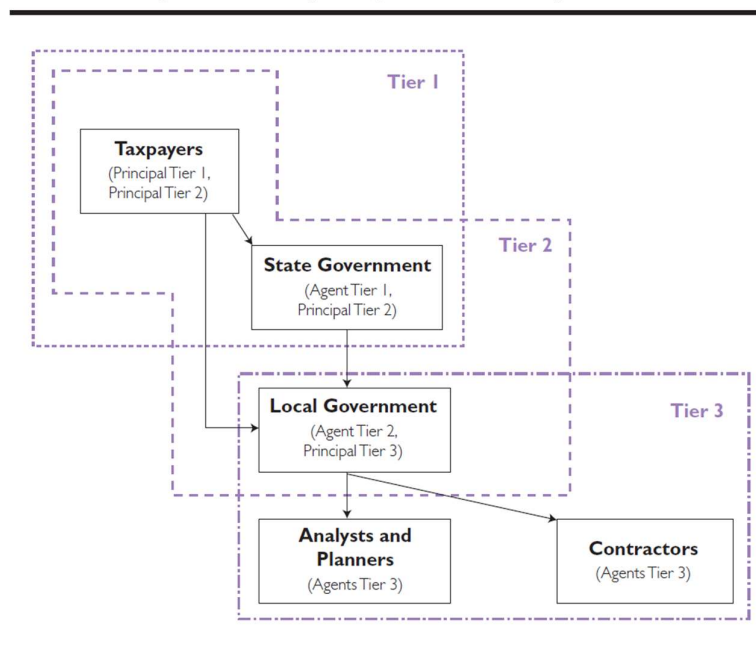
Source: Flyvbjerg, et al. (2009, p. 177)

Within this context, the taxpayers have a single preference: get the most benefits possible from their taxes. Meanwhile, the state government has two different preferences: As an agent they wish to get reelected. But as a principal, their preference is to allocate funds as effectively as possible. The local government also has two preferences, in relation to the taxpayers they wish to be reelected, while they want to receive as much of the funds, that the national government provides, as possible. Finally, the third tier of agents are private actors, whose primary preference is to ensure future engagement by the government (Flyvbjerg, et al., 2009, pp. 176-179). These preferences and relationships are argued to lead to strategic misrepresentation.

The first argument is that economic self-interest leads to strategic cost underestimation: TIPs are funded in a world of scarce resources, which means they compete for funds. Because project promoters, whether state or local government, compete for funds, they underestimate the costs of TIPs, as low costs increases their likelihood of receiving funds (Flyvbjerg, et al. 2002, pp. 287-288; Flyvbjerg, et al. 2009, p. 173).

Secondly, political pressure can also lead to strategic misrepresentation. Part of the duty of politicians is to supply the public with well-functioning transport means, so they face political pressure to get new infrastructure. This means, that since politicians are interested in getting reelected, they will often propose new infrastructure to please voters. In addition to this, politicians are assumed to not care about eventual cost overruns, because their time frames are shorter than those of the projects, so they will not face political consequences of cost overruns. Therefore, they want the proposed infrastructure to be as cheap as possible, because cheap infrastructure is more popular (Bruzelius, et al., 2002, p. 145; Flyvbjerg, et al., 2009, pp. 177-178).

Thirdly, political pressure are particularly prevalent in certain projects, which politicians insist on getting starting for personal prestige, even if this necessitates forecasts to be 'cooked' using unrealistic assumptions (Flyvbjerg, et al., 2002, pp. 289-290). This type of pressure also explains, why the third tier of agents underestimate costs, as they perceive this to be the wish of their principals (Flyvbjerg, et al., 2009, pp. 178-179).

Finally, strategic misrepresentation occur, because the agents have better information than their principals, but have no incentives to reveal the information. If a project promoter knows, that there are high risks of cost overruns, which should increase the budget, but acknowledging such risks would reduce the chance of receiving funding, then they would attempt to hide such knowledge. The authors propose that project promoters often use the Everything-Goes-According-to-Plan (EGAP) approach, when budgeting costs (Flyvbjerg, et al., 2009, pp. 178-179).

These arguments lead to four sources of strategic misrepresentation: Self-interest; asymmetric information; different risk preferences; different time horizons. The self-interest of the project

promoters can be both political and economic, but as long as underestimating costs are beneficial from either point of view, then strategic misrepresentation is likely to happen.

Asymmetric information increases the ability of project promoters to hide or leave out information, so that they can underestimate the actual project costs of those aspects which only they have information on.

Project promoters will downplay the risks of projects, because they are willing to take higher risks, than the financing actor, as long as they do not stand to lose anything from those risks.

Finally, project promoters' time horizons often revolve around being reelected and ignores cost overruns on projects longer than their election terms (Flyvbjerg, et al., 2009, pp. 179-180).

As might be noted by the reader, this theory is therefore only related to cost overruns and not cost deviations in general. There are no preferences or relationships in the theoretical framework, which incentivize cost overestimation, so cost underruns must occur due to different causes.

In this thesis, the actors and relationships are a bit different compared to the model above. First, in relation to the project organization. Here three levels of actors are present: The ADB itself, who represents both the taxpayers and the state governments as principals. They provide the funds and their goal is to maximize the benefits of utilizing these funds; the second level consists of both state and local governments, whose preferences are to ensure their legacy/reelection and to receive as many funds as possible from the ADB; finally, the third tier of agents remain, as planners, analysts and contractors are engaged from the early preparation of ADB projects and cooperate with local/national governments in preparing project designs, etc. (ADB, 2020a).

Secondly, some of the funds provided are given in the form of loans, and not grants/taxes. If the assumption, that politicians are more concerned with getting funding than long-term cost overruns, then the fact that the funds are provided by loans should not influence their incentives to misrepresent. The guidelines for ADB public loans are that loan repayment is scheduled to be finished between 30 and 50 years after a loan agreement has been made (ADB, 2020b), which can be assumed to be well beyond the timeframe considered by national and local politicians. Furthermore, for many of the borrowing countries, public budgets are severely restrained, as mentioned in the introduction. As such, they may not be able to fund the projects by themselves and must therefore attract funding at all costs.

As argued by Osland and Strand these arguments should lead to analysis taking actor preferences and project institutions[5] as independent variables (Osland & Strand, 2010, p. 81). This thesis will focus on project economic institutions as the independent variable. This also means, that all state

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[5] Understood as the rules which regulate the relationship between project actors

and local governments are assumed to have the same preference as argued in the theory, i.e. to increase the chance of receiving funding and pay as little up-front as possible. This is obviously not the case but creating a clear operationalization of actor preferences is outside the scope of this thesis. Furthermore, it is in line with the literature supporting strategic misrepresentation, which proposes institutions as the path to overcome strategic misrepresentation. In particular, it suggests that increased transparency and accountability leads to smaller cost overruns.

Transparency

More transparency reduces strategic misrepresentation because it reduces the asymmetric information, as project promoters are forced to share more information. This ensures that project financiers will have more information on how the budgets are calculated, which makes it more difficult to underestimate costs (Bruzelius et al. 2002, p. 148; Flyvbjerg et al. 2009, p. 185). In this thesis, it has not been possible to adequately address the degree of transparency as an explanation of differences in cost overruns. The degree of transparency of ADB TIPs is dependent on the active policy of information disclosure at the time of project closing (ADB, 2018a), which would be confoundingly related to a wide range of explanations, which would expect differences in cost overruns over time. Other ways of testing the degree of transparency might be plausible but is considered outside the scope of this thesis.

Accountability

Instead, the thesis will focus on the effect of increasing the accountability of the borrowing countries. As mentioned, one of the claims of strategic misrepresentation theory is that project promoters strategically underestimate costs because they do not stand to lose anything if projects overrun their budgets. Therefore, increasing their accountability should reduce their incentives to mislead. Accountability is increased through shared financial responsibility, where project promoters share a portion of the financial responsibilities (Flyvbjerg, et al., 2009, p. 183). This can be done in two ways: by having project promoters cover a share of the initial capital costs; and by having project promoters cover a certain share of eventual cost overruns (Flyvbjerg, et al., 2009, p. 184-185; Bruzelius et al, 2002, p. 149-151).

In relation to the promoters covering a share of the initial capital costs, the theoretical argument for it being linked to cost overrun is as follows. TIPs are characterized by high up-front capital costs and being irreversible, i.e. the capital cannot be regained once investments have begun. This means that there are large risks of capital loss (Nijkamp & Ubbels, 1999, pp. 26-27). If the ADB would provide full up-front funding, then they would bear the full risks associated with this initial capital cost. By requiring the borrower to share a part of these initial capital costs, the ADB transfers part of the project risks to them (Flyvbjerg, et al., 2009, p. 183). By doing so, the risk preferences of the two

actors are more aligned, which reduces the incentive to misrepresent project costs (Flyvbjerg, et al., 2009, p. 180).

Secondly, the arguments for why increasing the borrowing country's share of cost overruns would reduce cost overruns can be described as follows. When the proposing organizations are held financially accountable for their estimates, this reduces the financial incentive to underestimate costs, as such underestimation would lead to financial burdens on themselves (Flyvbjerg, et al., 2009, pp. 183-184). This measure is aimed at reducing the self-interest of the borrower in underestimating project costs.

These two measures raise an important methodological issue with using accountability as a cause: The time factor. Causal relationships are defined by an appropriate time order between the cause and the effect, i.e. the cause has to be before the effect. In this case the accountability measures has to be known before the budgets are proposed, else they cannot reduce the risk of strategic misrepresentation. This leads to the ADB Operations Manual, where it is stated that "The actual share of ADB financing for a particular loan project… would vary, depending on the sector, client, and characteristics of the project" (ADB, 2019a, p. 1). Furthermore, there are standard ranges for how much of project costs the ADB finances, although it is not possible to include this in the thesis (ADB, 2005). But if borrowers are aware of these ranges, then share of initial capital costs could affect the proposed budgets.

Moving to the second measure, borrowers share of cost overruns, the Project Administration Instructions (PAI) and the Operations Manual deal more directly with this. The PAI state that "Normally, the borrower finances the cost overrun from its own resources… If additional financing from ADB or external sources is required, then the procedures in Operations Manual Section H5: Additional Financing… will apply" (ADB, 2018c, p. 1). And within the Operations Manual Section H5, it is stated that:

"Additional financing may be provided to finance

     (i)   changes in the scope of an ongoing project (for scaling up and/or restructuring);

     (ii)   cost deviations, which may be caused by exogenous factors or design and implementation problems; and/or

     (iii)   financing gaps, which may be caused by changes in the financing contributions from the original financing parties" (ADB, 2019b, p. 1).

So, the borrowers share of cost overruns are determined by their ability to cover the overrun themselves and the causes of the additional financing needs. This is not known *ex-ante*, although

one could speculate, that state or local governments can manipulate project scopes and/or use the EGAP approach, which would increase the cost overruns covered by the ADB. With this important caveat in mind, the thesis will include the borrowers share of cost overruns in its analysis to see if there is any correlation. Such effects would need to be investigated in detail on its own to properly validate this as a cause of cost deviations.

3.3. Hypotheses

The thesis aims at testing these theories against a database on ADB projects, and to do this a series of hypotheses are proposed.

Based on the arguments that bad policies and institutions makes it more difficult to make precise predictions, the thesis suggests the following hypothesis:

Hypothesis 1: Absolute cost deviations are negatively correlated with policy/institutional quality.

This hypothesis is hypothesizing that projects in countries with low quality policies and institutions are more likely to incur absolute cost deviations, because there are higher risks of unpredictable changes to project outputs and/or input costs.

Based on the two ways of increasing accountability, it is possible to propose two hypotheses. These are aimed at directly testing the arguments put forth in the literature on strategic misrepresentation, that increasing the project promoters' initial capital costs and share of cost deviations, reduces their self-interest in underestimating costs:

Hypotheses 2: Cost overruns are negatively correlated with the borrower's share of initial capital costs.

Hypotheses 3: Cost overruns are negatively correlated with the borrower's share of cost overruns.

The analyses to be conducted according to the methodology presented below will test these three hypotheses on a dataset of ADB funded TIPs by assessing the degree of correlation between independent variables representing each hypothesis and a dependent variable representing cost deviations.

4. Methodology

The purpose of this methodological section is to present and discuss how the thesis expects to answer the research question using the two theories. First, by addressing the ontological and epistemological bases for this thesis. This is followed by a presentation of the research design, and finally a detailed presentation and discussion of the data used in the analysis.

4.1. Ontology

The first methodological consideration of this thesis is its ontological assumptions. Is the research investigating an objective reality or is it investigating a subjective reality? In this thesis, the reality under investigation is considered objective from the perspective of the research conducted. That means that although variables and values might represent a subjective or socially constructed phenomenon, the values included in the research are objective values. For instance, even though cost deviations are based on the socially constructed phenomenon 'money', the value of that variable in this research is not subjective, but objective (Andersen, et al., 2012, pp. 22-23). This also means, that the answers given in this thesis is considered objective, but the author will not claim, that the answers are the final or only possible answers to the research question. To address why, this is, we can move to the epistemological assumptions of this thesis.

4.2. Epistemology

In asking a why-question, the research question is implicitly indicating a cause-and-effect relationship between dependent and independent variables. The thesis follows the rationalist tradition of testing theories using hypotheses in order to falsify them. This means that the thesis is only rejecting certain hypotheses, while others are considered supported, but not proven (Andersen, et al., 2012, pp. 23-24). So, if a cause is supported here, the thesis does not assume this to be a final proof, that the variable is causing the effect. How does the rationalist tradition then test hypothetical causes in order to either falsify or support them?

The rationalist tradition has commonly rejected hypotheses based on four criterion: Theoretical association; appropriate time order; correlation; and elimination of third variables (Agresti & Finlay, 1997b, p. 357). The two first criterion has been discussed in the theoretical chapter, while the remaining two criterion will be addressed in the analytical chapter of the thesis, based on the research design presented below.

Another important aspect of rationalist research is that it considers causality to be probabilistic, rather than deterministic (Agresti & Finlay, 1997b, p. 357), so the thesis is not claiming, that for all projects within countries with bad policies and institutions the cost deviation will be higher, than in

countries with better policies and institutions. Instead, it is claiming, that there is a higher risk of projects incurring cost deviations in countries with relatively worse policies and institutions.

4.3. Research Design

The research design is chosen in an attempt to adequately address the two other criteria. To eliminate third variables, research designs need to enable comparison of cases with similar values on those third variables. In some research fields, this is done using experiments, but this is not possible in social science, such as this thesis (Agresti & Finlay, 1997b, pp. 359-360). Instead, the thesis will use a comparative case study design in order to answer the research question.

The study will include a large number of cases and use quantitative methods to analyze the correlation between the independent variables and cost deviations. A quantitative approach was chosen over a qualitative comparison because the primary concern for this thesis is whether there are any correlation between the independent and dependent variables. Quantitative methods enables more broad assessments of the degree of correlation, i.e. how probable is it, that X causes Y? On the other hand, qualitative methods are better at assessing how X causes Y (Andersen, et al., 2012, pp. 428-429). Because there is little research on the causes of cost deviations of internationally funded TIPs, the answer to the thesis' research question will primarily be directed at the degree of correlation. Later research would then need to more adequately analyze how cost deviations are caused by different variables.

The thesis will use three different quantitative methods to analyze the degree of correlation between the dependent and independent variables. First, the effect of three nominal third variables needs to be analyzed, thereafter two methods are used to analyze directly the correlation between the dependent and independent variables: one assuming all other variables being equal, and another including analysis of the influence of third variables on the relationship between dependent and independent variables (Agresti & Finlay, 1997b, p. 360). Below these quantitative methods will be presented, followed by a discussion of the data used in these quantitative analyses.

Quantitative Methods

The quantitative methods in this thesis vary depending on the different variables' levels of measurement. The variables included in this thesis, presented below, can be divided into two groups: Nominal variables, where there are multiple possible values, but these cannot be ranked; and ratio variables, where the values of the cases can be ranked, i.e. X>Y (Andersen, et al., 2012, pp. 341-344). Both the independent variables and the dependent variable of this thesis are ratio variables, while there are some third variables, which are nominal. The remainder of this section will first present a common quantitative measure for all methods, followed by a presentation of the different methods used in the thesis in the order they will be used in the analysis.

All quantitative methods used in this thesis are associated with a measure called p-values. P-values are among the most common quantitative measures in statistical analysis. Basically, they present the probability of getting results even if the null hypothesis, that no relationship exists between the variables, was true. They are normally reported as decimal numbers, for instance p=0,05, which means there is a 5% chance of getting the specific result even if the null hypothesis is true (Andersen, et al., 2012, p. 369). In other terms, p-values are a statistic attempt at stating how reliable the results are. This also means that p-values does not inform us on how strong the correlation is, i.e. there can be both very reliable small correlations and very unreliable large correlations. Below the different methods associated with each level of measurement will be presented.

ANOVA:

Three third variables, Country, Financing Mode, and Output Changes, cannot be included in the OLS regression models, because they are nominal variables. This means, that they must be controlled for using a different approach.

First, the thesis will test if they are correlated with either the dependent or independent variables. The statistical method used for this will be One-Way Analysis of Variance (ANOVA). An ANOVA first calculates the variance between three or more groups and the variance within these groups. These calculations are based on the following equation. First, the total sample variance (SS) is calculated:

$$SS_{Total} = \sum (y_i - \bar{y})^2$$

Y_i represents the value of individual cases on the dependent variable, while $\bar{Y}$ represents the mean of the dependent variable. So SS_{Total} measures the sum of differences between actual values and the mean of the dependent variable squared. Secondly, the sample variance for each group (SS_{Group}) is calculated using the same equation with the total sample's mean, but only the y-values of cases within the group. The resulting SS_{Group} is multiplied by the number of cases in the specific group to account for differences in sample sizes. Finally, the remaining variance (SS_{Error}) is found subtracting all SS_{Groups} from SS_{Total}. These sample variances are used to calculate the F-value of the ANOVA using the following equation:

$$F = \frac{MS_b}{MS_w} = \frac{\sum SS_{Groups}/ (n_{groups} - 1)}{SS_{Error}/(n_{total} - 1)}$$

MS_b is called the mean square between groups, which measures the weighted average variance between groups, while MS_w is the same within the groups. As such, MS_b represents how much variance there are between groups, while MS_w represents how much variance there are within groups (Haslwanter, 2016, pp. 146-148).

From this calculation follows, that relatively large MS$_b$ compared to MS$_w$ means, that there are larger differences between groups, than within groups, i.e. there is a significant difference between the groups, making it improper to compare across groups. This is reflected in a common decision rule: If the calculated F has an absolute value below a statistical critical F-value, then there is no significant correlation between the two variables (Quirk, 2016, pp. 183-187).

If there is a significant relationship between third variables and the dependent variable, then the correlation between the dependent and both independent variables need to be analyzed taking this variable into account. To do this, the thesis will calculate the Pearson's r first using the means of the dependent and independent variables of the groups. Secondly, using a sub-sample of cases where there is no significant correlation between the third variable and the dependent variable, i.e. where MS$_w$ is higher than MS$_b$. As p-values are very sensitive to the number of cases, which makes these sub-sample analyses less reliable per definition, these are interpreted with more caution in these analyses.

Pearson's r:

The first method analyzing correlation between the dependent and independent variables will be Pearson's r, which analyses if there are any correlation between these variables, assuming that all other things are equal.

Pearson's r use the fact that ratio variables have meaningfully ranked values, which means it is possible to measure the effect of increasing the value of independent variables on the value of the dependent variable. The method is used to calculate a correlation coefficient, 'r', which can range from -1 (perfect negative correlation) to +1 (perfect positive correlation). The value of 'r' is calculated the following way:

$$r = \frac{\frac{1}{n-1} * \sum(X_i - \bar{X}) * (Y_i - \bar{Y})}{\sqrt{\sum(X_i - \bar{X})^2} * \sqrt{\sum(Y_i - \bar{Y})^2}}$$

X$_i$ and Y$_i$ represents the value of individual cases on the two variables, while $\bar{X}$ and $\bar{Y}$ represents the means of the two variables. When interpreting 'r' no universal rule of thumb exists. But within this thesis, variables with absolute values under 0,1 will be considered rejected as causes, as these do not even suggest a weak correlation (Andersen, et al., 2012, pp. 375-379).

Pearson's r is related to a common measure of how much of the variance of the dependent variable, the independent variable explains. This measure is called 'r^2', because Pearson's r squared gives this measure. 'r^2' is for other methods calculated as the explained variation divided by the total variation (Babbie, 1995, p. 422). For analyses using Pearson's r, the thesis will report the values of r and the associated p-value.

OLS Regression Model

But as mentioned Pearson's r only tests if there are correlation considering all other variables being equal, which cannot be assumed in this thesis. Therefore, it is necessary to include an analytical method, which controls for third variables.

'Ordinary Least Squares' (OLS) regression model is such a method. An OLS regression model is a model predicting the value of the dependent variable based on the values of independent variables, through an equation, which can be summarized as follows:

$$Cost\ Deviation = a + b_1 * x + b_2 * y\ (etc)$$

The values of the coefficients (b_x) are the values which produces the least squared distance from the predicted values of the dependent variable and the actual values in the dataset. The equation is based on the relationship between dependent and independent variables being linear, which corresponds to our hypothesized relationships (Agresti & Finlay, 1997a, p. 309). The equation behind each correlation coefficient is:

$$b = \frac{\sum(X_i - \bar{X})(Y_i - \bar{Y})}{\sum(X_i - \bar{X})^2}$$

The OLS regression analyses will consist of a set of OLS regression models, which increasingly introduce more variables on the right side of the equation. For each variable in the models, the coefficients, standard errors and p-values will be presented, while the r^2 of the models are also presented (Andersen, et al., 2012, pp. 388-391). Larger coefficients means stronger relationships; lower standard errors means greater precision; larger p-values mean greater risks of results being due to randomness. If the values of the independent variables' coefficients, standard errors or p-values change, when third variables are introduced, then these third variables affect the relationship between the independent variable and dependent variable.

4.4. Data

The data used in these statistical analyses are very important for the validity and reliability of the thesis. Reliability is achieved by making sure that the data would have the same values if another data collection was done, while validity is related to if the data is relevant to the theoretical framework. The reliability of the data will be addressed by presenting how the cases and values of each variable was chosen/found, while the presentation of each variable includes a discussion on the validity of using that variable to represent the theoretical cause.

Case selection

The thesis considers all TIPs receiving funds from the ADB as its population. The ADB provides a database of all sovereign projects they've financed since 2005. From this database a list of all closed transport projects were found (ADB, 2020c), which gave an initial population of 219[6].

Projects funded by the ADB undergo a thorough review process: First, project officers are required to complete a Project Completion Report (PCR) within 12-24 months after project completion. These are later desk reviewed by the Independent Evaluation Department (IED), producing a Project Validation Report (PVR), which assess the validity of the PCR by cross-referencing with other available information (ADB IED, 2016, pp. 2-4). Using the project database above, and the ADB's document database, reports on 101 projects, which contained land-based transport infrastructure construction as an output, were found. In addition to these projects, the author conducted search on the documents database using the search term 'Transport' and filtered the results to 'Evaluation Documents'. These were also reviewed to identify if the outputs, found under the Project Output section of the reports, included construction of land-based transport infrastructure. If so, then the projects were also included, leading to a total sample size of 182. The decision to select cases based on data availability is in line with the common approach in literature on TIPs, as data availability often proves to be the biggest obstacle for such research.

Three of the cases were later dropped, as these were international projects, which neither of our theoretical frameworks would adequately explain. Policy scores are per definition national measures, so using these for international projects would not be feasible. Likewise, strategic misrepresentation are based on the principal-agent framework, which does not include interaction between two actors at the same level. Therefore, the number of cases were reduced to 179. The cases and data on each case is available in Appendix 1, which contains the entire dataset used in the analyses.

Dependent Variable

As mentioned, cost deviations has been calculated in different ways in the literature reviewed. This thesis uses the difference between decision-to-fund and final project costs, because the reports themselves use this approach, rather than using later updated budgets. Furthermore, as argued by Flyvbjerg, et al. "Estimates made after the decision to build are by definition irrelevant to this decision" (2002, p. 281). If it is accepted, that the broader societal goal of this type of research, is to improve the budgets, that decision-makers use to decide which projects get build, then the budgets must be those, that these decision-makers use.

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[6] Filtering the 'Status' column to 'Closed'; excluding the 'Technical Assistance' and 'Loan | Private Sector Loan' category under 'Project Type and Modality'; filtering the 'Sector' column to 'Transport' and 'Transport | Water and other urban infrastructure and services'; filtering out 'Subsectors', which did not include 'Road transport' or 'Rail transport'.

Unlike some datasets, this dataset does not adjust for inflation, exchange rates etc. As ADB provides loans in US$, part of the budgeting risks are associated with changes in exchange rates. ADB budgets also include expected inflation into their projected costs (ADB IED, 2019, p. 5). So, if the budgets take this into account, then adjusting for inflation would make the variable less valid.

Another difference compared to some other research, is that cost deviations are calculated of total project costs and not just as construction costs. Some of the projects include non-construction elements, such as capacity building activities, which could affect cost deviations for those projects, as this is expected to be less difficult to make precise estimates for. The lack of adjustment follows the argument put forward by Lee, who argue that to properly assess the effectiveness of budgets, the planning costs and other preparatory costs must be included (Lee, 2008, p. 62). Additionally, not all reports included information on how much of the budget went to construction.

Cost deviation is reported in the dataset as a relative measure, 'Cost-Dev', which is calculated as:

$$Cost - Dev. = \frac{Actual\ Costs - Approved\ Costs}{Approved\ Costs} * 100$$

The data gathered to calculate this variable was collected from the PCR/PVRs under the Basic Data tables, where the approved project costs and the actual costs were provided.

Independent Variables

Policy and Institutional Ratings

The independent variable for *Hypothesis 1* must represent the quality of the policies and institutions of the country, which a project is constructed in. Before discussing the validity of the chosen independent variable, the Worldwide Governance Indicators (WGIs), discussions on the variables used in other research and why the WGIs was chosen is conducted. Following this discussion, the methodology of the WGIs will be presented and discussed.

As mentioned, the literature on the effect of policies/institutions use a wide array of different measures to test, if good policies or institutions lead to better outcomes. Isham and Kaufmann use four different policy indicators: Black market premiums; government fiscal deficit; pricing distortions in tradable goods; and real interest rates. They find that all four indexes are correlated with project economic rates of return, and that a combined measure is equally relevant (1999, pp. 157-159). Collier & Dollar also found, that individual policy-indicators had no significant effect outside of the effect measured by a collective policy assessment called the Country Policies and Institutions Assessment (CPIA) (Collier & Dollar, 2001, p. 1790). Therefore, and because the time needed to gather data on multiple indicators was not available, the decided to use a collective assessment.

Other collective assessments used in the literature were the International Country Risk Guide Rule of Law index, the Freedom House 'Freedom in the World' index (Dollar & Levin, 2005). Previous research have shown, that indicators of property rights/rule of law is particularly important for investment loans, compared to indicators of democracy and liberties (Dollar & Levin, 2005, pp. 3-5). Furthermore, the Freedom House index were found to be insignificant, when controlling for some project-level variables, and is therefore not chosen (Denzier, et al., 2013, p. 293). The other two assessments were unfortunately not plausible as variables in the thesis for different reasons. First, the Rule of Law index required a fee to be used, and secondly, the CPIA was only available from 2005 onwards, and did not include several countries, including China. Therefore, the author searched for alternative measures and considered, the ADB's internal Country Performance Assessment, different country credit ratings, and the WGIs. The Country Performance Assessment was also disregarded, because it only included information on some countries, excluding China, and from 2006 onwards. Credit ratings were not available to the author due to fees, so in the end the WGIs were chosen. Again, data availability severely influenced the choices of the author.

The WGIs consists of a series of six indicators of governance: Voice and Accountability; Political Stability and Absence of Violence/Terrorism; Government Effectiveness; Regulatory Quality; Rule of Law; and Control of Corruption. The data used to assign each country values on each of these six indicators come from 31 different sources within both civil society, the private sector and the public sector. The methodology to reach the scores can be summarized as follows: Data from the 31 sources is gathered and standardized into comparable units, which is used to construct an aggregated average score from -2,5 to +2,5 and a margin of error indicator. The aggregated average score is assumed to be subject to some uncertainty, reflected in the margin of error (Kaufmaan, et al., 2010).

Using so many different sources on the one hand limits the influence of each individual source's subjective assessments, but also makes it difficult to assess the reliability and validity of the WGIs, as these depend on the source data. The author did not have time to adequately discuss the reliability and validity of each individual source, but instead assume, that the authors of the WGIs, a senior fellow of the Brookings Institution and the World Bank Group's Chief Economist, have done their due diligence in assessing their sources.

The validity of the individual indicators can be discussed in relation to their definition vis-à-vis the theory on policies and institutions. As the theoretical arguments for policies and institutions as a cause focus on the predictability of economic forecasts, five of the dimensions are expected to affect this. Only the Voice and Accountability indicator could be left out, because countries with low degrees of liberty are not necessarily unable to provide stable economies. The similar Freedom in the World index was not significantly related to project outcomes in the research reviewed above, which supports this choice.

Political Stability and Absence of Violence/Terrorism capture the risk of destabilizing government overthrows and terrorism (Kaufmaan, et al., 2010, p. 4), both of which could significantly influence the costs of inputs, but it is expected that lower scores would only lead to cost overruns, unlike the theory, which also expects cost underruns to occur. Similarly, low degrees of government effectiveness is by definition linked to ineffective use of inputs, which would lead to cost overruns. Corruption is another indicator, which would only lead to cost overruns, as financial inputs would be directed for private gain, rather than the intended outputs (Kaufmaan, et al., 2010, p. 4).

The two last indicators, Rule of Law and Regulatory Quality are those most directly related to the theoretical arguments as they are aimed at the quality of contract enforcement, property rights etc. for the first, and the quality of economic policies and institutions (Kaufmaan, et al., 2010, p. 4).

Based on these discussions, two separate approaches can be taken: Only including Rule of Law and Regulatory Quality in order to accommodate the theoretical arguments as closely as possible. Or to create a different hypothesis, which takes into account, that the three other indicators would only lead to cost overruns for lower scores. In their discussion of the WGIs, the authors state, that the indicators are very positively correlated, i.e. if one indicator has a high score, there is a high chance other indicators are high (Kaufmaan, et al., 2010, p. 5). With this in mind, it might not be valid to analyze the impact of only two indicators. Therefore, the thesis will initially include all five indicators, which are expected to impact cost deviations of the projects.

Another important question is whether policy changes during project implementation affects cost deviations? The research on the effect of policies and institutions on project outcomes have shown that this is in fact the case (Isham & Kaufmann, 1999, pp. 169-170). This suggests, that in order to adequately test the relationship, aggregations of ratings over the project lifetime, should be used, rather than the rating at the decision to build.

The WGI Ratings are gathered from the World Bank's DataBank. Here it was possible to choose the 'World Governance Indicators' database, and then select all the countries in which the ADB has financed a TIP, under series all estimates except Voice and Accountability were selected, and every year with the series available was chosen under time. The data was then downloaded as an excel sheet (The World Bank, 2020). Using these data, each project was assigned the average WGI Rating of all the years from the project was signed until it was closed. The average score is reported in the 'WGI Ratings' column in the thesis' dataset.

WGI Ratings are not available for projects before 1996 reducing the number of projects with available WGI Ratings to 156. Because ratings from 1996 to 2002 are bi-annual, the first rating for projects started in uneven years will be of the year after the project started. In addition to an

aggregation of all five relevant indicators, a separate aggregation of only Regulatory Quality and Rule of Law is also reported under 'WGI Rating (RR)'.

Borrowers Share of Initial Capital Costs

The independent variable for borrowers share of initial capital costs is calculated using data from the PCRs and PVRs. These include data on both total approved project costs and the costs covered by the borrower, as envisioned at approval. Using these data, the independent variable for *Hypothesis 2* was calculated as follows:

$$Borrowers\ Share\ of\ Approved\ Costs = \frac{Borrowers\ Approved\ Costs}{Approved\ Costs} * 100$$

The data gathered to calculate the values of this variable comes from the PCR/PVRs, where the Basic Data tables includes a financing plan, in which it is stated how much the borrower should finance according to the approved budget. The variable can be found in the dataset under 'BS of App. Cost'.

So, the independent variable for *Hypothesis 2* is a measure of the percentage of the approved costs, that the borrower would pay. This is considered a relatively valid variable to test, if increasing the borrowers share of initial costs leads to smaller cost overruns. Although, it has to be noted, that this does not necessarily mean, that for every capital initially spend, the borrowers covers the exact same share. As such, there is still some uncertainty on the actual share of initial costs covered by the borrower.

A particular issue within this variable arises in seven of the projects in China: A substantial amount of the project costs are covered by local banks with strong ties to the government. As an example, one could look at the Southern Gansu - Roads Development Project. Here the Bank of Communications, where the Chinese state was the largest shareholder at project closing (Bank of Communications, 2015, p. 96), financed 712,6 million US$ (42,9 %) of the approved costs (ADB IED, 2019, p. 1). This could be considered as part of the Borrowers Share of Approved Costs, but in line with the reports the thesis will not do so. If more time had been available, an additional analysis with the alternative shares could have been made to check if this would significantly impact the thesis' findings.

Borrowers Share of Cost Overrun

The independent variable for borrowers share of cost overrun is also calculated using data from the PCRs and PVRs, in addition to the data presented above, the Basic Data tables includes data on how much of the actual costs are financed by the borrower. Here the calculation includes the data of both approved and actual costs as follows:

$$Borrowers\ Share\ of\ Cost\ Overrun = \frac{Borrowers\ Actual\ Costs - Borrowers\ Approved\ Costs}{Actual\ Costs - Approved\ Costs} * 100$$

So, the independent variable for *Hypothesis 3* is a measure of the deviation between the borrowers actual and approved costs, as a percentage of the deviation between the entire projects actual and approved costs. The variable can be found in the database under the column labeled 'BS of Cost Dev.'.

An important methodological consideration for the two latter is, that the strategic misrepresentation arguments does not explain cost underruns, and therefore, the cases, which incurred cost underruns cannot be used to test these explanations.

Third variables

The purpose of third variables are to minimize the risk of spurious findings in our analysis. Based on the literature review, a wide range of possible variables could intervene in our analysis. Below we will address the variables divided into country and project variables and discuss how and why they are or are not included in the analysis.

The first country-level variable, GDP-growth, is not included in the analysis, as GDP-growth was found to be the result of policies (Burnside & Dollar, 2000, p. 854). Introducing GDP-growth would therefore create invalid results in the OLS regression models.

Secondly, geography was found to be influential in both strands of literature. In this thesis, the variable accounting for geography will be the country in which the TIP is build. This could be found in the PCRs/PVRs in the Basic Data tables. Alternative measures could be either Odeck's subnational measure (2004, p. 46) or the measure of percentage of a country located in the tropics (Dalgaard, et al., 2004; Dollar & Levin, 2005). These were not possible to include in this thesis, as such operationalizations would take more time, than available. The variable is found in the column labelled 'Country' in the thesis' database.

The first project level variable from the literature review is project size. This is included into the OLS regression model, as no clear consensus have emerged on whether or not cost overruns/project outcomes are affected by project size. Project size is in this thesis operationalized as the approved costs, as found in the PCRs/PVRs, and can be found in the dataset under 'App. Costs'.

The second variable is implementation length, which is also included as there is general consensus that shorter projects are performing better (Nijkamp & Ubbels, 1999; Flyvbjerg, et al., 2004; Denzier, et al., 2013; Bulman, et al., 2017; Huo, et al., 2018). In this thesis, the implementation length is

calculated as the time between signing date[7] and approved closing date[8], both of which are found in the PCR/PVRs Basic Data table. Furthermore, this could be considered an operationalization of the difficulty in predicting the future, as was done in Nijkamp & Ubbels (1999). The variable is located in the 'Imp. Length' column in the dataset.

Related to implementation length, the variable of implementation delay from Bulman, et al. (2017) will also be used as a control variable. This is operationalized as the time between approved and actual closing date, which is also found in the PCR/PVRs, as a percentage of the approved implementation length above. The variable can be found in the column labelled 'Imp. Delay' in the dataset.

In relation to time between project approval and first financial disbursement and the 'problem project' dummy from Denzier, et al., the effects of these were relatively small and did not influence the relationship between policy ratings and project outcomes (2013, p. 297). Therefore, it was decided not to allocate the time needed to control for these variables.

The skill level of project officers has not been included in the dataset. Even though both Denzier, et al. (2013) and Bulman, et al. (2017) found that the track record of project officers had influence on cost outcomes, the variable they construct to measure project manager records are not possible to replicate in this thesis. This would require information on when the different project officers were responsible for the project, as both studies use how long project officers worked on the project (Bulman, et al., 2017, p. 350; Denzier, et al., 2013, p. 299). This information is not included in the validation reports, and the time dedicated to this thesis does not allow such information to be found. Furthermore, the measure would not be valid for measures of cost overruns, as these would occur at a specific time. The thesis would then have to assign the cost overrun to the project manager at this specific time of the project, which isn't possible from the information in the PCR/PVRs.

The research on TIPs did not find any relationships between either project types or the year in which a project began and cost overruns. Therefore, it is not expected, that these would be necessary to control. But in the assessment of whether projects were actual TIPs, the type of project would be identified, so this was included in the dataset under the 'Type' column as a dummy variable with rails valued 1 and roads valued 0. Similarly, the year the project began could be operationalized using the signing date, which can be found in the column labelled 'Signing Date'.

Regarding the other explanations proposed in the literature on TIPs, only scope changes would be controlled for, because this was the only explanation, which could be relatively validly

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[7] In some reports, this is called 'Date of Loan Agreement', while others use the term 'Signing Date'.
[8] Some reports include both a 'Loan Closing Date' and a 'Project Closing Date', if so, then 'Project Closing Date' is chosen.

operationalized. This means that the thesis does not include any variables to control for the effect of inadequate techniques and data in appraisals or for the effect of optimism bias.

The PCR/PVRs includes information on both the estimated outputs at appraisal and the actual outputs at project completion. These could be found under the Project Outputs section of the reports, as well as under the Effectiveness in Achieving Outcome/Output section. It was decided to use a nominal variable with three groups: Projects with increased outputs; projects with no changes in output; and projects with decreased outputs. This nominal operationalization was chosen because it was not possible to adequately assess the cost of a specific output increase/decrease, as prices per kilometer could vary significantly. A threshold of ±10% was used to determine if outputs had significantly changed.

Finally, the assumption that borrowers are willing to accept cost overruns even when the ADB only provides loans, and not grants, will be controlled using a 'Financing Mode' variable. The thesis can categorize projects as 'Loans', 'Grants' or 'Mixed', based on the 'Project Type or Modality' column in the projects database (ADB, 2020c). This could be controlled in greater detail by comparing the loan repayment schedules and the different borrowers' political timelines, for instance election terms for elected borrowers. But as payments were not expected to be finished before at minimum 30 years after project start, as mentioned in the theoretical argument for strategic misrepresentation, the author considered it reasonable to use a simpler variable, in order to save substantial time.

4.5. Methodology Summary

Through the methodological chapter it is argued, that the thesis will provide an objective, although incomplete, answer to the research question: Why do ADB TIPs have differing cost deviations?

It will answer this research question using a rationalistic approach aimed at rejecting or supporting the three proposed hypotheses and, through these, the two theories. It will do so through analyses of correlation between the operationalized dependent variable, Cost Deviation, and three independent variables: WGI Ratings; Borrowers Share of Approved Costs; and Borrowers Share of Cost Overrun. These analyses are based on a quantitative research design, where quantitative methods are used to analyze correlation between these variables on a large number of cases. These correlations will be controlled for the following third variables: Country; Approved Costs; Implementation Length; Implementation Delay; Project Type; Project Year; Output Changes; and Financing Mode.

5. Analysis

The purpose of the following chapter of this thesis is to analyze the degree of correlation between the three independent variables and the dependent variable in the data gathered using the methods presented in the previous chapter. Before this, the data will be presented in detail using univariate analyses. Following this presentation, the sample will be divided into sub-samples based on substantial differences due to one particular nominal third variable, country, which we are unable to account for in the OLS regression models. Afterwards, the thesis will analyze whether correlation exists between the three independent variables and cost deviations across different specifications in both Pearson's r analyses and OLS regression models.

5.1. Univariate Statistics

Before addressing the potential correlations between different variables, an overview of the four main variables addressed in this thesis is given to help the reader understand the data on which the analyses are done.
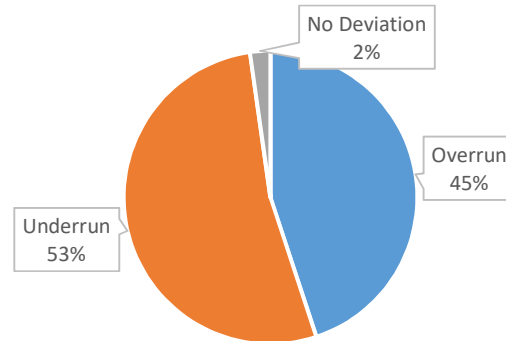
Cost Deviations

Based on the data gathering method presented in the previous chapter, it has been possible to create a dataset consisting of 179 different TIPs, which have received funding by the ADB. The projects had a mean cost overrun of 5,7% with a standard deviation of 34,4%-points. This provides substantial evidence, that there are large differences from project to project and therefore underlines the need to understand why such difference occurs. The highest cost overrun occurred under the Southern Transport Development Project in Sri Lanka, which suffered a cost overrun of 206,3%. At the opposite end of the spectrum, the West Bengal Corridor Development Project underran its budget with 58,6%.

The former of these have been removed from the dataset, as it was decided to remove outliers[9]. Outliers were defined as cases, whose value was more than one standard deviation higher or lower, than the neighboring case closer to the mean. For instance, the Southern Transport Development Project case was removed from the dataset, because there was a difference in the cost overrun of 83,1% or 2,4 standard deviations to the case with the second highest cost overrun. When using this definition, outliers are considered in relation to their distance from neighbors rather than to the mean/median, as some alternative methods (See McGraw, 2004). Using such a method would, for example, consider all cases with over 55% cost deviation as outliers, despite six projects being under one standard deviation from the last case within this limit. Therefore, the author decided to use the alternative definition of outliers.

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[9] Appendix 1 contains a list of the outliers for each of the dependent and independent variables.

After removing this outlier, the dataset contained 178 cases with a mean cost overrun of 4,53% and a standard deviation of 31,03%. Figure 2 presents the relative distribution of cost deviations divided into three categories: Overruns; No Deviation; and Underruns.

Figure 2: Distribution of Cost Deviations

Note: No Deviations defined as deviations between -0,5% and 0,5%.

What can be seen here, is that there is actually a slightly larger tendency for projects to underrun their budgets, than overrunning them. This suggests, that the ADB is better at preventing cost escalation, than the nationally funded projects analyzed in the literature reviewed above. These results are more in line with the results found in Gamez & Touran (2010), than Kelly, et al. (2015), which is not that surprising considering, that the former analyzed more cases and that WB projects are most likely more similar to ADB projects, than internal EU projects.

Independent Variables

Outliers in each of the three independent variables were removed individually according to the same definition as with the Cost Deviation variable. Table 2 provides a summary of the variables with the outliers removed.

Table 2: Summary of Independent Variables

Variable	Number of Cases	Mean Value	Standard Deviation
WGI Ratings	151	-0,6027	0,3229
BS. Of App. Costs	81	33,04%	20,57%
BS. Of Cost Dev.	73	63,00%	63,46%

Notes: BS. Of App. Costs (Borrowers Share of Approved Costs); BS. Of Cost Dev. (Borrowers Share of Cost Deviation)

For the WGI Ratings there were data on 156 cases, of which two cases were initially dropped because they were significant outliers (Values: -1,72 and -1,77). Following their removal, three

additional cases were removed. For both Borrowers Share of Approved Costs and Borrowers Share of Cost Deviation the number of cases were first reduced to cases with cost overruns, because, as argued in the theoretical chapter, strategic misrepresentation does not lead to cost underruns. This reduced the number of cases to 81 cases, with no outliers in the Borrowers Share of Approved Costs. Outliers in the Borrowers Share of Cost Deviation was found over three rounds, first removing two extreme outliers (3384% and − 865,35%), a second round removing four additional cases, while finally finding 2 two outlier cases.

In relation to WGI Ratings it is noteworthy, that all remaining cases have a WGI Rating between -0,0515 and -1,3227, so that the maximum variation is just 1,2712. This means that one standard deviation is equivalent to 25% of the maximum variation. As such, despite the relatively small total maximum variation within the variable, there is quite substantial variation from case to case.

Once data on the Borrowers Share of Cost Deviation was gathered, an important issue in relation to the validity of the variable was found. In 25 projects the borrower payed more, than the actual cost overruns, which suggests that the operationalization does not necessarily capture a borrowers share of the cost overrun isolated, but changes in the financing responsibilities irrespective of cost deviations. This is also reflected in 17 projects, where the borrower ended up paying more, despite the actual costs being below the appraised estimate and paying less in 12 projects, despite these projects overrunning their budgets.

Due to these empirical issues, it was decided to not use this operationalized variable as a test for Hypothesis 3. Therefore, no analyses are done in order to understand if differences in cost overruns are due to borrowers strategically misrepresenting estimated costs, because they do not stand to lose anything from such misrepresentation.

Following this presentation of the three independent variables and the dependent variable, the thesis will now move to analyze the differences in cost deviation caused by nominal third variables, before analyzing the correlation between the independent and dependent variables.

5.2. Nominal third variables

Because nominal third variables are not possible to include in the OLS regression models, they have to be controlled for before analyzing correlation, so that proper sub-samples can be identified. This was done to avoid the issue faced by Flyvbjerg et, al., who start by analyzing across project types, despite later finding, that this was invalid due to significant differences in project types (2003, p. 80).

The nominal third variables in this thesis are Country, Output Changes and Financing Mode. Of these, only country was found to have any significant effect on cost deviations, whereas both

Financing Mode and Output Changes had insignificant variation between groups. Therefore, this section only analyzes the effect of the country variable in detail.

The result in relation to Output Changes also means, that even though projects in countries with poor policies and institutions might be subject to more design changes, in terms of volume of outputs, this does not necessarily lead to larger cost deviations.

Country

Country is in this thesis understood as the country in which a specific project is being built. There are many possible explanations for why cost deviations might differ from country to country, which are not accounted for by other variables in this thesis. Furthermore, it is argued to be associated with both independent variables as well: WGIs are per definition dependent on country, while the share, which a borrower must pay is dependent on the borrower, as is discussed in the theoretical chapter, and the borrower is per definition associated with the country in which a project is built.

A total of 28 different countries have received funds for TIPs from the ADB. Table 3 presents the mean cost deviations, WGI Ratings and Borrowers Share of Approved Costs of countries, which have received funding for more than three TIPs[10].

Table 3: TIPs divided by country

Country	Total number of TIPs	Cost Deviation	WGI Rating	BS. Of App. Costs
Bangladesh	11	-21,36 % (17,18)	-1,0161 (0,0854)	-
Bhutan	3	8,89 % (2,45)	-[11]	24,53% (4,37%)
Cambodia	6	-3,46 % (12,05)	-0,7912 (0,0541)	6,33% (8,95%)
China	38	21,07% (29,48)	-0,3336 (0,0204)	53,62% (17,62%)
India	21	-5,28 % (21,89)	-0,4036 (0,0274)	27,07% (13,74%)
Indonesia	7	-2,21 % (17,80)	-0,7307 (0,1799)	24,67% (5,04%)
Kazakhstan	8	-21,87 % (18,98)	-0,4651 (0,0982)	-
Kyrgyz Republic	5	0,08% (18,60)	-0,8776 (0,0588)	20,71% (1,01%)

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[10] This threshold is based on Dollar and Levine (2005).
[11] Bhutan's WGI Ratings were all part of the outliers described above.

Continued Table 3 : TIPs divided by country

Lao PDR	8	11,90 % (16,47)	-0,8888 (0,1337)	15,36% (5,84%)
Mongolia	4	6,95 % (61,35)	-0,1712 (0,1037)	-
Nepal	8	4,96 % (19,23)	-0,9052 (0,0508)	23,20% (4,43%)
Pakistan	9	-20,27 % (18,41)	-1,0864 (0,0644)	-
Papua New Guinea	4	1,73 % (9,96)	-0,7613 (0,0413)	22,52% (12,63%)
Solomon Islands	4	43,44 % (50,03)	-0,5698 (0,1505)	2,90% (2,56%)
Sri Lanka	5	27,96 % (28,22)	-0,3290 (0,0393)	24,95% (4,60%)
Tajikistan	5	9,74 % (23,59)	-1,0993 (0,0396)	17,25% (9,62%)
Uzbekistan	6	-12,91 % (22,70)	-1,1507 (0,1405)	-
Viet Nam	9	-3,43 % (9,00)	-0,3160 (0,0536)	28,04% (4,23%)

Note: BS. Of App. Costs (Borrowers Share of Approved Costs); Standard deviations (%) in parentheses

ANOVA analyses on all three variables show that there are significant differences between countries. The highest p-value, i.e. the highest risk of the differences between countries being due to random chance, was for Cost Deviation with a p-value of $5,58*10^{-7}$. This provides significant evidence that there are substantial differences in the cost deviations from country to country.

This means that analyzing correlation on the entire dataset would produce invalid results. Instead, the analyzes will be structured around two different questions: Are the variance of cost deviation between countries explained by either WGI Ratings or Borrowers Share of Approved Costs; and are the variance of cost deviation within countries explained by either independent variable?

These two question will be answered separately. The first by analyzing the degree of correlation between country means of the dependent and independent variables, and the second by analyzing the degree of correlation within countries with similar means across all three variables.

5.3. Analyzing variance between countries

This section aims to answer why there are differences between countries' mean cost deviations, by using the means of the countries, which have received funding from the ADB for more than three projects. The section will be structured according to the research design presented in the

methodology, first using Pearson's r analyses on the independent variables separately and then using a series of OLS regression models to analyze the effects of third variables.

Policies and Institutions

As mentioned in the theoretical chapter, relatively worse policies and institutions can lead to both cost overruns and -underruns, as uncertainties can both lead to unexpected price increases and decreases. Therefore, the test of correlation between policies and institutions will use the absolute value of cost deviations, which reflects Hypothesis 1:

Hypothesis 1: Absolute Cost Deviations are negatively correlated with policy/institutional quality.

This should be reflected in a significant negative Pearson's r coefficient. This is not found in the first analysis using Pearson's r on the absolute means of cost deviations. The corresponding 'r' is 0,13 (p=0,62), which signals a small, but very unreliable, positive correlation. With this unexpected result, it was decided to conduct additional analyses at possible explanations of, why this could happen.

The first possible explanation for this unexpected result could, as already discussed in the methodological chapter, be the inclusion of Corruption, Political Stability and Absence of Violence/Terrorism, and the Government Effectiveness indicators. These indicators would all expect lower ratings to lead to cost deviations in a single direction, cost overruns. Including these could have decreased the validity of using the WGI Ratings. This could be addressed by removing the three from the ratings, but a Pearson's r analysis, shows that there is a strong correlation between the WGI Ratings including these three indicators, and when only using the Rule of Law and Regulatory Quality indicators (r=0,79; p = $5,71*10^{-31}$). This reduces the risk, that the results are changed by the inclusion of these three indicators, but that it is instead due to the relationship being one-directional.

Hypothesis 1(a) reflects the change, as bad policies and institutions are now expected to only increase the risk of cost overruns:

Hypothesis 1(a): Cost Deviations are negatively correlated with policy/institutional quality.

Calculating Pearson's r for the real value of country means did neither result in a negative coefficient. In fact, the coefficient turned even more positive (r=0,39; p=0,12), which suggests that there is a strong positive correlation between countries cost deviations and WGI Ratings.

It is not surprising, that there is a quite strong correlation between WGI Ratings and country means, as WGI rating is per definition correlated with country, but it is quite surprising, that the better a country's policies and institutions are, the more likely projects are to overrun their budgets.

This additional analysis provide an explanation for why there was such a small and unreliable correlation between absolute cost deviations and WGI Ratings. That the effect of policies and

institutions are one-directional and therefore only leads to correlation with the real values of cost deviations.

Borrowers Share of Approved Costs

The following section aims to analyze the correlation between the share of the approved costs, that borrowers are expected to finance and cost overruns. The theoretical arguments relating to strategic misrepresentation leads to an expectation, that borrowers who pay a higher share of the approved costs are less likely to have strategically misrepresented the expected costs. Hypothesis 2 reflects these arguments.

Hypothesis 2: Cost Overruns are negatively correlated with the borrowers share of initial capital costs.

There is some support for mean Borrowers Share of Approved Costs being correlated with the mean cost overrun of TIPs (r=-0,13). But it must be noted, that this correlation is very unreliable (p=0,61). As such, it is not possible to adequately assess, whether variation between countries are due to Borrowers Share of Approved Costs, at least when using Pearson's r. Instead, the thesis will move on to calculate OLS regression models based on the means of different countries.

OLS Regression Models

To further analyze the correlation between the means of the dependent and independent variables, a series of OLS regression models were created. The means of the countries were based only on projects, which weren't outliers in any of the three variables (n=68). The models can be found in Table 4.

Table 4: OLS regression models based on country means

	(1)	(2)	(3)	(4)	(5)	(6)
WGI Ratings	0,363** (0,204)	0,417* (0,242)	0,416* (0,252)	0,250 (0,347)	0,312 (0,347)	0,345 (0,303)
Borrowers Share of Approved Costs	-0,162 (0,418)	0,011 (0,577)	-0,001 (0,604)	0,363 (0,800)	0,546 (0,806)	1,005 (0,743)
Approved Costs	-	< -0,001 (< 0,001)	< -0,001 (< 0,001)	< -0,001 (< 0,001)	-0,001 (< 0,001)	-0,001* (0,001)
Implementation Length	-	-	-0,001 (0,004)	0,002 (0,006)	0,001 (0,006)	0,004 (0,005)
Implementation Delay	-	-	-	0,299 (0,419)	0,316 (0,414)	0,518 (0,376)
Project Type	-	-	-	-	3,506 (3,123)	4,119 (2,746)
Project Year	-	-	-	-	-	0,044** (0,023)
R²	0,20	0,21	0,22	0,25	0,34	0,56

Note: Each column represents one model (n=16). Standard error in parentheses.

** = p<0,10; * = p<0,15.

This table at first shows, that there is some correlation between WGI Ratings and cost deviations. This relationship is first substantially affected by implementation delays, where the coefficient falls slightly, but the associated p-value increases from 0,13 to 0,49. This despite Implementation Delay not having a reliable coefficient either. This suggests, that there is some interaction between Implementation Delay and WGI Ratings, which causes cost deviations. Similar changes happens once Project Type is introduced into the model, again there is a decline in the coefficient and a substantial increase of the p-value. This provides some evidence against WGI Ratings affecting cost deviations, despite there being a correlation without controlling for third variables. Throughout all these specifications, Borrowers Share of Approved Costs is so unreliable, with the lowest p-value being 0,66, that it is not considered a reflection of any actual relationship between this and Cost Deviation.

Finally, the introduction of Project Year significantly affects both independent variables, as both coefficients become significantly more reliable, although neither has a p-value below 0,15. In fact, in the final specification, only Implementation Length has a less reliable coefficient. Furthermore, both coefficients has large standard errors, which means that a standard deviation change in either could

lead to either increased or decreased cost deviation. For WGI Rating one standard deviation is 0,299, which would result in a change in cost deviation between -19,99% and 40,61%. As such, it can be concluded that the variation between countries is not the result of either independent variable.

5.4. Analyzing Variance Within Countries

In order to analyze why there were differences between cost deviations within countries, the author decided to use a sub-sample based on countries with no significant differences in their means on the three variables. These would be found using ANOVA analysis on the three variables, in order to identify countries where variance between them were most likely due to random chance. The author used a cautious threshold of p-values being above 0,75. There were no groups of countries, which did not have any significant differences in the means of at least one of the three variables. At least not on groups which included more cases, than using a sub-sample of projects constructed within China. Therefore, it was decided to analyze the variance within countries using a sub-sample of Chinese projects.

Policies and Institutions

As in the analysis on variance between countries, the first analysis of correlation between WGI Ratings and Cost Deviations used the absolute values of cost deviations. The results of the analysis on the Chinese sub-sample (n=35) provide more evidence against a negative correlation existing between the strength of a country's policies and institutions and their ability to prevent cost deviation. The Pearson's r coefficient is 0,14 (p=0,42), which again opposes the expectation that, there is negative correlation and the correlation is also very unreliable. Instead, the procedure from the analysis using country means will be used to test if there is a negative correlation between real values of cost deviations and WGI Ratings.

The corresponding r-coefficient becomes 0,09 (p=0,59), which provides evidence against the lack of correlation being due to using absolute values rather than real values. This leads the author to argue that, based on the Chines sample, WGI Ratings have no significant correlation with cost deviations.

These two analyses has provided substantial evidence against Hypothesis 1. The author would argue, that if Hypothesis 1 or 1a would have been true, a stronger correlation should have been found. With the correlation so small and unreliable, it is only reasonable to argue, that the quality of policies and institutions, as measured in the WGIs, does not affect cost deviations on its own. The final section of the analysis will be dedicated to analyzing whether there is any effect of the quality of policies and institution, when including additional variables in OLS regression models.

Borrowers Share of Approved Costs

The analysis of correlation between Borrowers Share of Approved Costs and Cost Deviations within countries will also be conducted on a sub-sample with the Chinese projects which had cost overruns (n=27).

The Chinese projects provides quite ambivalent evidence against Hypothesis 2, as there was a substantial negative correlation between the Borrowers Share of Approved Costs and the size of Cost Deviations. The corresponding r-coefficient was -0,22 suggesting a somewhat strong correlation. But the coefficient had a p-value of 0,27, which is considered a quite high risk of results being found even if the null hypothesis would be true.

As such, the analysis can only be considered cautious support for Hypothesis 2, as the coefficient is negative and somewhat strong, but unreliable. The more unreliable result in the Chinese sub-sample could, as discussed in the methodology, be the result of the smaller sample-size. Therefore, it would be preferable to find a larger sample of cases, where it would be valid to analyze the correlation between variables operationalizing borrowers share of initial costs and cost overruns.

OLS Regression Models

The last section of this analysis aims at understanding the influence of third variables on the relationships between cost deviation and the two independent variables. As shown in the previous section, there is almost no correlation between WGI Ratings and Cost Deviation, while there is some, albeit unreliable, correlation between Cost Deviation and Borrowers Share of Approved Costs.

The section will be structured around a set of OLS regression models using the sub-sample including only projects in China. The first model only included the two independent variables on the right-hand side of the equation. Thereafter, additional control variables will be introduced to analyze, whether the correlation coefficients of the two independent variables change significantly.

The set of OLS regression models is based on the Chinese sample, which was reduced from 38 to 26 because all underrun projects had to be removed for the analysis to be valid in relation to Hypothesis 2, while one additional case did not have available WGI Ratings. Table 5 below presents the models based on the Chinese sub-sample.

Table 5: OLS regression models based on Chinese sub-sample

	(1)	(2)	(3)	(4)	(5)	(6)
WGI Ratings	3,655 (3,093)	-1,329 (3,267)	-1,169 (2,942)	-0,603 (3,010)	-0,990 (3,403)	-5,574 (4,912)
Borrowers Share of Approved Costs	-0,480* (0,302)	-0,397 (0,268)	-0,699*** (0,270)	-0,659*** (0,274)	-0,662*** (0,281)	-0,548** (0,290)
Approved Costs	-	< 0,001** (< 0,001)	< 0,001 (< 0,001)	< 0,001 (< 0,001)	< 0,001 (< 0,001)	< 0,001 (< 0,001)
Implementation Length	-	-	0,016** (0,006)	0,018** (0,007)	0,018** (0,007)	0,017* (0,007)
Implementation Delay	-	-	-	0,179 (0,190)	0,171 (0,197)	0,207 (0,196)
Project Type	-	-	-	-	-0,033 (0,122)	(0,002) (0,124)
Project Year	-	-	-	-	-	0,031 (0,025)
R²	0,14	0,36	0,51	0,53	0,53	0,56

Note: Each column represents one model (n=26). Standard error in parentheses.

*** = p<0,05; ** = p<0,10; * = p<0,15.

The coefficient of the Borrowers Share of Approved Costs variable corresponds to the results from the Pearson's r analyses above, with a relatively large coefficient, which is relatively reliable (p=0,13). On the other hand, it is interesting that the coefficient of WGI Ratings are so high, considering the low degree of correlation in the Pearson's r analyses. This suggests that there was a substantial influence of the nine removed cases and supports that correlations between WGI Ratings and Cost Deviation are quite unreliable.

The strong positive coefficient for WGI Ratings in the first model change significantly as it goes from positive to negative in the second specification. Furthermore, introducing Approved Costs also increases the p-value of the WGI Ratings coefficient to 0,69. These two results are in line with the overall tendency for correlation between WGI Ratings and Cost Deviations to be very unreliable. Meanwhile, the effect of Borrowers Share of Approved Costs does not change in any significant way, with both the coefficient and p-value being relatively similar to the first model.

With the introduction of Implementation Length, the coefficient of Borrowers Share of Approved Costs moves from a coefficient of -0,397 (p= 0,15) to -0,699 (p= 0,02), while Approved Costs becomes unreliable (p=0,55). This change suggests, that the effect of Approved Costs is the result of some interaction between Borrowers Share of Approved Costs and Implementation Length. The introduction of Implementation Delay and Project Type do not affect the size of either coefficient significantly.

The final introduced variable, Project Year, significantly changes the coefficients of several other variables. It should be no surprise, that WGI Ratings change, as the source of variation in this variable, when looking at a single country is variation over time. But even with the increased coefficient, the effect is still quite unreliable (p=0,27). For Borrowers Share of Approved Costs there is a small change in the size of the coefficient, while the p-value increases from 0,02 to 0,07, still leading to the conclusion, that there is a positive effect of increasing the Borrowers Share of Approved Costs.

An unreported series of OLS regressions models including Chinese projects with cost underruns were included to control, whether this would change the relationship between WGI Ratings and Cost Deviations significantly. This was not the case, why these models are not included in the thesis.

6. Discussion

How does these analyses help provide informed answers to the research question? This will be the focal point of this chapter, first discussing the analytical results in relation to the two hypotheses. Afterwards, a broader discussion using the results of the OLS-models will be made in relation to identifying the variables with greatest effect on the size of cost deviations.

6.1. Policies and Institutions

The first discussion is to what extent Hypothesis 1, that cost deviations are negatively correlated with policy/institutional quality, is supported or rejected based on the analyses conducted above.

There is no substantial evidence to support the hypothesis, as the result closest to supporting it was the final specification in the OLS regression model based on the Chinese sub-sample. Here there was a strong negative correlation between WGI rating and cost deviation, but the correlation was associated with a p-value of 0,27. When considering the majority of results from the remaining analyses found positive correlation contrary to negative, the author considers it relatively certain to reject Hypothesis 1.

The relatively strong positive correlation between countries' mean WGI Ratings and cost deviations provide some evidence to support an alternative hypothesis, that cost deviations are positively correlated with policy/institutional quality. This should in future research be substantiated with analysis including other country-level variables, in order to control if the correlation is simply the result of correlation between country and WGI Rating.

One source of potential invalidity are the relative uncertainty associated with ratings such as the WGIs. As noted, in the methodological discussion of the variable, the aggregations are calculated along with margins of error, which could explain, why there are no effects of WGI Ratings, when comparing ratings across the same country, as in the Chinese case. Here the lowest and highest cases were both within each other's margins of error, -0,368(±0,189) and -0,283(±0,169) (The World Bank, 2020).[12] As such, the results from this particular sub-sample might be considered invalid, as there was no significant variation within the WGI Ratings.

Additionally, as discussed previously, there might be significant differences between the CPIA ratings, which was used in the research upon which the theoretical arguments were made, and the WGI ratings. This could with more time be tested on a sub-sample of the dataset, where scores are available for both ratings

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[12] Using the mean standard error series for the five indicators.

But even with these caveats in relation to using WGI Ratings as evidence against Hypothesis 1, the ratings are a useful indicator for the quality of governance, as understood by a wide range of public and private institutions. As such, the lack of correlation between WGI Ratings and Cost Deviations do provide data to argue, that there is no significant relationship between the quality of governance in general and cost deviations, and that the correlation is more likely to be positive, than negative. This suggests, that countries with good governance are slightly more likely to incur cost overruns, than countries with worse governance. This is quite a surprising result, which should spur additional research into if this result can be replicated using other cases and different measures of the quality of governance.

6.2. Borrowers Share of Approved Costs

The results of analyses related to Hypothesis 2 are more supportive, when it comes to explaining variance within countries. For variance between countries, none of the analyses provided any indication of correlation between Borrowers Share of Approved Costs and Cost Deviation.

Of the analyses explaining variance within countries, only two give rise to doubt the hypothesis: The Pearson's r analysis; and the second specification of the OLS regression model. Both of these analyses were associated with somewhat high p-values (0,27 and 0,15 respectively), which suggests that there is some uncertainty over the reliability of these results. But when considering the remaining evidence, which provides substantial support for Hypothesis 2, the author considers these uncertainties to be somewhat trivial, as more reliable results showed a similar correlation. Additional research is needed to understand if the relatively unreliable correlation in the variance between countries could be due to the lower number of cases in those analyses.

These analyses was, as far as the author is aware, the first statistical analysis using a variable, which is explicitly used as an operationalization of strategic misrepresentation. As such, more research is needed to support the theory enough to validate practical implications. Additional research could both replicate the attempt of this thesis to operationalize the effect of putting risk on agents in relation to initial capital costs and cost overruns. But furthermore, there needs to be research looking qualitatively at specific cases with cost overruns likely to have occurred due to strategic misrepresentation. Such research could help understand how and when the misrepresentation happens and identify proper ways of reducing them.

6.3. Third variables

The results of the OLS regression models produced in this thesis provides some additional evidence, which prompts some discussion of the third variables in relation to previous research.

First, the results provide additional evidence in the attempt of identifying significant causes of cost overruns in TIPs as summarized in Table 1. The thesis' results are in line with previous studies,

which have found that there are no significant effects of Project Type or Project Year on the size of cost overruns. Furthermore, Approved Costs was reliably correlated with Cost deviation in two specifications of the OLS regression models, while the remaining was not. As such, this might be seen as a validation of previous findings, which have been conflicting on the degree of correlation between project size and cost overruns. Considering the relatively strong and reliable correlation coefficient of Implementation Length, this thesis is in line with almost all previous studies. In relation to scope changes, the relatively simple operationalization used in this thesis did not result in differences in cost deviations between projects with reduced or increased project scopes. As such, this could either be interpreted as a counter-argument to the findings of previous research, or, in the view of the author, more likely, that such an operationalization does not capture scope changes adequately.

The lack of improvement over time has previously been understood as evidence against both optimism bias and technical explanations, but this type of inference is at best of limited validity, as it uses the same variable to represent multiple explanations. Therefore, this thesis' author do not consider the results of the analyses to infer any conclusions in relation to whether the differences in cost deviations can be explained by such theories.

Likewise, relative distribution in favor of cost overruns has previously been used as evidence against technical explanations, which would mean that the relative high proportion of cost underruns here provides evidence in favor of technical explanations. This type of argumentation, i.e. binary explanations, is not sufficient to adequately address the complexity of technical reasons for why cost deviations occur in TIPs. Therefore, the author of this thesis does not consider the tendency to underrun costs as evidence in favor of technical explanations.

As shown in the section on the influence of the country variable, there are significant differences from country to country, even within the same region. This makes it clear, that operationalizing location with region, as done in Flyvbjerg, et al. (2002; 2003), is not valid. But it does provide additional evidence for location being an important factor when analyzing cost deviations. Why and how country affects the size of cost deviations is a substantial question for future research, with one possible approach, which has received limited attention, is the effect of geo-political goals, as has been done in Lauridsen (2019).

The influence of country is also related to two of the latter articles on MDB project outcomes, which attempted to answer whether project level or country level variables have the strongest explanatory power (Denzier, et al., 2013; Bulman, et al., 2017). Both of these found, that the majority of differences in project outcomes comes from project level variables. Although no analyses were made in an attempt to address this question specifically, the ANOVA results suggest that a large portion of the variance is due to country level variables, as there were more variation between

countries (25,73%), than within countries (6,03%). This is not evidence contrary to the previous findings, as variance between countries mean cost deviations, could be the result of differences in their means of specific project level variables, as for instance with Approved Costs and Project Year in this thesis.

6.4. Why Do ADB Funded TIPs Have Differing Cost Deviations?

All of the above leads back to the research question, why do TIPs receiving funding from the ADB have differing cost deviations? In particular, are differences in ADB funded TIPs cost deviations the results of the institutions/policies of the country in which they are built and/or are they the result of strategic misrepresentation? The analyses and discussions above points to both some negative and positive answers to these questions.

First, the quality of countries policies and institutions is most unlikely to affect the sizes of cost deviations. This result prompts the question of whether this is because ADB budgets take these qualities into account. As discussed in the theoretical argument for why the quality of policies and institutions might affect cost deviations, there is a risk of a false negative if the ADB are adjusting budgets according to the quality of the country's policies and institutions, which would then hide a potential effect of these policies and institutions. If this is the case, then the results would indicate that the ADB overcompensates in their adjustments, as there is now indications of positive correlation. To adequately address this, future analyses could rely on different source data with information on such adjustments.

Secondly, the thesis has found evidence, which supports the theory, that TIPs overrun their projects, because budgets are strategically manipulated to attract funding. With significant empirical support for Hypothesis 2, the author would argue, that the only uncertainty of the results, is the discussion on how much is known about the share borrowers pay of budgeted costs at the time when estimates are made. As discussed in the theoretical chapter, there are some guidelines on how the share is found and general ranges, which can be known *ex-ante*. Future research could address both these issues, finding out when in the planning process borrowers share of budgeted costs are determined precisely vis-à-vis cost estimates, and by analyzing the correlation between actual borrowers share of budgeted costs and the ranges, which countries might anticipate this to be within.

These results should also prompt more in-depth theoretical discussions on why increasing the borrowers share of budgeted costs leads to smaller cost overruns, as other theories, than strategic misrepresentation, might lead to similar effects. One such theory could be, that cost overruns is not the result of improper appraisals, but rather that implementation is done ineffectively. If borrowers are covering a larger share of the budgeted costs, they would be more interested in implementation being as effective as possible, leading to smaller cost overruns.

The support for strategic misrepresentation comes with a strong caveat in its inability to explain why projects have negative cost deviations, i.e. that projects underrun their budgets. This is particularly important with the overall finding, that cost underruns are more common than overruns. As such, it is, from a practical point of view, more important to understand why cost underruns occur, rather than why there are differences in the size of cost overruns.

Despite the significant support for strategic misrepresentation, there is still a large gap in the academic understanding of why TIPs receiving MDB funding have relatively large cost deviations, in fact the OLS regression models in this thesis was only able to explain at most 56% of the variation. Future studies are needed, both to replicate the results of this thesis and to include additional explanations, such as lack of stakeholder involvement and the technical explanations proposed in the literature on TIPs in general. Finally, there remains a significant gap in understanding why cost deviations vary between countries.

7. Conclusion

This thesis has attempted to provide deeper understanding of the issue of cost deviations in MDB funded projects providing transport infrastructure in developing countries. The issue has received little academic attention, despite studies aimed at nationally funded TIPs providing substantial evidence, that budgets are often overrun to the detriment of long term planning. The primary aim of this thesis has been to provide initial understanding of the issue, both in relation to how precise budgets are and what could cause cost deviations in MDB funded TIPs. In particular it tried to answer the following research question:

Why do ADB funded TIPs have differing cost deviations?

The thesis used a sample of 178 projects receiving funding from the ADB in order to analyze the effect of two theories of why cost deviations occur: Country policies and institutions; and strategic misrepresentation. These two theories represent some of the most prominent theories behind why projects fail to live up to expectations, with the former being one of the dominant theories on explaining project outcomes in development research, while the latter has been developed specifically to understand cost overruns in TIPs.

The policies and institutions of countries had previously been used to explain differences in the outcomes of projects receiving funds from MDBs and was chosen to understand if causes of differences in outcomes, also caused differences in cost deviations. Policies and institutions were expected to affect the precision of budgets, because they affect how easy it is to predict prices of project inputs and the necessary outputs to meet project objectives. Previous research has suggested, that bad policies and institutions leads to more changes in project designs, which causes costs to

change. Furthermore, bad policies can lead to unexpected changes in prices due to market shortages or economic volatility. One particular important aspect of the theoretical arguments were, that these suggested that bad policies and institutions could both lead to cost over- and underruns, i.e. absolute cost deviations.

The thesis used a World Bank measure of policies and institutions called the Worldwide Governance Indicators, which is a set of indicators based on multiple sources to measure the quality of countries governance. This had not previously been used in research analyzing the relationship between project outcomes and policies and institutions, but the commonly used CPIA ratings were not adequately available to the author, leading to the choice of the WGIs. This did lead to some concern over the validity of these ratings in relation to the theory, although such concern did not fundamentally affect the expectation that better WGI Ratings would be correlated with cost deviations.

Strategic misrepresentation explains cost overruns in particular, as a result of perverse incentives in the organization of TIPs. Within the preparation of TIPs several actors in the process has incentives to underestimate costs in order to gain financially. In the context of this research, the degree of incentives for national/local governments to underestimate costs, was argued to be dependent on how much of the initial costs, they would pay themselves, as well as how much of potential cost overruns they would have to pay. While other factors, such as election cycles or degrees of transparency, could also influence the risk of strategic misrepresentation, these could not be included in this thesis, as it would require too much time to validly address such factors.

The thesis operationalized these explanations through the share of the approved costs, which the local/national borrower would pay according to the budget and through the share of the cost overrun, which they ended up paying. Based on the three different operationalizations, the thesis used different quantitative methods to analyze the degree of correlation between the three independent variables and the size of cost deviations. The latter of these turned out to be highly invalid, prompting the author to dismiss this operationalization and not analyze the correlation between this and cost overruns.

The first finding in the analysis was that projects had a mean cost deviation of 4,53%. This despite 53% of projects had cost underruns, meaning that the average cost overrun was larger, than the average cost underrun. That most projects were below budgets confirmed the findings of one previous study on cost deviations in MDB funded TIPs. Meanwhile, it also suggests that MDBs are better at preventing cost overruns, than national governments, where most research show, that a majority of projects overrun their budgets.

Secondly, the effect of three nominal variables, which could not be included in later OLS regression models, was analyzed. The only variable with significant effect on cost deviations, where a division of projects into the country, in which they were build. An ANOVA analysis provided significant evidence (p<0,001), that there are more variance between countries, than within countries. Properly analysis of why there are differences in cost deviations would therefore have to analyze the variance between and within countries separately. Furthermore, this seems to indicate that the answer to the research question is to some extent, that differences are due to differences between countries.

Therefore, analyses were done to see if the variation between countries were explained by either of the independent variables. These analyses investigated the degree of correlation between country means of the dependent and independent variables. A Pearson's r analysis showed, that there is a positive correlation between real values of cost deviation and WGI Ratings. This means that countries with high ratings have higher cost overruns, than countries with low ratings. This countered the theoretical expectation. First, because the correlation was not based on absolute values. Secondly, because better policies and institutions did not lead to more precise budgets, but less precise. Once controlled for third variables, it turned out that this correlation became quite unreliable, especially due to Implementation Delays and Project Year. Therefore, it was concluded, that variation between countries was not due to differences in policies and institutions.

For Borrowers Share of Approved Costs, there was no reliable correlation in any of the analyses, which meant that any effect of this variable on cost deviations had to be on variation within countries. Therefore, it was also concluded that variation between countries could not be explained by strategic misrepresentation. Instead, the OLS regression models suggested, that the variation could be related to differences in the size of projects and the year in which projects were started.

In order to discuss what caused variation within countries, the thesis analyzed the correlations between the dependent and independent variables on a sub-sample of Chinese projects. These analyses provided substantial evidence against the theory, that better policies and institutions would lead to either smaller cost deviations. The results of both the Pearson's r analysis and the OLS regression models provided strong evidence, that there were no effect of WGI Ratings inside this sub-sample. This means, that the only correlation found between WGI Ratings and Cost Deviations was the one found, when using country means, without controlling for third variables. Therefore, the author concluded, that differences in ADB TIPs cost deviations were not the result of policies and institutions, and as such this only provided a negative answer to the research question: Differences in cost deviations of ADB funded TIPs are not due to differences in policies and institutions.

Contrary, the analyses based on the Chinese projects found substantial support for the hypothesis that Cost Deviations are negatively correlated with Borrowers Share of Approved Costs. First, a Pearson's r analysis found a strong negative correlation (r=-0,22), which was substantiated by the ensuing OLS regression models, where Borrowers Share of Approved Costs had a coefficient of -0,548 (p=0,07) in the final specification. These strong results led the author to conclude, that differences in ADB TIPs cost deviations were partly explained by Borrowers Share of Approved Costs. Therefore, it can be concluded that ADB funded TIPs have differing cost deviations because borrowers strategically misrepresent expected costs.

In addition to this, there were some evidence that differences in ADB TIPs cost deviations within countries could be explained by Implementation Length, while the differences between countries could be explained by differences in projects sizes and the year in which they were started. But such evidence needs to be substantiated by adequate theories and testing to properly explain, why these would lead to differences only within and between countries respectively.

The results of the thesis has pointed towards a great deal of potential research agendas, which would further improve our understanding of why TIPs receiving funding from MDBs have cost deviations. First, there is a general need for additional analyses with similar methodologies in order to validate the results found in this thesis, as they are based on relatively small samples. Secondly, research using the strategic misrepresentation framework needs alternative approaches to analyze if different actors have different preferences and to analyze if increasing borrowers' share of cost overruns *ex ante* decreases the risk of overruns. Thirdly, researchers with access to more indicators of policies and institutions could greatly benefit from comparing results using different indicators. Fourthly, the author would suggest, that future research looks specifically at explanations of variation between countries, for instance, that competition between geo-political actors could affect the leniency of lenders, as suggested by Lauridsen (2019).

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