Selling to a government: improving the odds

Exploiting potential losses to build consensus in the public sector

Abstract

Companies that do business with the public sector must employ project acquisition strategies that are tailored to the sector. In this thesis, I explore one such situation. BearingPoint Caribbean aims to sell to governments in the Caribbean, tries to build consensus among different departments of a government to ensure project implementation. Using an adapted version of the Caillaud & Tirole (2007) model, I show that they are best off when they face two departments, of which the most favorable one carries a larger share of the potential project losses. In this situation, they can generate a persuasion cascade started by the most favorable member of the committee and thusly increasing the probability of project implementation. A strategic implication of this finding is that they should focus on approaching pairs of departments that fit this profile with their sales offer.

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1. Introduction

In the academic literature little attention has been given to project acquisition in the public sector, especially from the perspective of private companies that do business with governments. The analysis presented in this paper is a step in this direction.

As a company aiming to break through in the government sector of the Caribbean, BearingPoint Caribbean (BearingPoint) harnesses the talents of students to focus on this specific area, hoping to learn more about the functioning and decision-making within governments. BearingPoint is an IT and management consultancy firm, that provides software for government organizations. Their main focus areas are the tax and social security administration, and permitting and licensing. In this study, I focus on the sales process of the Multi Permit Solution, BearingPoint's administration system for permits and licenses. Due to the nature of this product, sales representatives have to entice cooperation from representatives of different departments in order to be able to sell the product to multiple departments at once. Thus, the central focus of this paper is on how to achieve cross-department cooperation in governmental organizations. The main research question at hand is:

"What parties should BearingPoint approach to efficiently maximize the probability that they will jointly agree to implementing the Multi Permit Solution?"

With a theoretical analysis some steps are taken towards a sales strategy that minimizes the cost and effort of sales representatives, while efficiently harnessing the influence of decision-makers in the targeted organizations. The theoretic framework for this work is based on the model set up by Caillaud & Tirole (2007) in their paper on consensus building in groups.

This paper contributes to, and builds upon, the literature on strategic information transmission, public sector decision-making and group persuasion. The main contribution that is made to this field is the conclusion that a sponsor approaching different governmental organizations with the objective of producing cross-department consensus can initiate a persuasion cascade, as described in Caillaud & Tirole (2007) in cases where it is unlikely that decision-makers will approve of the proposal without additional investigation. I show that in

these cases, a sponsor is best off when the committee-member that is a priori most likely to approve of the project, is also the one bearing the largest share of the potential loss. I also relate the distribution of total potential losses to the size of each department in particular: the larger department carries a larger share of the potential loss.

These findings hold interesting strategic implications for not only BearingPoint, but for any company that does business with governmental organizations: when given the opportunity, BearingPoint should identify those departments that are ideologically most aligned with their strategy, and then make sure that the department that is most aligned with them, also carries a larger share of the potential losses. Assuming that a larger department carries the larger share of the potential losses, I recommend that they pick a comparatively large, ideologically aligned department and a smaller department.

The construction of this paper is as follows: In the first section, the context surrounding the central question is elaborated upon. After that, I take a brief look at the current findings in the academic literature that are relevant to this research. The methodology section expands upon the research that was done, and on the application and necessary adaptation of the Caillaud & Tirole (2007) model. The model and analysis follow. The strategic implications for BearingPoint are discussed in the results section, and finally the conclusion follows.

2. Context

BearingPoint Caribbean is a management & IT consulting firm based in Curaçao, an island that is part of the Kingdom of the Netherlands. Due to the island's convenient location in the Caribbean basin, a lot of companies there look to expand their business to other Caribbean islands. BearingPoint offers guidance and support to organizations in the public sector. Their clients include tax offices, social security agencies and other governmental organizations. The services they provide can be sorted into two categories: consulting services and software development services. The vision of the company is that these services are not separate, but should rather be seen as complementary to one another.

By standardizing the software development process based on regional best practices and addressing issues specific to small-scale governments BearingPoint offers the governments in the region a cost-effective way to upgrade their administrative processes. In addition to this, BearingPoint consults governments in ways to optimize their functioning. The focus lies on providing straightforward, implementable advice.
Their vision when it comes to software development is that it is a tool to help governments perform better. They have four specific solutions; focused on the common issues that government markets face.

The four solutions that BearingPoint Caribbean sells are related to the main financial flows governments deal with. The solutions are:

- Multi tax solution (MTS): A tax administration system, with built in modules to handle several common tax types and modules for levying processes. Due to this system, a government has a much better grasp on the tax duties of its citizens, and they can increase their revenues by managing tax compliance and regulations easily.
- Multi benefit solution (MBS): A solution specifically for benefits administration, making it easier for administrators to handle things like unemployment benefits, social health insurance and the like. The focus of this system is to reduce fraud with fees and benefits by ensuring that only those that are entitled to government benefits receive those. Additionally, it helps social insurance offices keep track of the premiums paid and owed by citizens, a task that is often done manually.

- Multi collection solution (MCS): an additional module that can be attached to any of the existing systems to facilitate the collection of fees, taxes and premiums. It is specifically made to automate the collection of funds, to ensure quicker, more efficient collection.
- Multi permit solution (MPS): a system built to support the administration of licenses and permits. It can be used for any process that involves license applications, fees for licenses and complex approval procedures by multiple parties. This system has a variety of applications: the most obvious is for business license applications due to the complicated licensing processes in the region. Additionally, it can be used for the administration, application and granting of labor and immigration licenses.

The benefit of working with pre-built solutions is the lack of resources in the Caribbean market: after all, the governments there are of a much smaller scale than European governments. As such, to have a solution built tailored to their needs can be quite costly. Because of this, a lot of governments in the region deal with outdated software and cumbersome administrative processes. The buying cycles of these solutions are all complicated, often several years long.

When it comes to the sales progression, the multi permit solution seems to have the most difficult sales process of the 4 products. While other systems can be implemented at large organizations and have direct financial benefits, the multi permit solution is trickier to handle. Prior to the sale of the MBS, MCS, MTS it is straightforward to analyze the business case of system implementation, and to show that there are direct monetary benefits from system implementation. However, the return on investment of the MPS is not as straightforwardly defined. Whereas the other solutions have direct monetary returns, the benefits of the MPS are of an indirect nature. The returns of stimulating small and medium enterprises (SME's), more transparency and more stability are not easily measured in monetary terms. As such, decision-makers are more hesitant towards the purchase of this system.

These issues have led BearingPoint to search for ways to ease and speed up the sales process. Matters to take into account are the modular nature of the systems, the buying cycle that can take up several years, lengthy decision-making timelines in governments and the indiscrete nature of system returns.

One way to decrease the potential loss (in case of non-monetary returns only) of system implementation is to focus on department collaboration to sell the system to multiple departments at once. In doing so departments share the cost of the system, leading to individual lowers costs. This approach adds an extra degree of difficulty to the sale of the system though. With a buying cycle that is already years in length, BearingPoint cannot afford to prolong this cycle any longer with unnecessary negotiations and votes. This requires them to be creative in their market approach: to waste as few resources as possible while achieving cross-department (when possible, cross-country) co-operation.

This market approach can be expanded to cross-island cooperation in the Caribbean. Since a lot of islands in the region are (former) part of the British West Indies, laws and regulations in the islands remain similar. Thus, they can make use of economies of scale, to purchase systems that can be implemented in multiple islands, reducing costs while the benefits per island remain the same. It is up to BearingPoint to come up with the most efficient mechanism to approach potential buyers with, to ensure that they maximize the probability of project approval, while preserving as much resources as possible.

In this study, I look at BearingPoint's situation and use the model of Caillaud & Tirole (2007) to find out which departments BearingPoint should approach, and how it should distribute information across these departments to achieve cross-department cooperation.

3. Related literature

Literature on decision-making in the public sector, strategic information transmission and group persuasion was surveyed to draw preliminary conclusions on the research question at hand. A primary focus was sender/receiver models in order to capture the interaction between BearingPoint and their sales demographic.

Crawford & Sobel (1982) use a model of strategic communication between a sender *S* and a receiver *R*. The focus of their model is to argue that the sender will always transmit a noisy signal to the receiver, unless their preferences and/or incentives are perfectly aligned. The sender has information that is relevant to the receiver on a certain issue, and sends a possibly noisy signal to the receiver. They show that as the preferences of the sender and the receiver are more aligned, the sender becomes more honest towards the receiver. Their work inspired Seidmann and Winter (1997) to prove that in a model with verifiable messages, fully revealing equilibria do exist.

The case for advocates and representatives is argued by Dewatripont & Tirole (1999). They argue that burdening advocates with information collection, and letting them argue the case for a certain cause with decision-based rewards are better at achieving the organizational goals of the principal. Additionally, they consider how advocates transfer information about their cause: An advocate is eager to reveal information supporting his cause, and will always destroy information opposing it, in the event that he finds it. A rational agent will never exert effort and disclose any opposing information, as that requires for his reward being equal for situations in which he learns nothing and situations in which he has positive evidence. In that case a rational agent will never exert the effort of collecting information at all. This loss of information is one of the costs of the advocacy system. However, increasing the integrity of decision-making mitigates this cost, as an abusive decision will entice a strong reaction from the opposing party. They conclude their paper by stating that unless rewards are provided by the decision-maker (or someone whose goals are aligned with the decision-maker's), she has a reputation for being fair or inertia is very expensive, it is sub-optimal to have a non-partial agent for information collection.

Myerson (1983) studies a situation in which a principal that holds private information designs a mechanism in order to influence subordinates to make a Pareto-optimal decision. In the paper, the principal controls all communication channels, so that private communication is not possible, and none of the subordinates can influence the mechanism design. This assumption entails that no information about one individual's type is revealed. The difficulty of bargaining with incomplete information is addressed by studying only problems in which a principal has full bargaining power: think of a hierarchic situation. The paper explores a number of solution concepts for the mechanism design of the principal, and explores the feasibility and stability of each. It finally arrives at the conditions for a neutral optimum mechanism: an incentive compatible mechanism that cannot be blocked by further constraining the equilibria in the earlier solution concepts.

A step closer to decision-making in the public sector is the study by Visser & Swank (2007). They study a committee that votes on projects on behalf of the public while keeping their own reputational concerns in mind. They show that committee members with reputational concerns want to form a unified front; will implement some projects even if status quo is preferable or vise versa; and might distort information to reach a favorable decision. In situations where information cannot be manipulated, the unanimity-voting rule protects the public from distortions caused by reputational concerns. If information can be manipulated the voting rule must offset the negative distortions caused. If there are no reputational concerns, the voting rule doesn't matter. The situation in their paper is of more resemblance to the public sector, due to the payoff structure of the committee members and the fact that they are making a decision on behalf of 'the public'. However, in their model there is no sponsor focusing on persuasion.

Differences in public and private sector decision-making were explored by Nutt (2006). While private sector decision-makers tend to make decisions based on analysis, public sector decision-makers tend to place more value on internal bargaining. It seems that public sector officials understand the limitations of analysis, and thus do not place much emphasis on this in the decision-making process. Additionally, public sector decision-makers tend to discount the risk associated with their decisions, and thus may engage in dangerous behavior. In these cases, it is best for them to not only rely on internal bargaining but to consult external networks.

With the information presented above, a research direction is established for this paper. In the following section, this is discussed. Additionally, the work and findings of Caillaud & Tirole (2007) is presented in section 5.

4. Methodology

Two main hypotheses follow from the research question proposed in the previous sections:

"It is possible for BearingPoint Caribbean to maximize the probability of collaboration among departments by distributing project information in a strategic manner."

And

"The sizes of the departments that BearingPoint Caribbean approaches have an influence on the probability of project implementation."

To test these hypotheses, a theoretic analysis is done, building upon the work of Caillaud & Tirole (2007). The terminology used in this paper, is also largely borrowed from their work. An adapted version of their model is applied to the situation at hand to find an answer to the main question, and to test the hypotheses. A slight adaptation to their model is made, to capture the incentive structure in the public sector. In this section their findings are highlighted, and the necessary adaptation to the model is discussed.

4.1 Model Selection

The model in Caillaud & Tirole (2007) was selected based on a couple of criteria. First and foremost, its key focus on persuasion strategies of sponsor was especially well suited to the context at hand. After all, the focus on the sponsor's optimization problem is key, as we focus on the optimization problem of BearingPoint. Secondly, the mechanism design approach enables the researcher to focus on the optimization problem of the sponsor, given that each decision-maker evaluates his or her own expected pay-off. Lastly, the cost of investigation each decision-maker must incur in order to have reliable estimate of their pay-off is also highly relevant in the situation at hand.

4.2 Model findings

Theirs is a sender (S) / multi-receiver (R_i) communication game, that captures the interactions between the project sponsor and a committee of decision-makers. The focus of their model is to find a sponsor's optimal mechanism to maximize the probability of project approval. They take a mechanism design approach to the analysis and show that the sender, a sponsor *S,* should distill information selectively to key members of the committee, in order to generate a persuasion cascade: a situation where one committee-members' verdict on the project entices the other decision-maker to approve of the project without further investigation. In an N-member committee with $N > 2$, the key member in the group, is the member that is most aligned (externally congruent) with the sponsor, while being credible enough within the group so that his judgment is still trustworthy. An increase in external congruence can hurt the sponsor, as this might imply a loss of credibility of said group member. The more internally congruent a group is, the easier it is for the sponsor to generate this persuasion cascade: after all, the higher the internal congruence, the more information the judgment of a fellow committee member contains. It is shown that adding veto powers benefits the sponsor as it increases the probability of approval, and that if the sponsor can benefit from creating ambiguity, while the model is robust when the sponsor is not able to control communication channels.

4.3 Necessary adaptation to the model

The context to which this model is applied in this research requires a different structure of payoffs. As mentioned in the previous section, the clients that BearingPoint Caribbean targets are governmental non-profit organizations in small Caribbean islands. Representatives of these organizations tend to display the following characteristics[1]:

- A lack of technical knowledge about the subject at hand, with a workforce that is also likely lacking in skill and knowledge about the project;
- Their organizations do not expect a direct quantitative benefit from project implementation;
- However, the cost of the project is to be carried by the departments, and directly comes out of their allotted budget.

[1] These characteristics follow from conversations with management and sales-representatives at BearingPoint

Caillaud and Tirole assume that a committee member receives an individual pay-off (a gain or a loss, $r_i \in \{G, -L\}$) when a proposal is approved, and when a proposal is rejected everyone in the model receives 0. While r_i does not directly affect the sponsor's decision making, it enters the model by affecting the expected utility of the committee members. However, the characteristics described above give reason to expect a different structure of gains and losses in the model. A slight change is made to the pay-off structure: $r_i \in \{G, -L_i\}$). With this change losses become member-specific, while gains remain the same across the committee. The reasoning behind this is as follows:

- As previously stated, the product BearingPoint wants to sell, the MPS, does not yield a concrete, financial benefit. Its benefits consist of indirect financial gains through easier business procedures and qualitative benefits relating to public perception and authority. These benefits are independent of organizational size and stature. As such, the gains G are assumed to be roughly equal across organizations.
- However, the financial burden of the system is the most prominent component of the potential loss L. As such, L is member specific, as the distribution of the cost of the system plays a role in the expected utility of each committee member.

Given this reasoning, it is justified to structure the pay-offs as discussed above. By making L member-specific, this model is a better fit for our research question and context.

5. Basic Caillaud-Tirole setup

Consider a two-person committee of public officials (R_1, R_2) that must decide over the proposal a sponsor (S) delivers. The sponsor aims to maximize the probability (Q) of his project being implemented, yielding benefit $s>0$ to S. To solve the sponsor's maximization problem, we adopt a mechanism design approach, granting the sponsor the possibility to 'draw the game' that R_1 and R_2 will play.

The public officials each have an organizational agenda and goals that they aim to fulfill, and the proposal that the sponsor delivers may or may not contribute to the goals of one or both of the public officials. Since this is a two-person committee, both the K=N and the K<N-majority rules boil down to the same thing: both committee members must approve of the project before it can be implemented. Once they receive the proposal, the public officials have a look at it and make an estimate on their expected utility from the project that was proposed: the extent to which the project proposal helps them fulfill their agendas, denoted by r_i, $r_i \in \{-L_i, G\}$. Their benefits are unknown prior to the proposal being handed in, and it is up to the sponsor to decide whether or not he believes r_i is $-L_i$ or G. It is up to the public officials as decision-makers to decide whether they'll investigate the proposal any further if the sponsor gives them the opportunity to do so. If he doesn't ask or if the public officials don't want to, they can individually rubberstamp the proposal (accept it without further investigation) or reject it, yielding 0.

$p=\Pr\{R_i=G_i\}$ is the a priori belief of the decision-makers that they stand to gain from the project. Additionally, it measures the congruence each decision-maker has with the sponsor: the extent to which their preferences are aligned[2]. For BearingPoint this can mean whether or not the decision-maker is in their network, and whether or not the organization has an e-government strategy in place. p is not affected by the actual value of G or L. However, the actual values of G and L do impact the values of the member-specific decision-making thresholds of the committee members; thus the sponsor (if possible) can manipulate these values to maximize the probability of his project being implemented.

[2] Possible lobbying efforts are not within the scope of this paper.

The expected utility of the public official plays a key role in our analysis: When the sponsor delivers his additional information, it depends on the expected utility of the official whether or not they'll accept it. The information the sponsor can provide contains hard information about the value of r_i but deducing this value from the report provided demands an investment of the public official, a cost denoted by c. Hence, when his expected utility is negative due to c he will never investigate the proposal: why would a public official invest time and effort to learn more about a project that is not at all in line with her agenda and goals?

5.1 Decision-making thresholds

The expected utility of the public official if she accepts the project without investigating any further to ensure her pay off is denoted by:

$$u^r(p_i) = p_i G - (1 - p_i)L \tag{1}$$

If she investigates the true value of r_i and accepts the project, her expected utility is:

$$u^I(p_i) = p_i G - c \tag{2}$$

If she decides to reject the project, her utility remains 0. With the information provided above, we can find the location of the thresholds at which R_1 and R_2 are willing to investigate. First of all, the project must not be so far off from the public official's political agenda that she will never want to invest c to learn the exact value of r_i. Hence, her expected utility from investigating and approving the project must exceed that of rejecting the project without further investigation:

$$u^I(p_i) \geq 0 \Leftrightarrow p_i \geq p_- \equiv \frac{c}{G} \tag{3}$$

Thus, we can conclude that if $p_i < p_-$ R_i will never investigate the project as her prior belief dictates that project is unlikely to contribute to her electoral agenda. The sponsor may very well provide her with additional information about the project, but he will not be able to induce her to take a closer look at the project.

When the public official prefers rubberstamping to rejecting without investigation, the sponsor knows that she is a priori positive towards the project.

Her prior must exceed:

$$u^R(p_i) \geq 0 \Leftrightarrow p_i \geq p_0 \equiv \frac{L}{G+L} \quad (4)$$

The sponsor prefers to have a committee member rubberstamp the project, rather than investigate the project any further. For her to do this, the following inequality must hold:

$$u^R(p_i) \geq u^I(p_i) \Leftrightarrow p_i \geq p_+ \equiv 1 - \frac{c}{L} \quad (5)$$

These thresholds play a central role in our analysis. The visual interpretation of these thresholds, and the corresponding terminology is depicted in Figure 1.

A mechanism design approach is taken to solve the sponsor's optimization problem.

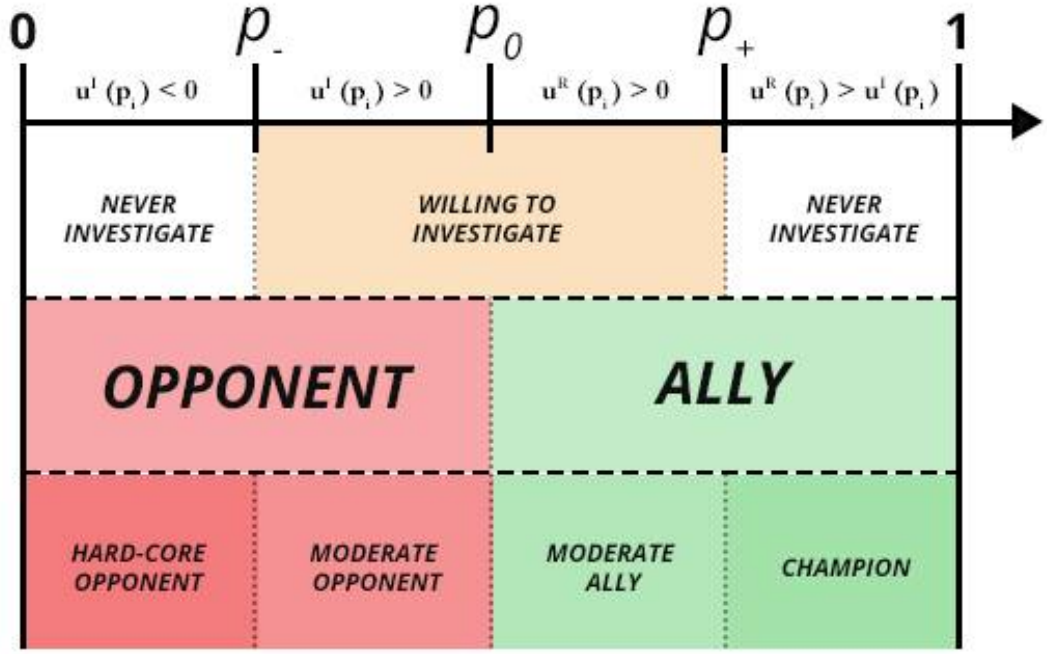

FIGURE 1: Thresholds and terminology of decision-makers

5.2 Optimal mechanism design by the sponsor

We label the committee members so that R_1 is more of a proponent of the project than R_2, so that $p_1 \geq p_2$. Let $P \equiv Pr\{r_1 = r_2 = G\}$ be the joint probability of both committee members benefiting from the project. The Bayesian update of the prior of r_i given the other member's benefiting from the project is:

$$\hat{p}_i \equiv Pr\{r_I = G | r_j = G\} = P/p_j \quad (6)$$

There are three constraints that help us restrict the area of optimal mechanisms for the sponsor[3]:

- Incentive constraints: I consider only those mechanisms where the member complies with S's request to investigate, and where the member subsequently truthfully reports her findings. These thresholds are dictated by equations 3, 4 and 5;
- Individual rationality: I consider only those mechanisms where the committee members can rationally expect a non-negative return from project implementation.
- Measurability: I consider only those mechanisms where only the information that is available to the committee members can affect their decision to investigate, and subsequently, implementation decision.

Given these constraints, there are 4 different mechanisms that the sponsor can implement and there is a distinct pecking order over them. His favorite mechanism is to ask both committee members to rubberstamp, as $Q = 1$. His following choice is to have only R_1 investigate, while R_2 rubberstamps yielding $Q = p_1$. The third preferred mechanism is to have R_2 investigate and R_1 rubberstamp, with $Q = p_2$. His last choice is to have both committee members investigate, with $Q = P$.[4] The external congruence of the committee (the prior probabilities p_i, that the members' benefits coincide with that of the sponsor), and the internal congruence (the posteriors $\hat{p}_i$, whether the benefits of the committee members are aligned with each other) is quite influential in these cases.

The most interesting set of cases are those where the no-investigation mechanism is unfeasible: where at least one member is not an ally and at least one member is not a hard-core opponent, and we follow down *S*'s pecking order in each case.

First of all, if R_1 is a champion and R_2 is a mellow opponent, *S* is forced to let R_2 investigate, since R_1 will always choose to rubberstamp. As such, $Q = p_2$. If R_2 is a hard-core opponent, there is no way to have the project approved.

In the non-trivial case, where $p_- \leq p_1 \leq p_+$ and $p_2 < p_0$ we can move down *S*'s pecking order. If player 2's posterior turns out to be such that $\hat{p}_2 \geq p_0$, it is optimal to let the most favorable member investigate and the project is implemented with $Q = p_1$. If $\hat{p}_2 < p_0$ and $\hat{p}_1 \geq p_0$ it is

[3] A more extensive explanation of measurability and individual rationality constraints is relegated to Appendix 1.

[4] Incentive compatible mechanisms are dictated by equations 3,4 and 5. An extension is necessary for mechanisms with two investigations, depicted in Appendix 2.

optimal to let the least favorable member investigate and decide. However, if the least favorable member is a hard-core opponent, the project is never implemented. If $\hat{p}_i < p_0$ for both committee members and $P \geq p_-$, it is optimal to let both members investigate. These mechanisms all rely on persuasion cascades: that a committee member sees that if another member is better off due to the project, she can also benefit from it and thus be inclined to give her approval without investigation, as she will update her beliefs due to the other member's reaction.

The analysis in section 7 focuses on showcasing whether the sponsor prefers to face a committee with a variance in their potential losses or a committee where the losses are the same for all members. We keep to the notation where $p_1 > p_2$ in these cases.

5.3 Internal Congruence

After a member investigates the proposal, the other committee members can update their beliefs based on the probability that the benefit of the project holds for them, too.

For committee members to infer the value a project holds to them from knowing the value it holds for other committee members, they must know the extent to which their preferences are aligned. This is referred to as the internal congruence of the committee. $P \equiv \Pr\{r_I = G | r_i = G\}$ denotes the joint probability that both members expect to benefit from the project. In the case of a two-member committee, with $p_1 > p_2$, P is given by:

$$P = p_2[\rho + (1-\rho)p_1] \tag{7}$$

As a committee member observes the outcome of investigation of another member, he updates his belief about whether the project will also result in a gain for him according to: $\hat{p}_i = P/p_j$, leading to:

$$\hat{p}_1 = \rho + (1-\rho)p_1$$

$$\hat{p}_2 = \frac{p_2[\rho + (1-\rho)p_1]}{p_1} \tag{8}$$

The variable $\rho \in [0,1]$ captures the probability that the committee members' preferences are nested: that what is good for R_2 is necessarily also good for R_1. The equations indicate for each committee member R_i the amount of information that the judgment of their fellow committee R_j holds for them, given the value of ρ. The variable ρ denotes the probability of the committee members' preferences being nested. When ρ is 1, it does not mean that their preferences are perfectly correlated, but rather that they are perfectly nested. In this case, $\hat{p}_1 = 1$ and $\hat{p}_2 = \frac{p_1}{p_2}$. A higher value of ρ is good news for the sponsor: the higher ρ is, the more likely that R_i will be willing to rubberstamp based on the judgment of R_j. In Figure 2, the sponsor's optimal mechanism is depicted in the nested case, where $\rho = 1$.

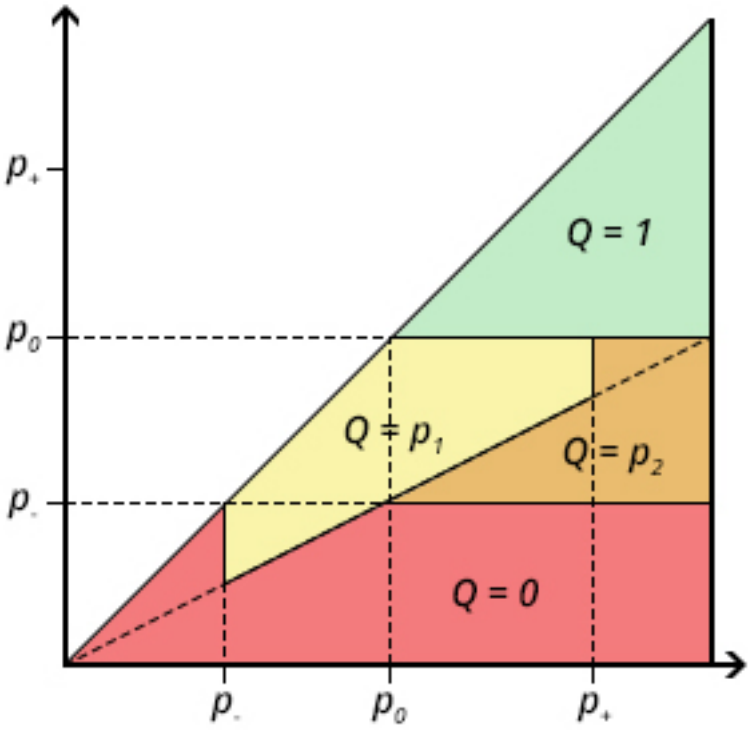

FIGURE 2: Example of optimal mechanism: $\boldsymbol{\rho = 1}$

The posteriors in equations (7) and (8) play a key role in the sponsor's analysis of the optimal mechanism he can employ. In committees with high internal congruence, the sponsor will find it easier to arrange a persuasion cascade, e.g. ask one committee member to investigate, and have him then communicate his finding to the others, inducing them to rubberstamp. In committees with less internal congruence this becomes harder to achieve, as committee members cannot rely on the correlation of their benefits to influence their decisions.

6. Analysis

The main research question at hand is "What parties should BearingPoint approach to efficiently maximize the probability that they will jointly agree to implementing the Multi Permit Solution?" I focus on the non-trivial case where the sponsor of the project can initiate a persuasion cascade, where $p_+ > p_1 > p_-$ and $p_2 < p_0$. This focus is justified by the ease of the situation in any other case: either it is possible to have both committee members rubberstamp, or the project cannot be implemented.

I make the following assumptions to tailor the analysis to the problem at hand. Firstly, given that cost of a project does not increase proportionally when two departments, assuming that each department contributes one committee member to the decision-making committee, decide to co-operate on a project, the cost L is divided between the two departments. In this research it is assumed that a larger department will carry a larger share of L. Secondly, when examining the thresholds p_-, p_0 and p_+, a larger interval means that it's more likely for the committee member's p to be within that interval.
In line with the model adaptation in section 5.3, the gains G remain constant and equal for each decision-maker.

In what follows I first examine the reference case, where $L_1 = L_2$, with corresponding diagrams to examine how the member-specific thresholds relate to each other. After the reference case, I show how changes in L affect the thresholds at hand. Once this is clear, potential changes to L are examined for the non-trivial case.

6.1 Reference case: $L_1=L_2=L$

Visually, the thresholds of the committee members are symmetric, as depicted in the diagram below.

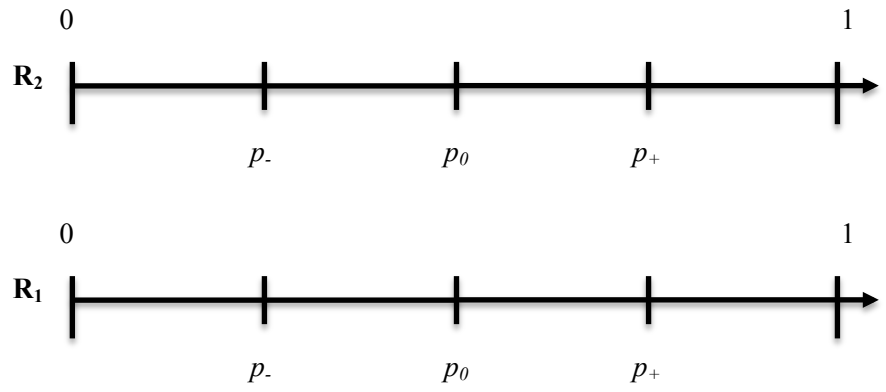

DIAGRAM 1: Decision-making thresholds in the case of Caillaud & Tirole (2007)

The pecking order of the sponsor remains the same, as this case is identical to that in Caillaud & Tirole (2007). Firstly, the sponsor prefers the no-investigation mechanism: where $p_i>p_0$ and $Q=1$. The second-preferred mechanism is the mechanism where R_1 investigates, yielding $Q=p_1$. The third mechanism is where R_2 investigates, yielding $Q=p_2$. The last preferred mechanism is the sequential investigation mechanism, yielding $Q=P$.

In the non-trivial case where $p_- \leq p_1 \leq p_+$ and $p_2<p_0$ for the sponsor is to:

- If $\hat{p}_2 \geq p_0$ it is optimal to let the most favorable member investigate and the project is implemented with $Q = p_1$.
- If $\hat{p}_2 < p_0$ and $\hat{p}_1 \geq p_0$ it is optimal to let the least favorable member investigate and decide. However, if the least favorable member is a hard-core opponent, the project is never implemented.
- If $\hat{p}_i < p_0$ for both committee members, it is optimal to let both members investigate, and Q=P.

Given that both G and L are equal, the p_-, p_0 and p_+ are the same for both decision-makers. This analysis focuses on finding out whether or not a sponsor can exploit differences between L_1 and L_2 to increase the likelihood of project implementation in the non-trivial case. The

likelihood of project implementation is increased by maximizing the distance between the thresholds at which $Q = p_1$ is more likely.

6.2 Changes in L

In what directions do the decision-making thresholds move as L changes? For both committee members, as L approaches infinity in p_0:

$$\lim_{L\to\infty} \frac{L}{G+L} = 1 \tag{9}$$

And as L approaches infinity in p+:

$$\lim_{L\to\infty} 1 - \frac{c}{L} = 1 \tag{10}$$

As L increases, p_0 and p_+ approach 1, so consequently as the potential losses of the sponsor increase it becomes less likely that a decision-maker will be an ally. As such, having a project implemented becomes more and more difficult, until only opponents remain. Keeping this in mind, the following analyses focus on the redistribution of L and on possible manipulations of L through markups and discounts.

6.2.1 Redistributing losses: reducing L1 and increasing L2

A sponsor might think that reducing the potential loss of the most favorable member in the committee, R_1 might increase the chance of project implementation as p_0 and p_+ move towards 0. But is that really the case?

In diagram 2 is the visual representation of a committee where L, which can now be described as the total loss the two members may end up bearing, is redistributed across both committee members with member 1 being favored, resulting in $L_1 < L_2$:

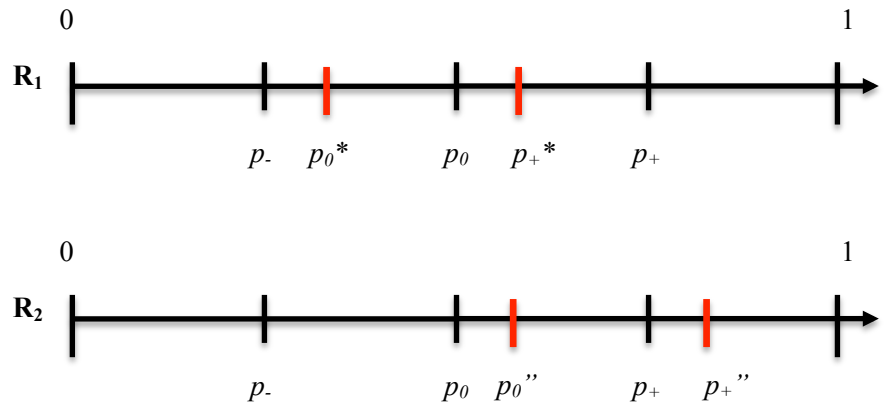

DIAGRAM 2: Redistributed losses where $L_1 < L_2$

Because of the redistribution of L the decision-making thresholds become member-specific. The pecking order of the sponsor with the new thresholds in place, compared to the reference case indicates the following. Firstly, in this case the probability of the no-investigation mechanism is reduced: after all given that $p_1 > p_2$, if R_1 is only willing to rubberstamp after a decrease in her potential loss moves p_0 towards, R_2 remains unwilling to rubberstamp. However, as was stated before, the focus in this analysis remains on the non-trivial case where the no-investigation mechanism is not feasible. As we continue to move down the pecking order: a decrease in L_1 reduces the likelihood that R_1 is willing to investigate the project. After all, if p_+ moves towards 0, R_1 may become a champion for the project, and hence she will not be able to send a credible signal to R_2. Furthermore, as p_0 moves towards p_0" for R_2, it becomes less likely that R_2 will want to rubberstamp based on the findings of R_1. Thus, this increases the likelihood that the investigation must be conducted by R_2, increasing the chance that the probability of project implementation will go from $Q=p_1$ to $Q=p_2$.

While at first surprising, the intuition for these findings is quite straightforward: by reducing the potential loss of the most favorable committee member, she is less inclined to take the project seriously and carefully consider it. By reducing her risk, the sponsor has made her

signal unreliable for R_2. Furthermore, R_2 is made even more ambivalent towards a project that was initially not in line with his preferences.

We thus have:

Proposition 1: Let L be the total loss that both committee members may end up bearing from accepting the project. Redistributing this loss in favor of member 1 leads to a *lower* probability of adoption of the project in case member 1 is asked to investigate the project.

6.2.2 Redistributing losses: increasing L1 and reducing L2

Now what happens if L_1 is increased? As L increases, p_0 and p_+ approach 1, and the remainder of the losses are allocated to R_2. Below is the visual representation of this case (Diagram 3):

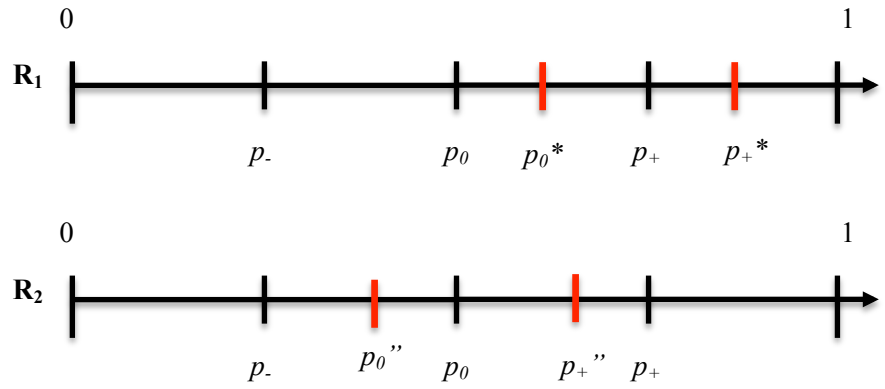

DIAGRAM 3: Redistributed losses where $L_1 > L_2$

Again we focus on the non-trivial case:

- the increase in L_1 makes it less likely that R_1 is a champion for the project. As such, increasing the potential loss of the most favorable member increases the potential of a mechanism where R_1 investigates, given of course, that $\hat{p}_2 \geq p_0"$. As $p_0"$ approaches 0, this becomes a very likely situation.
- If $\hat{p}_2 < p_0"$ it is optimal to let R_2 investigate, yielding $Q=p_2$. However, as for R_1 p_0 moves to p_0*, this option may become less appealing.
- Lastly, the sequential investigation mechanism remains the same.

As such, by redistributing L so that the most favorable committee member carries the bulk of the potential loss, the sponsor increases the likelihood that in the non-trivial case, the investigation will be conducted by the most favorable member, yielding $Q=p_1$. The intuition behind these findings is that as the potential loss of the most favorable player increases, the sponsor forces her to investigate the project. The implication for the sponsor is as follows: if he knows that R_2 is not particularly favorable towards the project $(p_2 < p_0)$ he may have the best results if he increases the potential loss of R_1.

We thus have**:**

Proposition 2**:** Let L be the total loss that both committee members may end up bearing from accepting the project. Redistributing this loss in favor of member 2 leads to a *higher* probability of adoption of the project in case member 1 is asked to investigate the project.

6.3 Redistributing losses: Further analysis

As mentioned before, we have seen that a sponsor is able to increase the probability of project implementation to $Q=p_1$ by redistributing the total losses in such a way that R_1, the most favorable committee member, carries a larger share of the losses. This is done by exploiting the fact that having R_2 carry a proportionally smaller share of L will lead to a lower member-specific p_0 for that committee-member. In this section I examine how a sponsor can achieve this. Let $(1-\alpha)$ be the share of L that is attributed to R_1 and α the share of L that is attributed to R_2. In the baseline case, described by Caillaud & Tirole (2007), $\alpha = ½$, yielding $L_1=L_2$. Recalling proposition 3 in their paper: In a committee with an opponent and a moderate ($p_- \leq p_1 \leq p_+$ *and* $p_2<p_0$) R_1 will investigate and R_2 will rubberstamp when $\hat{p}_2 \geq p_o$, yielding $Q=p_1$ and R_2 will investigate when $\hat{p}_2 < p_o$ and $\hat{p}_1 \geq p_o$, yielding $Q=p_2$.

Consider a sponsor that is facing a committee with $\alpha = ½$ and where $\hat{p}_2 < p_o$ and $\hat{p}_1 \geq p_o$, yielding $Q=p_2$. Firstly, let's assume that R_1 is a moderate ally, meaning that $p_0<p_1<p+$ and that R_2 is a moderate opponent $p_-<p_2<p_0$. Secondly, we assume that there is no internal dissonance in the committee, so that is $\hat{p}_1 \geq p_1$. Then, the main constraint that needs to be satisfied for R_2 is $\hat{p}_2 \geq p_o$, which can be rewritten as:

$$\frac{p_2[\rho + (1-\rho)p_1]}{p_1} \geq \frac{\alpha L}{G + \alpha L} \tag{11}$$

$$\alpha < \frac{G\dfrac{p_2[\rho + (1-\rho)p_1]}{p_1}}{L\left(1 - \dfrac{p_2[\rho + (1-\rho)p_1]}{p_1}\right)} = \frac{G}{L}\left(\frac{p_1}{p_1 - p_1p_2 - p_2\rho + p_1p_2\rho} - 1\right) \tag{12}$$

And we thus have:

Proposition 3: There is an upper bound on the share of the potential loss L the sponsor can impose on the least favorable committee member R_2 if the sponsor wishes that R_2 will rubberstamp member 1's recommendation.

I assume that the sponsor can only control α. Looking back at equation 12, we know that in the case of Caillaud & Tirole (2007) α = ½. When α = ½ and the sponsor is in a situation where R_2 is unwilling to rubberstamp, the condition in (12) is violated. When the sponsor can only influence α, he will have to reduce α in order to satisfy this condition again. As such, it is shown that the sponsor can increase the probability of project implementation to $Q=p_1$ by reducing α.

By how much should the sponsor reduce α? Firstly, the value of α in Caillaud & Tirole (2007) is α = ½. Equation 12 dictates the upper bound of α, so that α must be reduced until it satisfies this condition. Thus, if the sponsor is looking to for the value with which he should reduce α, it is straightforward to conclude that the sponsor should reduce α with:

$$\Delta\alpha = \frac{1}{2} - \frac{G\hat{p}_2}{L(1-\hat{p}_2)} \tag{13}$$

Technically, one might argue that the sponsor is best off reducing α to 0. However, p_- is not affected by L and α, so that this lower bound on R_2's willingness to investigate and rubberstamp remains in place at $\frac{c}{G}$.

6.3.1 Internal congruence

The degree of internal congruence of the decision-makers Q. Rewriting the constraint posed in equation (11), shows that for an investigation to be conducted by R_1 instead of R_2:

$$\rho \geq \frac{\frac{p_1}{p_2}\alpha L - p_1(G+\alpha L)}{(1-p_1)(G+\alpha L)} \tag{14}$$

Equation (16) shows that there is a minimal value of ρ that is necessary in order to have R_1 conduct the investigation. If this condition is not satisfied, investigation by R_1 will not persuade R_2 to rubberstamp.

6.4 Markups and discounts on project costs

From the analysis presented above, some conclusions can be drawn. First and foremost: in the non-trivial case where $p_- < p_1 < p_+$ and $p_2 < p_0$ the sponsor is best off when he faces a committee with a high L_1 and low L_2. This will increase the likelihood of the mechanism where R_1 investigates, yielding $Q = p_1$. A natural extension of this line of reasoning is to find out whether the sponsor then is better of imposing a premium on the most favorable committee member rather than a redistribution of the cost.

Visually, and in line with the previous diagrams, member specific thresholds for this case are in Diagram 4:

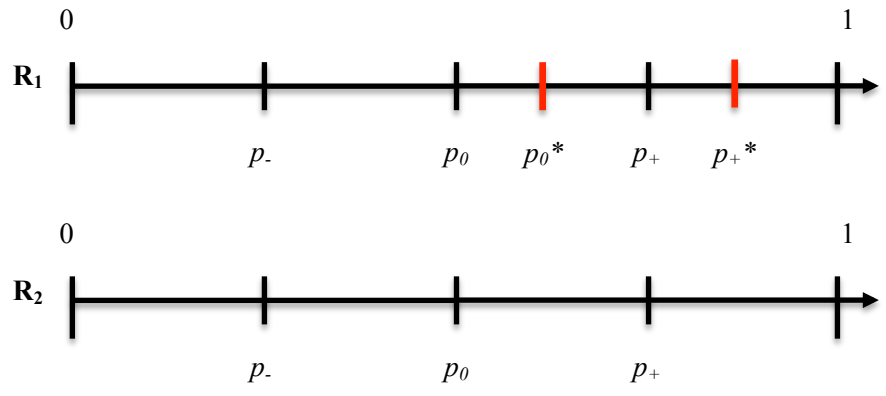

DIAGRAM 4: Markup on L_1

Moving down the sponsor's pecking order, we can see that in the same fashion as for $L_1>L_2$ with redistributed losses, the probability of the no-investigation mechanism is reduced. However, in contrast to $L_1>L_2$ with redistributed losses, the one-investigation mechanism based on investigation by L_1 is not as likely. When p_+ moves towards p_+* it is more likely that R_1 is willing to investigate, but this mechanism is not as likely, since the p_0 remains at the same level for R_2. Investigation by R_2 may also become less appealing as for R_1 p_0 moves to p_0*. Lastly, the sequential investigation mechanism remains the same.

What if instead of a markup on R_1 the sponsor gives a discount on R_2? This is visualized in Diagram 5. Once again we analyze the non-trivial case. The no-investigation mechanism is more likely, as R_2 may be willing to rubberstamp after the discount. When this is not the case, investigation by R_1 is as likely as in the basic case where $L_1 = L_2$, as p_+ remains the same. However, R_2 becomes more likely to rubberstamp based on R_1's findings, making this a better option that the basic case, but a worse option than a cost redistribution. When it comes to investigation by R_2, this has no real impact on the sponsor, as a discount will not change p_- for R_2.

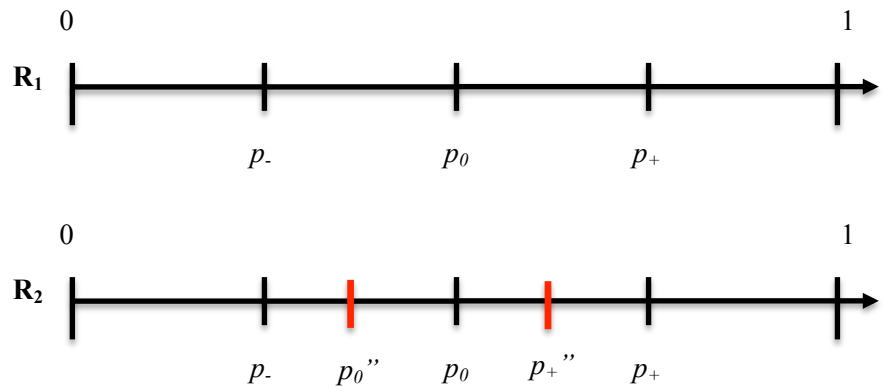

DIAGRAM 5: Discount for L_2

Thus given the analysis above, it seems that a redistribution of project cost is more beneficial to the sponsor, as it is more likely to yield $Q=p_1$ than a markup on the most favorable committee member[5]. A discount for the least favorable member is preferable to the basic case, but is not preferable to a redistribution of project costs.

[5] Unsurprisingly, adding a markup to the least favorable committee member's price hurts the sponsor by making it more likely that he or she is an opponent to the project, thus having to resort to either investigation by R_2 or the sequential investigation mechanism. Conversely, giving a discount to the most favorable committee member may turn them into a champion, potentially hurting the sponsor.

6.5 The allocation of G

Throughout the analysis above, we assume that the allocation of G is equal across committee members. The intuition for this is lies in the nature of the benefits of BearingPoint Caribbean's product: a product that has benefits that are not easily measured. In this section, I let go of that assumption and briefly examine the effects of unequally allocated gains, where both departments split G, leading to $G>G_1>G_2$ or $G>G_2>G_1$.

Firstly, the effect of changes in the potential gains of the project is examined. As G approaches infinity in p_-:

$$\lim_{G\to\infty} \frac{c}{G} = 0 \tag{15}$$

And in p_0:

$$\lim_{G\to\infty} \frac{L}{G+L} = 0 \tag{16}$$

Intuitively, this means that as the potential benefit of the committee-member increases, it becomes easier for the sponsor to have is project implemented, as given a large enough value of G, opponents cease to exist. The larger G becomes, the less likely it is that the sponsor will need to ask a committee member to investigate, and thus the optimal mechanism for the sponsor is to never ask a committee member to investigate and the project is implemented with $Q=1$.

6.5.1 Unequal allocation of G

As $G_1 > G_2$ it becomes more likely that R_1 willing to investigate R_2. While R_1 is not any more likely to be a champion for the project, due to the disproportionate allocation of G, they are more likely to be willing to investigate the project. However, by reducing G for R_2, he is less likely to be willing to rubberstamp based on R_1's findings as p_0 increases. Investigation by R_2 is also less likely, as p_- becomes larger. The converse holds for $G_2 > G_1$. As such, redistribution of G without increasing or decreasing L will negatively impact the probability of project implementation because it makes the mechanism where $Q=p_1$ unfeasible, and the sponsor is to conform with $Q=p_2$ or $Q=P$ depending on the degree of internal congruence of the committee.

7. Results

From the analysis presented above, the most surprising conclusion that can be drawn in the non-trivial case is that BearingPoint Caribbean is best off when they face a committee of two members where the most externally aligned member (with the highest p) is also the one with the higher potential loss (L). The strategic implications of this and other findings for BearingPoint Caribbean in discussed in this section. The non-trivial case can be interpreted as a situation in which initially one department in interested in the project, and another is opposed to the project.

When looking at different departments to do business with, when given the choice it is optimal to look for a larger department that is aligned with their own objectives and a smaller department that is less favorable (though not entirely unfavorable). Given that the assumption that a large department carries a larger share of the potential losses, the intuition behind this finding is that by ensuring that the department that is most favorable towards the sponsor has more to lose, they will be forced to consider the proposal carefully. This means that their judgment will in turn hold more information for their fellow committee member, who will then be able to rely on the investigation of committee member one to rubberstamp the proposal. As the small, least favorable department has to carry a smaller share of the project losses, it becomes more likely that they are willing to rubberstamp the proposal. As such, when given the opportunity, BearingPoint should identify those departments that are ideologically most aligned with their strategy, and then make sure that the department that is most aligned with them, is also carries a larger share of the potential losses. Ideally, they should pick a large department and small department to approach. The analysis suggests that BearingPoint stands to gain more from approaching one larger and one smaller organization, than it does when it approach two departments of equal size. In the following section I review some additional strategic implications of these results.

7.1 Asymmetric bargaining power

A large department is likely to have more bargaining power than a small one: can they use this to pressure the sponsor into making the proposal more favorable to them? Given the nature of the decision-making process in this research (where the sponsor decides on who to

ask to investigate his proposal, investigation occurs by the asked member, and the members simultaneously vote on the project) each committee member has equal veto powers. As such, any attempt of the larger department to influence project characteristics, will be offset by the equal veto-powers of the decision-makers.

7.2 More resources available to a large department

A large department may have more resources available, to the point that the increased potential losses are not substantial enough to be taken seriously by the decision-maker. Following the reasoning of Caillaud & Tirole (2007) it is evident that a rational agent will take any non-negative outcome over a potentially negative one. As such, the asymmetric allocation of potential loss is used as an instrument to make a champion into a useful ally for the sponsor.

Additionally, BearingPoint may be best off to only focus on one organization if the potential loss L from the project is negligible to them.

7.3 Bureaucracy in large organizations

Bureaucracy often plagues decision-making in large organizations. This may make committees slow functioning and prone to the status-quo bias. This can be interpreted as a larger organization with a higher cost of investigation. This may negatively impact the probability of project approval[6]. The strategic implication of this reality is that BearingPoint should focus on delivering their information in a clear and concise manner to offset this increase in cost.

7.4 Committees consisting of external members

In public sector acquisition projects, it is common to appoint a committee member of an external organization to conduct the necessary investigation into the proposal. These can be consultants, or public officials with knowledge and experience that is relevant to the topic of the proposal. However, when in the role of a decision-maker on behalf of the organization, it is up to the committee member to take on the role of an internal official. As such, they rely on the strategic goals and ideologies of the organization and not on their own. This point is

[6] As c increases, p- moves towards 1 potentially turning a mellow opponent into a hard-core opponent.

strengthened by Dewatripont & Tirole (1999). Strategically, this means that BearingPoint Caribbean should select departments based on the extent to which their strategic objectives are aligned with those of BearingPoint, as to not rely on network advantages.

7.5 Internal Congruence

In line with Caillaud & Tirole (2007), an increase in internal congruence benefits BearingPoint. As such, approaching departments with similar goals and strategies increase the likelihood of project implementation. Again, BearingPoint can take a look at indicators such as similarities in targets, business processes and even management structure.

8. Conclusion

Any sponsor that deals with the public sector and is tasked with ensuring that a specific proposal is accepted must distribute the information available to him in a strategic fashion. This paper took a look at the situation of a firm selling a product that requires co-operation across departments, and builds upon the work of Caillaud & Tirole (2007) to take a step in the direction of a strategic sales strategy that produces consensus among different departments of governments.

The main hypotheses in this paper were:

"It is possible for BearingPoint Caribbean to maximize the probability of collaboration among departments by distributing project information in a strategic manner."

And

"The sizes of the departments that BearingPoint Caribbean approaches have an influence on the probability of project implementation."

Based on the analysis presented in this paper, and on the assumptions made regarding firm size and cost distribution, both of these hypotheses are accepted. My main finding is that when given the opportunity, BearingPoint should identify those departments that are ideologically most aligned with their strategy, and then make sure that the department that is most aligned with them, is also carries a larger share of the potential losses. Typically, a larger department will carry a larger share of the project-costs. Ideally, they should pick a large department and small department to approach, and to redistribute the cost of the project between the two departments. Simply marking up the price of the larger departments or giving a smaller department a discount, does not have the same effects as a cost redistribution.

While the framing of this piece centers on the questions and needs of one particular organization, it is easy to imagine a variety of different applications for these findings. Other applications of these findings may include politicians working in legislature that must accrue

votes from representatives of different political parties for a proposed bill, or committees that vote on procurement proposals. Further extensions of this research may look into decision-making when 3 or more departments and/or organizations are involved. Additionally, it is interesting to apply this model to consensus building among political figures, and to take voter preferences into account.

9. Appendix

Appendix 1: Measurability and Individual Rationality

Firstly, the definition of the measurability constraint in our case is that the sponsor will plan each action he will take in each state of nature, without actually observing the state of nature. As such, the action of the sponsor cannot depend on information that is unknown to the sponsor.

In our case:

Possible statures of nature $\omega \in \Omega$: $\omega_0 \equiv (-L_1, -L_2), \omega_1 = (G, -L_2), \omega_2 = (-L_1, G),\ \omega_3 = (G, G)$.

Probabilities of occurrence: $\pi(\omega_h), h \in \{0,1,2,3\}$.

Outcomes (list of investigating members *I* and the decision *d* that follows): *(I,d)*, $I \in 2^{\{1,2\}}$ and $d \in \{0,1\}$

The definition of the individual rationality constraint in our context is that the sponsor will only ask a committee-member to investigate when she will rationally want to do so (her expected utility exceeds the cost of investigation) and if said investigation affects the outcome of the sponsor.

Appendix 2: Sequential and simultaneous investigation mechanisms

Incentive constraints for sequential investigation mechanisms, given that P is the probability that both committee members benefit from the project, are:

$u^I(P) \geq \max\{p_j u^R(\hat{p}^i), 0\} \Leftrightarrow\ P\ \geq\ p_-\ and\ p_j - P\ \geq 1 -\ p_+$;

$$u^I(p_j)\ \geq \max\{p_j u^R(\hat{p}^j), 0\} \Leftrightarrow\ p_- \leq \hat{p}_j \leq p_+$$

Incentive constraints for the simultaneous investigation mechanism:

$$u^I(P) \geq \max\{p_i u^R(\hat{p}_j), 0\} \Leftrightarrow\ P\ \geq\ p_-\ and\ p_i - P\ \geq 1 -\ p_+$$

With $P \geq p_-$ implying

$$\hat{p}_j \geq\ p_-\ and$$

$$p_i - P \geq 1 - p_+ \Leftrightarrow\ \hat{p}_j \leq 1 - \frac{1 - p_+}{p_i} =\ p_+ - (1 - p_+)\frac{(1 - p_i)}{p_i} < p_+$$

So that if the simultaneous investigation mechanism is incentive compatible, so is the sequential investigation mechanism.

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