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**Government, Not-For-Profit and For-Profit Sectors
in Canadian International Aid**

by

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A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of

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Abstract

This thesis examines the relationship between the Canadian International Development Agency (CIDA) and its for-profit and not-for-profit executing agencies. The thesis first examines the evolution of CIDA's use of these two sectors for delivering assistance to developing countries, and their relative roles as executing agencies. The study then considers the theoretical implications of opening up the contract auctioning process to both sectors after having originally used this mechanism primarily as a venue for the for-profit sector firms. Finally, the thesis examines whether there is any apparent preference towards one sector over the other in the allocation of auctioned projects between the two sectors, and what the source of any bias might be.

The research required the construction of two original data sets to examine the empirical dimensions of these questions. The analysis indicates that while the two sectors are relatively balanced in their roles as executing agencies, each has sought to protect their program areas from intrusion by the other. The allocation of duties seems to show a preference for allocating difficult-to-monitor projects to not-for-profits through uncompetitive contribution agreements, with easier-to-monitor projects being allocated mostly by auction to for-profit firms. An examination of auction theory highlights the welfare implications to CIDA from opening up the auction to both sectors, and identifies the conditions under which not-for-profit firms might be successful in these auctions. Finally, an empirical examination of the project auction outcomes indicates that there is an apparent bias on the part of CIDA towards not-for-profit organizations, and that this preference seems to be general and not related to project type.

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List of Acronyms

ACAN	Advanced Contract Award Notice
CA	Contribution Agreement
CDF	Cumulative Distribution Function
CIDA	Canadian International Development Agency
FP	For Profit
MERX	Electronic Tendering Service
NFP	Not For Profit
NGO	Non Governmental Organization
ODA	Official Development Assistance

Chapter 1: Introduction

Development assistance competes with many other expenditure priorities in the budget of the Canadian government, and in other donor countries as well. One means of securing funding for development assistance is to ensure its effective delivery, thereby raising the ratio of benefits to costs. As in many other important areas of government expenditure, such as in health and education, the government relies on numerous delivery mechanisms to try and provide public services efficiently. Governments supply some of the services themselves, of course, but in other instances they rely on for-profit firms or not-for-profit institutions to manage publicly funded endeavours. This thesis examines important questions about how the Canadian government through its aid agency, the Canadian International Development Agency (CIDA), uses these other institutions to deliver a portion of Canada's foreign aid budget.

The topic is important for several reasons. First and foremost, it is an important problem in development economics. Recent literature has cast considerable doubt on the efficacy of foreign aid at the aggregate level. Therefore, it seems logical to consider the details of development assistance delivery when trying to understand the potential micro-level sources of failure (or success) of these programs. Second, the topic includes the analysis of the not-for-profit sector, a growing area of research in economics. Finally, and in a related manner, this thesis is relevant to other important areas of government operation where there is a heated debate about the relative roles of the private for-profit and not-for-profit sectors in the provision of public goods and services.

In the development area the tension between these two competing sectors is particularly acute, as the original purported humanitarian and charitable foundations of development assistance in principle stood somewhat in contrast with the initially dominant role of for-profit firms as the key independent executors of CIDA projects. Instead of channelling funds primarily through development-focused charities and other not-for-profit non-governmental organization (NGOs), the profit motive seemed to be alive and well in the development assistance field. Tension between the two sectors inevitably evolved, however. Both felt discriminated against by evolving CIDA procedures. One representative of a for-profit firm involved in CIDA projects suggested that the playing field was skewed towards the not-for-profits because of the use of instruments (contribution agreements) that favoured that sector. One CIDA official thought that not-for-profits were at a disadvantage in the bidding for contracts. A not-for-profit manager argued that the contribution agreements were better and should be used more heavily. Clearly CIDA faces contradictory pressures in determining how to allocate its project funds.

This thesis asks some basic questions of this process of allocating development project funds through the different executing agency sectors. First, what is the evidence, both historical and statistical, on how allocations of funds between the for-profit and not-for-profit sectors have been made? Is it the case that procedures have favoured one sector over the other, and on what basis has this discrimination occurred? The second question deals with the theoretical arguments for particular allocation mechanisms. Specifically, what are the allocation and welfare implications for CIDA of opening up the bidding for

contracts to the not-for-profit sector, as they did in 1997? In the process of opening up the contract auction to the not-for-profits, a reallocation of funds towards that sector occurred. The final major contribution of this thesis is to examine empirically whether and why not-for-profit organizations have managed to win a larger than anticipated share of the competitive contracts, and which of the theoretical explanations of their success the evidence supports.

1.1: CIDA and its executing agencies: stylized facts and preliminary evidence

This research collected evidence on how CIDA allocated funds between the competing sectors from two perspectives. From a historical perspective, literature on the subject and interviews with individuals were some of the research procedures used. From a statistical perspective, CIDA documents and literature on the subject served as basic sources of a preliminary empirical study. The first findings revealed diverse delivery channels that had evolved over the years. Each domestic sector had carved its own space and delivery mechanism in the context of the distribution of funds for development.

CIDA does not relate to domestic sectors through the Canadian Partnership branch only. Bilateral aid branches also use domestic partners as executing agencies. The Canadian Partnership branch funds have to be added to the bilateral aid funds flowing through each domestic sector so as to present a more complete picture of the competition between the sectors for Canadian aid funds. Therefore, quantifying CIDA's reliance on the two

sectors is not as simple as it might first appear. The following statistics clarify the point made above. Current CIDA's funds have been distributed roughly this way:

- 30 to 40 percent goes to bilateral programs. This is assistance to developing countries in Africa, Asia and the Americas that stems from agreements signed by Canada and the recipient country's government. In other words: government-to-government aid.
- 30 to 40 percent is channelled through multilateral international aid organizations such as the World Bank or UNICEF.
- 10 to 15 percent goes to the Canadian Partnership branch, which means funds to support Canadian organizations, not-for-profits (nine percent) or for-profits (three percent) that work in developing countries that are eligible for receiving Canadian aid at each point in time.
- 10 to 25 percent covers administrative costs, research and development, and aid to less traditional recipients such as the European countries in transition, among others.

While it is easy to identify the Canadian Partnership branch's 10-15 percent share of CIDA's budget as a key conduit for funds channelled through these sectors, a portion of the bilateral programs' 30 to 40 percent share of CIDA's budget also flows via these private agents.

It is fairly transparent how much money CIDA's Canadian Partnership branch allocates to each of the for-profit and not-for-profit sectors; it is much less obvious how that

balance is struck with the bilateral programs, either historically or in their present operations.

There is a significant amount of funds going under the umbrella of government-to-government aid that may actually be described more accurately as partnerships with domestic sectors. CIDA hires Canadian not-for-profits and for-profits to execute most development projects that fall into the general framework agreed with the recipient country government. On top of that, CIDA adds funds under contribution agreements to projects originated within the domestic partners. It is now obvious that the not-for-profit and for-profit participation in the aid program goes further than the specific aid channels designed for them within the Canadian Partnership branch. It also falls into the category of government-to-government type of aid, which has far more weight within CIDA's budget. Chapter 2 explores more carefully the details of percentage of funding through each branch.

At the beginning of this research, it was relatively easy to find statistics of the specific amounts of bilateral aid channelled through the sectors after 1997. This is because CIDA has published the results of internal studies on the open competition process, which is the name they have given to their 1997 change in policy. However, data on the distribution of funds between the sectors was not available. Through direct enquires to CIDA after the first stage of this research we were able to obtain unique and original data on the bilateral aid channelled through each sector before 1997. To our knowledge, this is the first time

the distribution of funds for the period 1987-1997 has been published. Unfortunately, not even CIDA has this sensitive information available for the period prior to 1987.

The year 1997 was then identified as a turning point in the history of the relationship between CIDA and its domestic partner organizations. Before 1997, for-profit organizations were hired through a competitive bureaucratic process that would lead—if successful—to a contract between CIDA and the fortunate executing for-profit agency. The project in this case originated within CIDA. The mechanism was called the bilateral directed mechanism. Also before 1997, not-for-profit institutions had access to a mechanism called bilateral responsive. Projects originated within a not-for-profit agency at that time, which happened to fall into the characteristics of the agreed terms with a specific recipient country government, were accepted by CIDA as unsolicited proposals. When funds existed and unsolicited proposals from not-for-profit institutions followed the government-to-government aid program requirements, they could become contribution agreements. In that case, CIDA would co-finance a project with a Canadian not-for-profit organization that would provide a combination of its own funds, labour, experience, ideas, or connections with recipient country partners. Contribution agreements were not awarded on a competitive basis.

Preliminary statistical analysis reveals that there is a link between the difficulty in monitoring¹ the quality of a project and the type of delivery mechanism and sector to which the project was allocated: hard to monitor projects tend to be executed by not-for-

¹ In the present research the words monitoring and evaluation are used interchangeably with reference to projects. There is no difference between the two in the present analysis.

profits via contribution agreements. After 1997 and up to the present, both bilateral channels described above were open to both sectors and cooperation of both sectors was expected and encouraged. Not-for-profit organizations could bid for competitive contracts and for-profit companies were invited to submit unsolicited proposals. Except for very special cases, all development projects over \$100,000 are supposed to be posted for public bidding from both sectors. The competitive character of the allocation of funds appears to be a goal for CIDA to achieve, according to its documents.

1.2: CIDA and its executing agencies: auction theory and empirical analysis

Given the pre-existing de facto separation of duties between the sectors, however, it might be expected that not-for-profits would have a difficult time competing for contracts. The theoretical analysis of not-for-profits and auction theory were combined to provide insights into the implications of CIDA's opening up of the contract allocation procedures. First, it is possible to gain some insights into the welfare advantages for CIDA from reforming its contract procedures, and generally the reforms could be seen as likely to lead to positive outcomes for CIDA. More importantly, by blending and extending these theories it was possible to identify circumstances under which not-for-profit firms might be successful in this new competitive environment despite their likely cost disadvantage.

The theoretical analysis, in turn, informed the formal empirical examination of the performance of the not-for-profit sector organizations in the contract auction. This

analysis required the construction of a unique data set which, while imperfect, allowed us to test for possible bias in the allocation of competitive contracts. Data from the electronic tendering service that the aid governmental agency uses to auction its development contracts was collected and tested using several statistical models. These models focused on both the success of bidders as separate firms seeking contracts, as well as the success of specific bids from different types of executing agencies for specific contracts. These analyses suggested that not-for-profit firms enjoyed an advantage over their for-profit competitors, and advantage not linked to monitoring and unlikely to be the result of lower costs, though these could not be observed directly.

1.3: Concepts and Terminology

At this point it is imperative to establish the terminology to be used throughout the thesis. The for-profit (FP) group will include any organization that could not be considered a government agency and follows the standard definition of pursuing the profit maximization goal. In contrast, the term not-for-profit (NFP) will be used to refer to any organization that could not be included in the for-profit group, but could not be considered a government agency either. It is not our purpose to differentiate rigorously between the charities, non-governmental organizations, non-governmental international organizations and other categories widely used in the literature. In the case where it is imperative to make a distinction between different categories within the members of the not-for-profit sector (NFPs) so as to make our study comparable to other studies, a specific detailed note explains the differences.

The other set of terms that it is useful to clarify matters are related to the task to be executed by either NFPs or members of the for-profit sector (FPs) on behalf of CIDA, and which also depend which branch of CIDA is the source of the funding. All activities being financed by CIDA and executed by an agency are referred to as “projects” in this thesis. If the project originates within CIDA’s bilateral branches and is allocated through CIDA’s directed mechanism to the winner of an auction, the project will be referred to as a “contract.” A project that is not allocated by a competitive auction but is instead assigned by a responsive mechanism in CIDA’s bilateral branches is called a “contribution agreements” (CA). Bilateral branch projects are intended to follow the government-to-government aid agendas. In addition to the bilateral branches, projects may also be funded through non-competitive processes in CIDA’s Canadian Partnership branch, which is supposed to channel funds for development through domestic sectors. For CIDA’s funds allocated through the Canadian Partnership branch the distinction between CA and contracts does not apply. Finally, CIDA funds that flow through multilateral organizations are not examined in this thesis.

1.4: Contributions

The topic examined in this thesis has not previously attracted much attention and analysis. Most previous research on the details of CIDA processes and executing agency selection has been descriptive and anecdotal, though still very valuable. These studies are now somewhat out of date. The first contribution of this thesis is to update past work and reconcile the data on project allocation, thereby providing a more accurate and current

picture of CIDA operations after an important period of restructuring. This is an important starting point for understanding larger questions about aid effectiveness.

More importantly, the thesis begins to develop theory and preliminary tests of why the allocation of projects between different executing agencies occurs the way it does. Specifically the research identifies the potential importance of monitoring project quality as a possible reason for differentiating between responsive and competitive allocation mechanisms, and between for-profit and not-for profit firms.

A major difficulty in the present study is the lack of theoretical reference. Auction theory does not provide a set of results to describe what will happen when we include FPs and NFPs in the competition for government funds. The economics of the NFP sector are not developed enough to provide a theoretical framework on which there is wide consensus. Auction theory is at a stage where answers can be found only after very complex mathematical analysis. This research attempts to combine insights from NFP theory with the mechanics of auctions to identify the likely consequences of opening CIDA project auctions to both sectors.

Another difficulty in this study is the fact that data are not readily available. There is very little information on the domestic partners that work with CIDA. The prices they submit for executing projects are not available; therefore, an important component of the information needed to test the theory of auctions within this context is lost. The sources of information on other variables that we could use to compensate for not having the

prices are incomplete and diverse. As a result, much time and effort was needed to create a unique database for the purposes of this study. This database was used to conduct a more rigorous empirical examination of the interaction between FP and NFP organizations in the auctions for development projects. Though missing and confidential data make this analysis less than ideal, it does shed some light on to the balance between the two sectors and the framework within which CIDA makes its allocation decisions.

In sum, this research makes four contributions. First, it presents the basic descriptive statistics of aid flows through domestic partners, including a detailed distribution of bilateral aid funds channelled through the two competing domestic sectors. Second, it explores the empirical link between the difficulty in quality monitoring and a delivery mechanism based on the choice of executing agency. Third, it develops a theoretical model that combines aspects of two bodies of economic literature, auction theory and the economics of the not-for-profit sector. And fourth, it creates and analyzes a unique database on the potential executing agencies for government contracts from the perspective of the two domestic sectors.

1.5: Thesis structure

The balance of the thesis is: Chapter 2 outlines the historical interactions among the sectors that are involved in the development aid. It presents the basic descriptive statistics of aid flows through domestic partners and examines their connection to the monitoring characteristics of projects. Chapter 3 works on the theory of the not-for-profit sector applied to the economics of auctions in order to find a model that would best describe the

process of competition between the sectors over CIDA contracts. Finally, Chapter 4 describes and undertakes an empirical analysis that attempts to estimate the probability of a particular domestic agent winning a CIDA contract. Both univariate and bivariate probit procedures are explored. In addition, the problems associated with quality monitoring that are raised in Chapter 2 are further discussed at a theoretical level in Chapter 3, and further developed within the context of a more formal econometric model in Chapter 4. Chapter 5 concludes.

Chapter 2: Historical overview and preliminary empirical analysis

2.1: Introduction

In Chapter 1 it was explained that the NFP sector delivers international aid, along with other altruistic and humanitarian services. It is also well known that FP firms focus their efforts on acquiring pecuniary gains, and are presumed to be less concerned with the welfare of non-shareholders. The engagement of these different sectors in the delivery of foreign aid is not unique to Canada. There are, however, some interesting dimensions to the Canadian approach to channelling development assistance. The NFP and FP sectors receive some support from CIDA via their own specific institutional channels in the Canadian Partnership branch, but also compete with each other for funds allocated through CIDA's bilateral programs. These structures have generated a particular balance between these sectors as agents of Canadian foreign aid, giving rise to a number of interesting questions: What was the origin of these structures? How have the links between CIDA and domestic NFP and FP sectors evolved over time? What determines the amount of funds flowing through one sector or the other? What circumstances helped shape the balance we observe today?

In Chapter 1, we suggested that some portion of the bilateral aid funds were channelled through domestic sectors. Charts 1 and 2 go a step further in showing which portion of bilateral aid goes through the sectors and how the balance changed from the period before and after 1997. Other CIDA branches such as multilateral aid and administrative branches are not analyzed in detail as the relevant participation of the domestic sectors in

other branches is outside the scope of this research. Other delivery mechanisms within the bilateral branches may involve the use of recipient country organizations or governments directly without the use of domestic partner organizations.

Chart 1. CIDA. Distribution of funds,
NFP and FP sectors
1995-96
(\$ Million and %)

Sources: CIDA, 2004, *Bilateral Service Contracts and Contribution Agreements Signed by Fiscal Year*; CIDA, 2006, statistical reports on ODA; and Morrison (1998).

Notes:

(1) The total dollar amount for the Canadian Partnership branch was estimated based on percentages from CIDA statistical reports.

(2) CA refers to funds assigned through contribution agreements and C refers to funds assigned through contracts.

Chart 2. CIDA. Distribution of funds.
NFP and FP sectors.
1999-00
(\$ Million and %)

Sources: CIDA, 2004 *Follow-up Study on Open Competition between the Sectors for the Period of April 1, 1999 to June 30, 2000*; and CIDA, 2006, statistical reports on ODA.

Note:

(1) CA refers to funds assigned through contribution agreements and C refers to funds assigned through contracts.

A few facts emerge from inspection of the preceding flow charts. First, they clearly identify the two routes by which development assistance dollars are channelled through the two sectors. The amount and share of funding flowing through each branch of CIDA and through the different funding arrangements (contribution agreements and contracts) are made very clear.

Second, regardless of the branch, the NFPs receive more funding than the FPs when accounting for the total flow received by the sectors. In 1995-96, the NFPs received 18 percent of total aid versus the 10 percent received by the FPs, and in 1999-00 the NFPs received 13 percent of total aid versus a seven percent received by the FP sector.

Third, the Canadian Partnership branch clearly favours the NFP sector partnership in its allocations. In both periods, 1995-96 and 1999-00, the percentage of Canadian Partnership aid received by the FP sector is significantly lower than the percentage of this branch's funds assigned to the NFPs.

Fourth, the bilateral aid mechanisms were clearly separated before 1997, with the non-competitive mechanism leading to a CA assigned almost exclusively to the NFP sector and the competitive mechanism leading to contracts assigned primarily to the FP sector.

A fifth related observation is that, after 1997, NFPs became more successful participants in the bidding process for contracts, receiving two percent of all CIDA financing through this mechanism. In contrast, the members of the for-profit sector (FPs) have been less

successful or interested in contribution agreements (CAs) that are now supposed to be more readily available to them.

Sixth and last, both sectors have experienced a decline in CIDA funding. The NFP's share of CIDA funding has declined from 18 percent in 1995-96 to 13 percent in 1999-00, a reduction in revenues from both the Canadian Partnership branch and the bilateral contribution agreements. The FPs similarly saw reductions in both their partnership and bilateral operations, though the former reductions are due to projects issued as contracts. CIDA seems to favour the use of other delivery mechanisms within the bilateral branches as well.

This chapter delves into the relationships between CIDA and the FP and NFP agencies that deliver a large portion of their assistance program. With the structure described in the above charts as a reference, this chapter's purpose will be to explain when, how and why the FP and NFP sectors became partners with CIDA in its development aid efforts, and how the balance between these two delivery sectors has changed. The study also presents data to quantify the nature of CIDA's relationship with these two sectors, including flows from both the partnership and bilateral programs. The study focuses in particular on the post-1997 period, thereby complementing Morrison's (1998) earlier work on CIDA's history but also capturing the important policy decisions made in 1997. These policy changes altered significantly the balance between the FP and NFP sectors in their competition to deliver programs; the details of these changes are presented below. The change in the division of work between the competing delivery sectors will help describe

the current selection of executing agencies at CIDA. The initial hypotheses, empirical results and analysis in this chapter open the way to additional theoretical analysis and more formal empirical work in subsequent chapters.

Methodologically, this chapter relies primarily on CIDA documents, some of them unique to this research. These reports are supplemented by interviews with CIDA officials and CIDA's partner organizations' staff. These sources provide insights into the struggle between the two delivery sectors over their access to CIDA's funds. Using this information as a guide, the chapter then goes on to consider what forces might be at play in the evolution of CIDA's policies towards its domestic executing agencies.

The chapter is organized as follows: Section 2 reviews briefly the literature on international aid and the history of CIDA and its partners. Section 3 reviews CIDA's Canadian Partnership branch, the official channel for partnership with both domestic sectors. Section 4 reviews bilateral aid channelled through the two sectors. It presents not only the evolution of the interactions between the sectors, but also a preliminary empirical analysis. The section on bilateral aid is based on the documents requested from CIDA for the purposes of this research, and contains information on the specific amount of bilateral funds channelled through each domestic sector. This is an important contribution of the present research to a better understanding of the complex relationship between CIDA and its partners. Section 5 presents a preliminary empirical analysis of the 2003 projects awarded to each domestic sector. Section 6 concludes.

2.2: Literature Review

There are many studies of international development assistance. Some studies look into the heterogeneity of aid with respect to the type of programming (such as food transfers versus community programming). However, for the most part, studies of development assistance examine aid flows from donor countries to recipients without much attention being paid to the institutions of the donor country through which the aid is actually disbursed.

In Canada, as in most donor countries, the NFP sector delivers a portion of the official development assistance budget, along with other funds and humanitarian assistance provided by private donors. The FP sector also participates in the process of delivering foreign aid both in Canada and elsewhere. At first glance, the presence of both FPs and NFPs as delivery mechanisms for development assistance might seem unusual. There is presumably some coherence between the altruistic motivations of the NFP sector and the more noble motivations often ascribed to the provision of foreign assistance. It is harder to reconcile the pecuniary motivations of private firms with notions of charity that—in theory—underpin development assistance. In truth, these initial impressions are probably inaccurate. Several studies have attempted to discern the motivations for donor governments engaged in development assistance programs.

Classic papers in the aid motivation literature include Dudley and Montmarquette (1976) and McKinlay and Little (1977). These papers introduce the basic classification of the motivations of aid into two groups, which is still being quoted by the current motivation

aid literature. The two groups are aid based on the recipient country needs or humanitarian motives, and aid based on the donor country interests. The subgroup of motivations based on the donor country interests could be classified into other categories in turn, such as motivations of a political, development, or economic nature. Specifically, the motivation for international aid defined in the literature as “overseas economic interests” (McKinlay and Little, 1977: 68) helps explain the sustained participation of the FP sector in official international aid. According to this theory, donor country aid will be positively related to the trade and investment opportunities of the donor country with respect to the low-income or recipient country.

Another significant contribution to the aid motivation literature is Maizels and Nissanke (1984). It undertakes an empirical test of the two main motivations of aid as defined by McKinlay and Little (1977). For a group of 80 developing countries during the periods of 1969-70 and 1978-80 they find evidence of the relevance of the humanitarian motivation of aid in the case of multilateral aid, and they find the donor-country motivation of aid to be relevant in the case of bilateral aid. McKinlay and Little (1977) is complemented by Mosley (1981), another early influential paper in the motivations of aid literature. Mosley (1981) argues that the estimation of aid flows based on recipient country need indicators suffers from a bias if the independent variables are endogenous, affected by aid itself. Nevertheless, the Canadian bilateral aid program has counted on an intense FP sector participation over the years and this sector has been traditionally identified with the donor-country motivation of aid.

The literature on tied aid expanded since the 1980s with theoretical models such as Kemp and Kojima (1985), Schweinberger (1990) and Kemp (2005). Arvin and Drewes (1998) examine Canadian bilateral aid over the period 1982-92, specifically, the bias in aid allocation from the perspective of characteristics of the recipient country. To this day the classification of aid into recipient country interests and donor country motivation is still alive; see, for example, White (2004). It summarizes the idea that established the basis for studies in the allocation of international aid back in the 1970s. White (2004) also mentions, as a confirmed result, that bilateral aid has been dominated by donor interest variables, while the recipient country's needs still tend to influence multilateral aid.

In the presence of such mixed motivations and results it is, perhaps, less difficult to understand why FPs act as delivery agents for development assistance, especially in bilateral aid. Even when the needs and interests of the recipients motivate aid programs, FPs might offer a variety of skills and services that may be superior to what might be forthcoming from the NFP sector. Consequently, we should not be surprised by the presence of both sectors as channels of development assistance.

The literature in the area of channels of development assistance is quite thin. At the most general and theoretical level the question of how aid agencies interact with their agents of delivery is considered to be of potential significance. Governments and their aid agencies respond to domestic political pressures, including the interests of those non-government entities involved in delivery. As Easterly (2002) reminds us, even in the case where the international aid bureaucrats of the donor country are well intentioned, their incentives

are more likely to be affected by the dynamics of politics within their own country rather than by the opinions of potential beneficiaries in the recipient country. In the absence of meaningful direct political input by the intended beneficiaries of aid, delivery intermediaries can presumably play a critical role in diverting development assistance towards efforts more in line with their own perception of how the money is best spent. The goals of these intermediaries could be at least partially aligned with the wishes of the poor in the less developed countries, but there is no guarantee of this coincidence of interests. Instead, the agencies delivering aid may pressure their government to adopt policies in keeping with their own interests, even if these are presented as those of the intended recipients.

Easterly's (2002) arguments at the theoretical and general level find resonance in the literature on development assistance specific to Canada as well. The process and implications by which CIDA selects its domestic partners, however, is not well understood. What has the literature on Canadian aid found? Rudner (1996) provides references to the importance of delivery channels in the international aid literature. In his analysis of Canadian aid statements in the early years of the Liberal government rule in the 1990s, Rudner (1996:217) argues, "the Canadian approach to international assistance was driven by a matrix of domestic considerations, almost exclusively, and had its role defined primarily as an instrument of a higher foreign policy agenda." These domestic considerations presumably include the interests of the development assistance "industry" that has evolved around the government's foreign aid program.

The specific role of aid deliverers in Canada's development assistance policy has attracted even less attention. Morrison (1998) provides the most complete history of the interactions between the Canadian government and the Canadian domestic agents that deliver components of its international aid program. He describes how the government's development assistance policies changed over time in terms of amounts disbursed, priorities identified, and delivery options for aid projects. However, he does not provide clear and consistent statistics of the bilateral aid channelled through the sectors. His work also predates important changes in the balance between for-profit and not-for-profit executing agencies.

2.3: CIDA's partnership with the two sectors

This section summarizes the interactions of CIDA and its domestic partners focusing on the Canadian Partnership branch. The main points related to the topic of interest in this section were extracted and compiled from Morrison's (1998) comprehensive history of CIDA. These main ideas were further confirmed through several interviews with individuals who have served at CIDA or some of its related domestic partners over the years. The main ideas were also modified according to our findings from a review of CIDA's documents and data.

2.3.1 The NFP Sector

It took twenty years for the NFP sector to capture a mere three percent of Canada's total Official Development Assistance (ODA) budget. These were the early years of foreign aid, when developed countries first started co-ordinating their efforts in support of the

developing world. Development assistance in Canada began as government-to-government aid, with funds flowing directly between the Canadian government and the recipient country's government. Aid programs in these early years emphasized support for infrastructure and food aid rather than human resource development and community-based projects. This early emphasis clearly placed at a disadvantage the NFPs that worked in human resource and community development. Instead, the Canadian government looked to the FP sector for partners in the execution of technical tasks related to development projects.

Though FP participation dominated in the initial period, the NFP sector also participated early on in the aid program. Eventually NFP participation was so extensive that, in 1967, a specific channel of interaction with the NFP sector emerged within the early governmental development agency; namely, the Non-Governmental Organizations Program (Morrison, 1998: xiv). This channel was the seed for what later became the Canadian Partnership branch.

Chart 3 illustrates the vicissitudes of Canadian Partnership funds channelled through the sectors from 1949 to 2003. This chart will be a continual reference point for this section. Notice that Chart 3 includes only Canadian Partnership branch disbursements that were made using the NFP or “voluntary” sector and the FP channel called Industrial Cooperation. It does not include bilateral aid channelled through each sector.

Source: CIDA's Statistical Reports on ODA and Morrison (1998).

As Chart 3 reveals, 1969 to 1989 is a period during which NFP participation in the aid program grew considerably. The reasons for this favourable attention were both operational and political. At the operational level, development theory had begun to shift away from an emphasis on big projects such as infrastructure and integrated rural development, towards basic needs and community-based programming. An appreciation of the particular effectiveness of NFPs in community and basic needs projects was an important consideration in allocating more resources to that sector, especially at a time when the bilateral program was less responsive to the shift in development philosophy. The other main reason for reaching out to the NFPs in this period was CIDA's desire to strengthen political support for the aid program.

Not everything, however, was rosy between CIDA and the NFPs. As Morrison (1998) points out, CIDA also supported the NFP's development education activities that, curiously, caused subsequent troubles for the relationship between CIDA and the NFP sector. The purpose of these activities was to educate Canadians in the importance of supporting development projects abroad. More awareness of CIDA's actions and policies, however, fostered criticism of CIDA's policies and strategies from the NFP sector. Despite this tension, the NFP's share of ODA doubled again over the decade, ultimately reaching 12 percent. The sense from interviews¹ conducted with people in the FP sector

¹ Interviews were initially designed to include members of the main bidders from both competing sectors and CIDA officers involved in the selection of executing agencies. A list of organizations and individuals was prepared and time and effort was spent trying to contact these individuals by mail, electronic mail, or phone. The individuals were given a list of questions, the choice of answering by mail or phone and the choice of remaining anonymous. The ethics committee of Carleton University was contacted and an ethical procedure was followed in each case. Not everyone in our list accepted to take the time to

is that the increased importance of NFPs within bilateral aid after the 1980s was due to the growing influence of large NFPs in steering CIDA's priorities towards their area of expertise, along with a planned movement of CIDA towards the NFPs areas of expertise.

However, in Morrison (1998), one of the most important points stressed is that during the period that followed the 1980s CIDA looked to the NFP sector not only to engage Canadians and offer community-based aid programs, but also as a way of increasing labour cost savings. As a part of this strategy, CIDA included NFPs as executing agencies in bilateral programming in a policy named "country focus." In addition, CIDA funded some large NFPs as a group, and transferred funds to NFP coalitions along with the authority to distribute funds among other NFPs under CIDA's supervision. The delegation of authority in funding distribution reveals how complex the relationship between CIDA and its NFP executing agencies came to be.

The relationship between CIDA and the NFP sector grew so much that it expanded beyond the specific sector channel into the bilateral branch type of aid. Funds channelled through the NFPs included responsive as well as directed programming. Responsive programming in CIDA's jargon was defined in Chapter 1 as CAs -projects originating in the NFP partner organisation that are co-financed by CIDA- whereas directed programming consists of projects defined in Chapter 1 as contracts originating at CIDA

answer our questions. That is also the case in CIDA's studies of similar characteristics. Nevertheless, we believe the sample of interviews fairly captures the sequence of relevant events. The opinions selected come from individuals with plenty of experience in the sector -many of them with more than 20 years working in development aid organizations related to CIDA.

and executed by a domestic partner organization. Traditionally, the directed programming had been the channel CIDA used to relate to FP partners, while responsive programming had been reserved for the NFP sector.

Morrison (1998) identifies an administrative advantage for CIDA officers in the bilateral program to contracting with a member of the NFP sector. This procedure avoided the lengthy contracting and consultant selection process involved in selecting the best FP bidder. The trust CIDA placed in the NFP sector not only for executing a project but also for monitoring and management capabilities makes our Chapter 3 assumption of CIDA's preference for the NFP sector all the more plausible. However, in our interviews with individuals related at the time to the NFP sector, the impression given was that NFPs had to struggle within the bilateral branches, barely surviving the competition with the FP sector. This may be related to the idea developed later in this section that only big NFPs survived this competition. The reasons behind these competitive difficulties, as identified in our interviews, have to do with the high costs associated with formulating a project in development, which is a task beyond the reach of small NFPs.

All our sources agree that by the end of the period 1969-1989, only the big NFPs survived as executing agencies in country focus programming within the bilateral sector. The 1980s remained in the memory of some individuals linked to the NFP community as a time when only the big NFPs could survive the "competition" with the FP agencies within bilateral branches. The Canadian Partnership branch, along with the CAs then became the refuge for the "secure" funds that CIDA would still allocate directly to NFPs.

It is worth noting that Morrison (1998) was not able to separate the total amount of CIDA funds that went to each domestic sector. This is because CIDA, at some point during the 1980s, began to report bilateral aid that used the NFPs within the bilateral totals rather than reporting them as funds through special programs of cooperation between the sectors, as they did before.

The heavy funding in the 1980s generated a dependence that would characterize the relationship of the NFP sector with CIDA in subsequent years. NFPs continued to depend heavily on government funds relative to individual donations, as confirmed by Juillet et al. (2001). The very same nature of the NFP sector as a separate entity became jeopardized by its dependence on a government agency. This dependence would not bode well for many NFPs during the 1990s when their dedicated share of a declining ODA budget fell from twelve percent to nine.

The government was not inclined to reduce bilateral aid programs in favour of a larger responsive programming for NFPs. Instead, increased support for the sector emerged within the bilateral channels, where they continued to serve as executing agencies on projects, including a good many initiated by the NFPs themselves. Despite a decline in the share of ODA going to the sector via their dedicated program at CIDA, as shown in Chart 3 after 1989, NFPs were actually attracting more resources within the bilateral operations.

The debate about which domestic channels would be a priority for CIDA became most evident at the end of the 1980s. Morrison (1998) suggests that, on the one hand, country focus continued to be popular among CIDA staff both because they trusted NFPs and because it meant less paperwork. Bilateral projects executed by NFPs reached ten percent of Canadian ODA in 1990-91 —while the specific channel for the NFP sector was 11 percent. On the other hand, there was a decline in the trend of using NFPs because of pressures from the FP group and due to internal financial and planning problems within big NFPs at the time.

The decline in the NFP share of ODA that can be seen in Chart 3 may be explained by the Canadian government's desire to rely more heavily on recipient country partner organizations, implying a reduction in the use of Canadian partners. This reduction in its share of ODA coincided with smaller aid budgets, exacerbating the reduction in revenue for domestic sectors. The CIDA 1998-99 report on plans and priorities (CIDA 1998) notes the decline in Canadian ODA and situates it within the reductions with respect to most other donors as well. One of the methods of getting more of the money to the recipient target indicated in the plans and priorities document is to have more participation of recipient country partners rather than donor country partners.

In the plans and priorities document for the year 2000, (CIDA 2000), two other elements were added that explain the reduced financing for Canadian Partnership. One is the emphasis on the sectoral approach explained in the section entitled "Future Directions" on page 15, providing support to a large program in one sector in the recipient country in

order to gain coordination advantages and to save in transaction costs. Sectoral-focused programming may explain the reduction in financing for smaller and unallied NFPs and FPs through the Canadian Partnership branch. Again, in the year 2000, CIDA continues to emphasize in the importance of supporting recipient country partners.

To summarize, the relationship between the Canadian Partnership branch and its NFP partners evolved in a complex fashion over an extended period. NFPs joined the government in the very first stages of the official aid program, even though the types of projects at the time were predominantly of a technical nature, more suitable for a partnership between the for-profit and the government sector. A special administrative structure, known as the Canadian Partnership branch, was eventually created to manage government partnerships with domestic organizations, mainly the NFP sector, given that the FPs had the advantage in executing contracts for the bilateral branches. The main reason behind the special communication channel between CIDA and its NFP partners was the fact that these organizations were supposed to raise support from Canadians in favour of the aid program. Over time, the type of aid programming changed from technical projects to more community work, gender and other social issues, and other types of projects that fell within the area of expertise of the not-for-profit sector at the time. As a result, NFP sector participation in bilateral aid increased considerably. Bilateral aid had been the traditional field of the FP sector as a partner within CIDA. Only very big NFP organizations were able to survive competition with the FPs in government-to-government or bilateral aid. Smaller NFPs remained as CIDA's partners within the Canadian Partnership branch.

2.3.2 The FP Sector

CIDA's relationship with the FP sector began very early. As noted previously, CIDA's initial focus on infrastructure projects made the sector a natural partner for executing aid projects. The FP sector had a clear comparative advantage over their NFP counterparts in these early years.

It is worth noting the differences between CIDA's links and channels of communication with NFPs and FPs. The early links between CIDA and the NFPs ended in a special channel of communication between CIDA and the NFP sector in 1967 that grew considerably, as explained above -to a point where the presence of NFPs expanded into the bilateral aid arena. The FP sector, however, dominated bilateral aid with only a smaller presence in specific partnership. This is the reason behind the much smaller participation of FPs in partnership ODA as seen in Chart 3.

The FPs had a specific structure within the government official partnership called the Business and Industry Program, created in 1969. However, this special channel for CIDA to relate with the FP sector is reported in Morrison (1998) as less successful than the NGO program that had been created in 1967. Originally, it was conceived as a way to assist Canadian FPs with feasibility expenses in the establishment of Canadian firms in developing countries.

FPs participation in the aid program was linked to what is known as tied aid, which is the practice of promoting the sales of goods and services or the protection of commercial interests of the donor country through the aid program. Morrison (1998) reveals several examples of the struggles of conflicting interests between the NFP and the FP sector within CIDA.

In 1978, CIDA created what is known today as the Industrial Cooperation Program to replace the old Business and Industry Program. The new program was more successful, as shown in the subsequent increase in the FP sector's share to two percent of ODA in Chart 3. Morrison (1998) regards the 1980s as a favourable period for tied aid not only in Canada but also in other donor countries². A study quoted by Morrison (1998: 364) found that each dollar invested in the Industrial Cooperation Program resulted in three to four dollars in contracts for Canadian firms.³ This is so even when the program is designed to cover start-up activities or feasibility studies. Direct sales or exporting activities are not eligible for funding. The same study also finds evidence of the middle-income bias of the aid flow. From the mid-1980s to the present, the Industrial Cooperation Program has stayed relatively stable, oscillating from one to three percent of total Canadian ODA. Interviews with members of the FP sector indicated that the most important issue of contention was their dissatisfaction with the growth of the NFP sector in CIDA operations, which they viewed as being at their expense. The growth of the NFP sector's share was not only due to better deals within the Canadian Partnership branch, but also

² Significant contributions in the subject of tied aid are Jepma, C. (1991) and (1994).

³ Consulting and Audit Canada, (1992), Evaluation Report: Industrial Cooperation Program – CIDA. In Morrison (1998: 364).

because of increased bilateral programming going through CAs allocated exclusively to the NFP sector. The greater use of CAs in bilateral aid may have occurred due to the fact that the allocation procedure of CAs for CIDA's desk officers was relatively easier than the procedure for contract allocation.

The sources we interviewed suggested that the complaints from the FP sector eventually led to the 1996 decision to open the competition for funds to all sectors. CIDA was supposed to level the playing field by allocating most projects through contracts in open competition, not through contribution agreements. In practice, it did not quite work out that way. Considerable funds still flowed through the CA structure, without competitive bidding. While the FPs received access to these CA funds, they are of limited interest to the sector since they are not able to make any profits from the money provided through this mechanism. In contrast, the NFPs acquired extended access to the competitive contracts that had been the domain of the FP sector.

2.4: The change in bilateral aid channelled through both sectors

As mentioned above, there are two main delivery channels for domestic partners in bilateral aid. One is the competition process or directed mechanism that results for successful bidders in a contract with CIDA. Here the contract originates at CIDA and the domestic partner executes it. The other delivery channel is the responsive mechanism where the project originates in the domestic partner and CIDA co-finances it. The successful unsolicited proposal turns into a contribution agreement where both CIDA and the partner supply inputs.

Before 1997, only FPs could bid for contracts and only NFPs could submit unsolicited proposals. Statistics of this period that separate bilateral aid into these two channels are not available to the public through CIDA's Web site. A special report was requested from CIDA's Contracting Management Division, which was able to produce an estimate of the disbursements from 1987 to 1997. Statistics prior to 1987 could not be obtained.

The FP sector clearly dominates the open competition process before 1997, although with some participation of the NFP sector especially in the period 1991-92. The contribution agreement option is dominated by the NFP sector during the period, with no discernable variations.

Some of the information we used for our research and presented to this point, for example Chart 3, was already in the public domain, although it had to be rearranged in order to provide a clear presentation of the two domestic sectors. However the information presented in Table 2.1 and the analysis that it generates are important contributions of this research. In Table 2.1 our study shows the distribution of bilateral funds through each of the domestic sectors before and after 1997. As far as we know, this is the first time a detailed report of bilateral funds channelled through each domestic sector has been published.

Table 2.1 Distribution of bilateral funds through each domestic sector before and after 1997.

\$ Million

Period	NFP sector		FP sector		Total	Bilateral
	CA	C	CA	C		
1987-88	203	15	26	158	402	1,101
1988-89	195	13	5	194	407	1,177
1989-90	187	16	5	210	418	1,026
1990-91	201	17	7	207	433	1,106
1991-92	125	83	5	163	377	1,125
1992-93	79	0	12	168	259	979
1993-94	139	5	8	110	262	892
1994-95	166	0	0	130	296	1,056
1995-96	223	1	0	215	439	899
1996-97	247	13	9	251	520	933
1997-98	184	30	3	91	308	766
1999-00	42	47	4	148	241	838

Sources: For the period 1987-97: CIDA, 2004, *Bilateral Service Contracts and Contribution Agreements Signed by Fiscal Year*. For the period 1997 to 2000: CIDA, 2004, *Follow-up Study on Open Competition between the Sectors*. For the period April 1, 1999 to June 30, 2000.

We rearrange this information further and present it as Chart 4 in order to underline the relative importance of disbursements through the sectors.

Chart 4. Bilateral aid channelled through domestic sectors.

Sources: For the period 1987-97: CIDA, 2004, *Bilateral Service Contracts and Contribution Agreements Signed by Fiscal Year*. For the period 1997 to 2000: CIDA, 2004, *Follow-up Study on Open Competition between the Sectors*. For the period April 1, 1999 to June 30, 2000.

From Chart 4 it is straightforward to conclude that during the period 1987-1997, both the FP and the NFP sectors received similar attention from CIDA's bilateral branches.

However, if we separate the bilateral funds assigned through open competition leading to contracts from the funds assigned through contribution agreements or CAs we observe a clear distinction between the two competing sectors, as presented in Charts 5 and 6 below.

Chart 5. Funds channelled through an open competition process leading to contracts.

Sources: For the period 1987-97: CIDA, 2004, *Bilateral Service Contracts and Contribution Agreements Signed by Fiscal Year*. For the period 1997 to 2000: CIDA, 2004, *Follow-up Study on Open Competition between the Sectors*. For the period April 1, 1999 to June 30, 2000.

Chart 6. Funds channelled through contribution agreements, outside competition.

Sources: For the period 1987-97: CIDA, 2004, *Bilateral Service Contracts and Contribution Agreements Signed by Fiscal Year*. For the period 1997 to 2000: CIDA, 2004, *Follow-up Study on Open Competition between the Sectors*. For the period April 1, 1999 to June 30, 2000.

We observe again the same results from Charts 1 and 2 for the period 1995-96 versus 1999-00 presented in Chapter 1, but this time extended throughout the period 1987-2000.

Two conclusions may be drawn from the above charts:

- Even though the open competition process is still dominated by the FP sector, the NFP sector is making some gains in it.
- The NFP sector received and still receives the bulk of funds from the contribution agreements of bilateral branches where FP participation is relatively low.

Due to the FP pressure explained earlier in the section on partnership, after 1997 CIDA opened both delivery channels to both sectors. That is, both the NFPs and FPs could either bid for contracts and/or submit unsolicited proposals towards CAs. It is only after 1997 that CIDA's Web site publishes detailed statistics on the participation of the two sectors in the bilateral aid program. The logical questions at this point are: i) How successful is each sector after 1997 in its own traditional field given the presence of the competing sector? ii) Is each sector showing interest in the delivery mechanism used traditionally by the other sector? The Follow-up Study on Open Competition between the Sectors from CIDA's Contracting Management Division in December 2000 compares data from 1997-98 and 1999-00 and reveals some interesting results.

In 1997-98, FPs clearly dominated the open competition for contracts. They accounted for 80 percent of the number of contracts awarded and 75 percent of the total contract dollar value. In 1999-00, FPs accounted for a slightly smaller percentage (75 percent) of the number of contracts awarded, but still kept a very similar percentage (76 percent) of the total contract dollar value.

The NFPs show significantly increased interest in the open competition for CIDA contracts. CIDA reports an increase of 62.5 percent from 1997-98 to 1999-00 in the number of documents requested by NFPs with a corresponding increase of 63.3 percent in the number of proposals submitted by those entities. The number of documents requested by FPs dropped by 18 percent with a corresponding drop in their number of proposals submitted.

In 1997-98 NFPs accounted for 99 percent of all contribution agreements. In 1999-00, NFPs accounted for a smaller (down to 90 percent from the previous 99 percent) but still high percentage of the CAs. Table 2.2 summarizes these results.

Table 2.2 Number of projects awarded to each of the sectors by CIDA's geographical branches in 1997-98 and 1999-00.			
NFP sector		FP sector	
CAs	Contracts	CAs	Contracts
Year 1997-98			
72 (99%)	8 (20%)	1 (1%)	33 (80%)
Year 1999-00			
18 (90%)	11 (25%)	2 (10%)	33 (75%)

Sources: CIDA, 2004, *Follow-up Study on Open Competition between the Sectors. For the period April 1, 1999 to June 30, 2000.*

From Table 2.2 it is very clear that the traditional area of dominance according to that report has changed somewhat with NFPs winning more contracts and FPs winning more contribution agreements. However, the reduction in the percentage of contracts awarded to the FP sector is smaller than the reduction in the percentage of contribution agreements awarded to the NFP sector. It is very important to notice that the report mentions that in 1997-98 there were 50 contribution agreements for \$187.4 million being awarded outside the unsolicited proposal mechanism. This number was reduced to only 20

contribution agreements outside the competitive process in 1999-00. The report is not clear, however, with respect to the NFP participation in this distribution outside the unsolicited proposal mechanism. In interviews with members of the domestic partner community, it was found that the “unreported” \$187.4 million was the subject of debate between CIDA and its partners. Therefore, it is not accurate to judge NFP participation following CIDA’s published statistics on only the unsolicited proposal non-competitive mechanism.

To address the question of whether FPs are participating more in the responsive mechanism we found that, according to CIDA’s studies in 1997-98, FPs submitted 28 percent of the total number of proposals. In 1999-00, participation dropped slightly, with FPs submitting 25 percent of the total proposals.

It is still not clear, either from the CIDA staff that were interviewed for this research or from any of the available reports, what the criteria are, if any, for setting the percentages of bilateral aid that will be disbursed through Canadian partners and through each sector in particular. However, inspection of Charts 1 and 2 suggests that the competition between the sectors has kept the percentages close.

After three years (from 1997 to 2000) facing fair and open competition, it seemed that NFPs were still at a disadvantage in the competitive context, while unsolicited proposals remained their domain. Despite the opening up of the two mechanisms and the marginal

erosion of exclusivity, a clear division between the sectors and financing methods remained.

To examine whether this pattern of FP dominance within the bilateral branches changed we use our dataset from the year 2003. The 2003 dataset consists of the bilateral aid contracts and contribution agreements regularly published by CIDA, after an executing agency has been determined. In Table 2.3 we present the number of projects executed by each sector in 2003.

Table 2.3 Number of projects awarded to each of the sectors by CIDA's geographical branches in 2003 according to CIDA's list of allocated projects.			
NFP		FP	
CA	C	CA	C
150 (88%)	73 (46%)	20 (12%)	84 (54%)

Source: Data extracted from the published CIDA document: CIDA's Contracts and Agreements. CIDA. Ottawa. 2003.

In 2003, NFPs executed slightly fewer CAs (a reduction of two percent only) and considerably more contracts (from an average of 22 percent in 1997-2000 to a very much higher 46 percent in 2003). As a result, the FPs experienced a considerable reduction in their percentage of contracts (from an average of 77 percent in the period 1997-2000 to a very much reduced 54 percent in 2003) and a modest increase of 2 percent in their number of contribution agreements. Thus, in the period 2000 to 2003, it appears as if the

trend of each sector taking advantage of the new channels opened to them after 1997 has played to the advantage of the NFP sector. The traditional areas of influence have actually changed as a result of new government policies. Although there are some contribution agreements being awarded to FPs (12 percent), there has been a considerable increase in the participation of NFPs in open competition contracting.

It is worth noting that the average length and dollar amount of projects allocated to the NFP sector is smaller than, although very close to, the average length and dollar amount of projects allocated to the FP sector.

It would not be accurate to say that FPs dominate bilateral aid in 2003. It is true that they are still awarded the majority of contracts, which are, on average, larger in duration and size. However, NFPs are still awarded the majority of contribution agreements, free from competition and more flexible in terms of programming.

What do CIDA staff⁴ have to say about the evaluation process within the bilateral branches and the particular chance of success of each of the two domestic sectors? The following is a report on conversations with CIDA staff conducted as a part of this research.

The screening process at CIDA involves two stages:

⁴ Asia Branch desk officer and Contracting Management Division employee.

- A first stage where experience (measured in terms of the sector and recipient country, not previous projects with CIDA), staff and methodology of the bidder are evaluated according to the specific project in question.
- A second stage where price is taken into consideration to differentiate between equally qualified bidders.

Staff at the Contracting Management Division think the NFPs are failing to win contracts due to lack of experience in submitting good proposals that show the strengths of the organization with respect to the particular project. By contrast, some FP companies' staff experienced in CIDA contracting think this is not the case. In their opinion, the quality of the proposal does not decide the winner.

CIDA's argument in favour of the poor-proposal hypothesis is that NFP organizations with staff experienced in writing good proposals often win contracts. CIDA has offered training to both sectors. Over the years, CIDA has offered workshops on how to write proposals open to both sectors; but still only a few NFP organizations are winning.

The process of getting funds for a contribution agreement is longer (two to three years) than winning a contract but it means no competition for the winner. NFPs' and FPs' incentives differ with respect to CAs. Profit maximization, which is the theoretical goal of FPs, is at odds with CA regulations. The FPs may be interested in CAs when they can position themselves in a particular region where there are other potentially profitable

contracts with CIDA, or other multilateral or international organizations. The division between CA and contracts at the planning stage at CIDA is not clear. The present research could not identify a pre-established set of percentages for the funds allocated through each of the sectors or a clear ex-ante separation between CAs and contracts at CIDA.

What do bidders from each sector have to say about the factors that influence their own success? Even though it was not possible to conduct a series of structured formal interviews, as initially planned, we did have informal talks with some representatives of important bidders from each sector. The difficulties in finding a more comprehensive set of interviews have to do with the lack of incentives for giving interviews on the part of many companies. Even CIDA's follow-up studies reflect this fact.

In a talk with the financial manager of one of the NFP organizations that bids quite often for CIDA projects, "Organization A," we confirmed that there is no competition for contribution agreement funds, although that was not mentioned as an advantage. There is high risk in overseas operations and this is the reason why small NFP agencies cannot operate in this market. All their projects with CIDA recover the overhead costs, therefore CIDA helps by keeping the organization afloat.

Organization A is financed by CIDA for nearly 50 percent of its overseas operations. This organization receives financing from contracts and contribution agreements. However, they strongly prefer the contribution agreement as they can then tailor the

project better to beneficiary interests. The beneficiaries contribute to the project and this, along with other factors, adds to their sense of ownership.

At this point it is worth mentioning some ideas that emerged during the discussions with members of the FP sector. Winners do a lot of subcontracting. For example, the winner may be an FP that assigns 50 percent of its contract to NFPs. There are mixed executing agencies and mixed winners. Due to the difficulties in the availability of subcontracting data, and because we assume the winner's sector determines the agenda, projects assigned to a winner from one of the sectors is assumed to be executed by that sector, not a mixed group.

In the interviews with the FP sector, the idea of unfair competition emerged more than once. The market for development aid funds is not a level playing field by any stretch of the imagination. It is far from a simple auction where all homogeneous goods are auctioned under the same rules on the same playing field for all bidders. It cannot be characterized as an auction with unique goods and the same rules for all players. The reasons for this, as indicated by the aforementioned interviews, are as follows:

- There remains a significant amount of bilateral funds going through contribution agreements directly to NFPs where the “good” is a project being “cooked up” between CIDA’s desk officer and the NFP. This mechanism persists despite the fact that CIDA declared that more competition would be desirable.

- The FPs also have access to contribution agreements but cannot make any profit on them. Hence there is no compensation for losses in competition with NFPs bidding for the same contracts.
- NFPs do not pay taxes.
- NFP funds from the Canadian Partnership NGO division are far larger than FP funds from Canadian Partnership Industrial Program.
- In the opinion of some of the bidders, within the bilateral open competition, the proposals that win are highly influenced by the personal decision of the desk officers. The evaluation of proposals for contracts also depends on the partiality of desk officers. There is a sunk cost in submitting proposals. There is no correlation between money spent on proposals and the probability of success.

The preceding discussion shows that the opinion of individual bidders contradicts CIDA's opinion of the reason for potential candidates' failures: not being able to write a proposal. It also contradicts what some within the NFP sector think about the private sector having an advantage in writing proposals.

2.5: Preliminary empirical analysis

After analyzing the participation of the two sectors in partnership and bilateral aid, we now turn to a preliminary empirical test on which type of agency wins projects in

bilateral aid. Is it true that there is a bias in favour of the NFPs due to some type of perceived difference between the sectors?

The following is a preliminary study of the relationship between the type of executing agency and the type of project undertaken with respect to the difficulty in quality monitoring. Projects are separated into two groups: one in which quality is hard to measure, and one in which quality is easy to measure. This study uses projects from four samples: America, Asia, Africa, and all the geographical branches taken together. Our samples include all projects open in October 2003 published by CIDA in its Contracts and Contribution Agreements, 2003.

Obviously, the definitions and classification rules used when grouping agencies and contracts affect the results obtained in the study. It is therefore imperative to explain carefully how the different categories were constructed before proceeding. There are two types of projects: those assigned by contracts, and those assigned by contribution agreements.

In our study, contracts are those submitted through the electronic tendering service and subject to competition among firms of all sectors since 1997. Contribution agreements are those projects that originate at the Canadian partner organization and that the government supports financially if the project falls within bilateral agreements and objectives. With respect to the type of executing agency, the categories are FPs, NFPs and others that may include other governmental agencies that may be CIDA's partners.

Organizations in the sample are classified as FPs if they clearly belong to this group (private firms that operate under the profit-maximization objective). Whenever the category NFP organization is used, it pertains to an organization that belongs to the group of charities listed by the Canada Revenue Agency Web site. In the selected samples, we have used only these two groups. In the complete sample, however, we have expanded the NFP group by adding some not-for-profit organizations not included in the Canada Revenue Agency list of charities, such as governmental agencies and international organizations.

The classification of projects with respect to monitoring difficulty had to be done using categories, which are more difficult to define than types of agencies. A project may be difficult or easy to monitor depending on a number of variables that are not as straightforward as identifying the type of agency. It is hard to classify projects according to quality monitoring since a project may include a number of stages with varying degrees of quality monitoring and address a number of priorities that are also different in this respect. Even so, as a rule of thumb, projects were classified into four groups according to quality monitoring difficulty. Projects where quality is difficult to measure are assumed to be those related to the training of large and difficult-to-track⁵ groups of individuals. At the other end of the spectrum, there are projects that include a technical component where quality is easy to measure. These two groups were chosen for the selected sample. In addition, the complete sample includes projects with unknown or

⁵ Difficult-to-track refers to, for example, the members of a large community who would be costly to interview, as opposed to a small group of individuals who would be less costly to interview.

mixed quality monitoring difficulty. Projects were classified as having unknown quality monitoring difficulty if we could not tell by the name and priorities of the project what kind of activities the project would entail. Projects were classified as being of mixed quality monitoring difficulty when they included components of both difficult and easy quality monitoring. One example of a mixed quality monitoring project would be a training project for government employees or a reduced⁶ group of professionals, which involves easier monitoring due to the nature of the target group, despite the project's training component.

With respect to the statistical techniques used, when using the chi-square test for independence, we found some evidence that seems to confirm the following trend: charities tend to execute projects for which quality is difficult to measure, while for-profits tend to execute projects for which quality is relatively easier to measure.

First, we tested the null hypothesis, which is of the independence between two attributes: the method of allocation (by contract or contribution agreement), and the difficulty of quality monitoring⁷. When using the number of projects as the variable of choice there is evidence of the existence of a link at statistically significant levels in each geographical branch in particular and also in the all branches sample. The null hypothesis of independence was rejected at one percent in all cases except in the America's branch at 10 percent. Second, we tested the null hypothesis of independence between two

⁶ A reduced group of professionals could be, for example, the members of a small government agency or department.

⁷ Details of the techniques used could be found in Harnett (1993).

attributes: executing agency (NFPs or FPs) and difficulty of quality monitoring. When using the number of projects as the variable of choice we found no evidence of a link between the two attributes in each particular geographical branch, however we rejected the null hypothesis of independence at 10 percent significance for the all branches sample. There is evidence of the existence of a link at statistically significant levels in the all branches sample.

When using the dollar amount involved in the projects being assigned the results were as follows. The null hypothesis of independence are been rejected at the one percent level of significance when using dollar amount per project in all samples: America, Africa, Asia, and for all bilateral branches. Visual inspection of the differences between the observed values and the expected values seems to confirm the theoretical proposition that contribution agreements assigned without competition are used to solve the difficulty in quality measurement problem⁸. In Chapter 3, a more formal theoretical explanation is advanced to support this result.

Table 2.4 illustrates the results of the tests on the two types of links when using the number of projects. Therein, link A refers to the link with the method of allocation: open competition or contribution agreements and the monitoring difficulty according to quality. Link B refers to the link between the type of executing agency and monitoring

⁸ Even though the Chi-Square Test for Independence does not confirm the sign of the dependence between the two variables, visual inspection of the differences confirms the theoretical predictions.

difficulty according to quality. In Table 2.4 and subsequent similar tables, the percentage values refer to the significance levels for rejecting the null hypotheses of independence.

Table 2.4 Summary of results for the Chi-Square Test of independence. Number of projects. Null hypothesis: the two factors are independent against the alternative hypothesis that the two factors (type of executing agency and type of project) are dependent. Number of projects.		
	Link Tested	
Sample	Link A Method of allocation vs. monitoring difficulty	Link B Executing Agency vs. monitoring difficulty
America	10%	Non-sig.
Africa	1%	Non-sig.
Asia	1%	Non-sig.
All branches	1%	10%

Source: Empirical study conducted as part of this research on the database of the year 2003 projects published in CIDA's Contracts and Contribution Agreements.

This study finds some evidence on both types of links, which suggests that the method of allocation and the type of executing agency seem to be dependent of the degree of quality monitoring. Visual inspection and informal tests seem to suggest that easy-to-monitor projects tend to be assigned through open competition to FPs and that projects that are difficult to monitor according to quality are assigned to NFPs through contribution agreements.

When looking at the volume of funds assigned instead of the number of projects, the results are even stronger, as shown in Table 2.5.

Table 2.5 Summary of results for the Chi-Square Test of independence. Volume of dollars. Null hypothesis: the two factors are independent against the alternative hypothesis that the two factors (type of executing agency and type of project) are dependent. Volume of dollars.		
	Link Tested	
Sample	Link A Method of allocation vs. monitoring difficulty	Link B Executing Agency vs. monitoring difficulty
America	1%	1%
Africa	1%	1%
Asia	1%	1%
All branches	1%	1%

Source: Empirical study conducted as part of this research on the database of the year 2003 projects published in CIDA's Contracts and Contribution Agreements.

Thus there is solid evidence of the existence of both types of links being explored. It seems that the type of contract allocation and the type of executing agency are linked to the difficulty in quality monitoring. Visual inspection of the differences seem to suggest that funding for easy-to-monitor projects tends to be assigned by open competition to FPs, while funding for projects that are difficult to monitor is assigned directly to NFPs through contribution agreements. Further details on the tests performed are provided in Appendix A.

An alternative test was used as well to show the nature of the differences being studied in the above results. Specifically the normal distribution was used to test for the proportion of projects allocated through each method to both sectors. The results are indicative but not accurate since the proportions used may not be independent.

Appendix B presents the details as to how three confidence intervals were constructed for the two sample proportions: the proportion of difficult-to-monitor projects, and the proportion of easy-to-monitor projects. One should expect that projects that are difficult to monitor are assigned to NFPs through contribution agreements and that easy-to-monitor projects are assigned to FPs through contracts.

The results for the sample that includes all the bilateral geographical branches are as follows: For all branches, the sample size is 327 projects, the percentage of difficult-to-monitor projects is 35 percent, and the percentage of easy-to-monitor projects is 20 percent. Table 2.6 illustrates the proportion of difficult-to-measure and easy-to-measure

projects assigned through contracts and contribution agreements, as well as to different types of organizations (NFPs or FPs).

Table 2.6 Percentages of Type of Project according to monitoring difficulty (Easy or Difficult) by Type of project according to method of allocation of funds (CA or contract) and Type of Organization (FP or NFP). All Branches Sample.

Type of Project by Difficulty in Quality Monitoring					
Type of Project by Method of Allocation	Difficult to Monitor	Easy to Monitor	Mixed	Unknown	Total
Contract	23%	25%	50%	2%	100%
CA	46%	15%	37%	2%	100%
Total	35%	20%	43%	2%	100%
Type of Project by Difficulty in Quality Monitoring					
Organization Type	Difficult to Monitor	Easy to Monitor	Mixed	Unknown	Total
Unknown	29%	14%	52%	5%	100%
NFPs	46%	16%	36%	2%	100%
Charities					
Other NFP	40%	25%	35%	0%	100%
Non-charities					
FPs	23%	21%	54%	2%	100%
Government	29%	23%	46%	2%	100%
Total	35%	20%	43%	2%	100%

Source: Empirical study conducted by this research on the database of the year 2003 projects published in CIDA's Contracts and Contribution Agreements.

Notes:

- (1) The columns titled “Mixed” and “Unknown” include projects that were not possible to classify as difficult or easy to monitor.
- (2) Percentages inside cells indicate the joint probability of being in one of the organization types or methods of allocation and at the same time being difficult or easy to measure. For example, the proportion of easy-to-monitor projects that are executed by FPs is 21 percent. The number of projects that yielded the percentages in Table 2.6 are included in Tables A7 and A8 in Appendix A.
- (3) The relevant percentages used in the next study are highlighted in bold and italics⁹.

Three confidence intervals were constructed at a one-, five-, and ten-percent margins of error around the sample proportions -35 percent and 20 percent, for projects that are difficult and easy to monitor respectively. See Appendix B for the detailed procedure that yielded the confidence intervals in Tables 2.7 and 2.8.

⁹ It is worth noticing that the percentages add to the proportion value taken as a reference for the construction of the confidence interval which violates the principle of independence.

Table 2.7 Difficult-to-monitor projects. All Branches Sample. Sample 327 projects. Sample proportion 35 percent. Confidence Intervals.		
Margin of Error	Lower Limit	Upper Limit
1%	28%	42%
5%	30%	40%
10%	31%	39%

Source: Empirical study conducted as part of this research on the database of the year 2003 projects published in CIDA's Contracts and Contribution Agreements.

Table 2.8 Easy-to-monitor projects. All Branches Sample. Sample 327 projects. Sample proportion 20 percent. Confidence Intervals.		
Margin of Error	Lower Limit	Upper Limit
1%	14%	26%
5%	16%	24%
10%	16%	24%

Source: Empirical study conducted as part of this research on the database of the year 2003 projects published in CIDA's Contracts and Contribution Agreements.

Now, using the confidence intervals constructed above, the next step is to test if the proportion of projects allocated as CAs or contracts is significantly low or high compared to the proportion of projects for that subsample. Chart 7 illustrates the results of a the test on the link between the type of project with respect to quality monitoring difficulty and the type of project allocation (CAs or contracts) for difficult-to-monitor projects:

Chart 7. Difficult-to-monitor projects. All Branches Sample. Confidence Intervals with the Relative Position of Type of Project (Contribution Agreement versus Contract) Percentages.

The proportion of difficult-to-monitor projects assigned through contracts, 23 percent, is significantly lower than the average of 35 percent for difficult-to-monitor projects in the same sample. The proportion of difficult-to-monitor projects assigned through contribution agreements in the all-branches sample, 46 percent, is significantly higher than this average. On both sides, then the actual observed percentages fall outside the confidence interval one would expect if they had been distributed by a similar process.

The same sort of analysis can be applied to the link between the type of project with respect to quality monitoring and the type of executing organization for difficult-to-monitor projects.

Chart 8. Difficult-to-Monitor projects. All Branches Sample. Confidence Intervals and Relative Position of Type of Organization Percentages.

It is useful to highlight that by sheer coincidence the proportion of difficult-to-monitor projects assigned to FPs (24 difficult-to-monitor projects assigned to FPs of the 104 projects assigned to FPs, or 23 percent) happens to be the same as the proportion of contracts that are difficult to monitor (23 percent or 36 contracts that are difficult to monitor of 157 contracts). The proportion of difficult-to-monitor projects assigned to NFPs (52 of 112, or 46 percent) of the total number of projects assigned to NFPs (112) happens to be the same as the proportion of CAs that are difficult to monitor (46 percent, or 78 CAs that are difficult to monitor of 157 CAs) of the total number of CAs.

The proportion of difficult-to-monitor projects assigned to NFPs (as defined by the charities list) in the all-branches sample, 46 percent, is significantly higher than the average of 35 percent for difficult-to-monitor projects in the same sample. Similarly, the proportion of difficult-to-monitor projects assigned to FPs in the all-branches sample, 23 percent, is significantly low, compared to the average of 35 percent for hard to monitor projects in the same sample. Again, the conclusion is that there is a link between project type and executing agency; the difficult to monitor projects are not being distributed

“randomly.” In the subsample of easy-to-monitor projects, similar results are found.

However, this time there is a bias in favour of the FP group and contracts.

We now explore the link between the type of project with respect to quality monitoring difficulty and the type of contract agreement (contribution agreement versus contract) within the subsample of easy-to-monitor projects.

Chart 9. Easy-to-monitor projects. All Branches Sample. Confidence Intervals and Relative Position of Type of Contract Percentages.

The proportion of easy-to-monitor projects assigned through contracts in the All Branches sample, 25 percent, is significantly higher than the average of 20 percent for easy-to-monitor projects in the same sample. The proportion of easy-to-monitor projects assigned through contribution agreements in the All Branches sample, 15 percent, is significantly lower than the average of 20 percent for easy-to-monitor projects in the same sample. Again, easy-to-monitor projects seem to be assigned significantly more frequently through contribution agreements than through contracts.

Finally, Chart 10 explores the link between the type of project with respect to quality monitoring difficulty and the type of organization within the sample of easy-to-monitor projects:

Chart 10. Easy-to-monitor projects. All Branches Sample. Confidence Intervals and Relative Position of Type of Contract Percentages.

The proportion of easy-to-monitor projects assigned to NFPs (charities in particular) in the All Branches sample, 16 percent, equals the lower boundary of 16 percent for the proportion of easy-to-monitor projects in the same sample. The proportion of easy-to-monitor projects assigned to FPs in the All Branches sample, 21 percent, is only slightly higher than the average of 20 percent for easy-to-monitor projects in the same sample. However, it is still within the boundaries of the confidence interval, and therefore not significantly higher.

The links explained above were also tested in each geographical branch subsample separately. The results for most cases are similar to those obtained with the all-branches sample reported above and can be found in Appendix B.

2.6: Conclusions

NFP and FP participation in the aid program started almost as early as CIDA itself. This has created a diversity of delivery channels. Official aid started as government-to-government aid with the help of domestic executing agencies of both sectors. Soon after, a specific channel for CIDA to relate to the NFP sector appeared and grew. Even though the FP sector soon had a similar specific channel with which to relate to CIDA within the Canadian Partnership branch, it was much smaller and more limited. Bilateral aid remained the almost exclusive domain of the FP sector until CIDA introduced the practice of funding big NFP organizations through bilateral aid as well. However, while the FP potential partners had to compete for CIDA projects, the NFP partner organizations were assigned funds out of competition.

After 1997, CIDA seems to have pursued more competition for both sectors. It opened the competition for projects to the NFP sector although, in 2003, assigned funds to the NFP sector outside this mechanism. It is worth noting that even when bilateral aid counted on domestic partners since its beginnings in the 1950s, statistics on separate disbursements through each sector are not readily available until 1997. A contribution of this research is to uncover an analysis of the executing agencies before and after 1997 and updated to 2003.

A question that still has no answer is how CIDA sets its preferences over each domestic partner and over them as a whole and over recipient country partners. The results of this

research show a balanced amount of bilateral funds flowing through each of the two competing sectors, more NFP participation in the bilateral branches after 1997, relatively less bilateral funds through the FP sector after 1997, and definitely no change in the dominance of the NFP sector in the Canadian Partnership branch.

A number of simple empirical tests were used to determine links between the difficulty in project quality monitoring and the type of executing agency in bilateral aid. We found some evidence that the type of executing agency (NFP or FP) and the type of project allocation (CA or contract) seem to be linked to the difficulty in quality monitoring of the project. Visual inspection of the descriptive statistics seem to suggest that projects that are difficult to evaluate tend to be executed by NFPs under the modality of contribution agreements, while easy-to-monitor projects tend to be executed by FPs as contracts. The next two chapters of the thesis will provide a theoretical as well as a more sophisticated empirical analysis for the evidence found in this chapter.

Preliminary empirical tests appendices

Appendix A. Chi-Square Test

The source of all tables and information presented in Appendix A and Appendix B are the empirical tests performed during this research based on the CIDA's Contracts and Contribution Agreements for the year 2003.

The technique used is the Two-Sample Chi-Square Test for Independence. This test consists of a chi-square statistic that indicates the difference between expected independent indicators and observed values. If the computed statistic is higher than a chi-square critical value, the null is rejected. This implies that the method used for project allocation by CIDA's geographical branches depends on the degree of difficulty involved in measuring quality.

The null hypothesis states that the method used for project allocation (by contract or contribution agreement) and the degree of difficulty in quality monitoring are independent. It is tested against the alternative hypothesis according to which the method used for project allocation depends on the degree of difficulty in quality monitoring.

The complete samples in terms of difficulty in quality monitoring include projects that are difficult to monitor, projects that are easy to monitor, and projects with mixed or unknown difficulty in quality monitoring. The complete samples in terms of the type of executing agency include FPs, charities, Non-charities NFPs, governmental and international agencies.

The following tables show the results of the test for the sample of projects in the America's branch.

Tables A1: America's sample.

**Testing the allocation method used vs. difficulty in quality monitoring.
Number of Projects**

Observed values or O_{ij}
Method of allocation (i)

Contract

CA

Total

Monitoring difficulty (j)

Difficult	Easy	Mixed	Unknown	Total
4	5	13	2	24
21	6	24	1	52
25	11	37	3	76

Expected values or E_{ij}
Method of allocation (i)

Contract

CA

Monitoring difficulty (j)

Difficult	Easy	Mixed	Unknown
7.89	3.47	11.68	0.95
17.11	11.00	25.32	2.05

Observed - Expected
Method of allocation (i)

Contract

CA

Monitoring difficulty (j)

Difficult	Easy	Mixed	Unknown
-3.89	1.53	1.32	1.05
3.89	-5.00	-1.32	-1.05

Observed values exceed expected for:
contracts where monitoring is easy or mixed
CA where monitoring is hard

$i=1...r$ $j=1...k$
 $[(O_{ij}-E_{ij})^2/E_{ij}]$

row 1

row 2

Total

$r=2$

$k=4$

column 1	column 2	column 3	column 4	Total
1.92	0.67	0.15	1.17	3.91
0.89	2.27	0.07	0.54	3.77
2.81	2.94	0.22	1.71	7.68

Statistic:

7.68

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (4-1) = 3$
3 degrees of freedom

Critical values:

1% significance	11.30
5% significance	7.81
10% significance	6.25

Conclusions: Tables A1

The null is rejected at ten percent significance. The method used for project allocation depends on the degree of difficulty in quality monitoring in the sample analyzed. The sign of the differences between observed and expected frequencies seem to suggest that easy-to-monitor projects tend to be assigned through contracts, while difficult-to-monitor projects tend to be assigned through contribution agreements.

The following tables show the tests of independence between the type of executing agency and the difficulty in quality monitoring, using the sample of projects of the America's branch.

Tables A2: America's sample**Type of executing organization used vs. Difficulty in quality monitoring**

Observed values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Total

Monitoring difficulty (j)				
Difficult	Easy	Mixed	Unknown	Total
2	5	14	1	22
19	4	13	1	37
3	2	5	0	10
1	0	4	1	6
0	0	1	0	1
25	11	37	3	76

Expected values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Monitoring difficulty (j)

	Difficult	Easy	Mixed	Unknown
For profit	7.24	3.18	10.71	0.87
Non-profit Charities	12.17	5.36	18.01	1.46
Non-profit Non-charities	3.29	1.45	4.87	0.39
Government Agencies	1.97	0.87	2.92	0.24
Unknown	0.33	0.14	0.49	0.04

Observed - Expected

Method of allocation (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Monitoring difficulty (j)

	Difficult	Easy	Mixed	Unknown
For profit	-5.24	1.82	3.29	0.13
Non-profit Charities	6.83	-1.36	-5.01	-0.46
Non-profit Non-charities	-0.29	0.55	0.13	-0.39
Government Agencies	-0.97	-0.87	1.08	0.76
Unknown	-0.33	-0.14	0.51	-0.04

Observed values exceed expected for:

Projects executed by for-profit and non-charities firms where monitoring is easy

Projects executed by non-profit firms where monitoring is hard

i=1...r j=1...k $[(O_{ij}-E_{ij}) \times (O_{ij}-E_{ij})] / E_{ij}$

row 1

row 2

row 3

row 4

row 5

Total

R=5	k=4				
	column 1	column 2	column 3	column 4	Total
row 1	3.79	1.04	1.01	0.02	5.86
row 2	3.83	0.34	1.40	0.15	5.71
row 3	0.03	0.21	0.00	0.39	0.63
row 4	0.48	0.87	0.40	2.46	4.21
row 5	0.33	0.14	0.54	0.04	1.05
Total	8.46	2.60	3.35	3.06	17.47

Statistic:**17.47**Degrees of freedom: $(r-1) \times (k-1) = (5-1) \times (4-1) = 12$

12 degrees of freedom

Critical values:

1% significance

26.20

5% significance

21.00

10% significance

18.50

Conclusions: Tables A2.

The null cannot be rejected at ten percent significance. The two factors appear to be independent.

The following tables A3 to A8 show similar tests for the sample of projects in the Africa, Asia and All-Branches samples.

Tables A3

Africa's sample

Allocation method used vs. Difficulty in quality monitoring

Number of projects according to method of allocation and degree of monitoring difficulty.

Observed values or O_{ij} Method of allocation (i)	Monitoring difficulty (j)				Total
	Difficult	Easy	Mixed	Unknown	
Contract	22	23	30	1	76
CA	39	11	13	2	65
Total	61	34	43	3	141

Expected values or E_{ij} Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	32.88	18.33	23.18	1.62
CA	28.12	34.00	19.82	1.38

Observed – Expected Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	-10.88	4.67	6.82	-0.62
CA	10.88	-23.00	-6.82	0.62

Observed values exceed expected for:
 Contracts where monitoring is easy or mixed
 CA where monitoring is hard

i=1...r	j=1...k	r=2	k=4		
[(Oij-Eij)x(Oij-Eij)]/Eij		column 1	column 2	column 3	column 4
row 1		3.60	1.19	2.01	0.24
row 2		4.21	15.56	2.35	0.28
Total		7.81	16.75	4.36	0.51
					29.43

Statistic: **29.43**

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (4-1) = 3$

3 degrees of freedom

Critical values:

1% significance	11.30
5% significance	7.81
10% significance	6.25

Conclusions: Tables A3

Reject the null hypothesis at one percent. The two factors being analyzed are dependent.

Tables A4:

Africa's sample

Type of executing organization used vs. Difficulty in quality monitoring

Observed values	Monitoring difficulty (j)				
Executing organization (i)	Difficult	Easy	Mixed	Unknown	Total
For profit	17	12	18	1	48
Non-profit Charities	22	6	6	1	35
Non-profit Non-charities	11	8	5	0	24
Government Agencies	6	5	6	0	17
Unknown	5	3	8	1	17
Total	61	34	43	3	141

Expected values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Monitoring difficulty (j)

Difficult Easy Mixed Unknown

20.77 11.57 14.64 1.02

15.14 8.44 10.67 0.74

10.38 5.79 7.32 0.51

7.35 4.10 5.18 0.36

7.35 4.10 5.18 0.36

Observed – Expected

Method of allocation (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Monitoring difficulty (j)

Difficult Easy Mixed Unknown

-3.77 0.43 3.36 -0.02

6.86 -2.44 -4.67 0.26

0.62 2.21 -2.32 -0.51

-1.35 0.90 0.82 -0.36

-2.35 -1.10 2.82 0.64

i=1...r j=1...k**r=5 k=4** $[(O_{ij}-E_{ij}) \times (O_{ij}-E_{ij})]/E_{ij}$ column 1 column 2 column 3 column 4 **Total**row 1 0.68 0.02 0.77 0.00 **1.47**row 2 3.11 0.71 2.05 0.09 **5.95**row 3 0.04 0.85 0.73 0.51 **2.13**row 4 0.25 0.20 0.13 0.36 **0.94**row 5 0.75 0.29 1.53 1.13 **3.70****Total 4.83 2.06 5.21 2.09 14.19****Statistic:****14.19**Degrees of freedom: $(r-1) \times (k-1) = (5-1) \times (4-1) = 12$

12 degrees of freedom

Critical values:

1% significance 26.20

5% significance 21.00

10% significance 18.50

Conclusions: Tables A4

The null hypothesis cannot be rejected at ten percent. The two factors seem to be independent.

Tables A5 Asia's sample

Allocation method used vs. Difficulty in quality monitoring

Number of projects according to method of allocation and degree of monitoring difficulty.

Observed values or O _{ij} Method of allocation (i)	Monitoring difficulty (j)				Total
	Difficult	Easy	Mixed	Unknown	
Contract	10	12	35	0	57
CA	18	8	27	0	53
Total	28	20	62	0	110

Expected values or E _{ij} Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	14.51	10.36	32.13	0.00
CA	13.49	20.00	29.87	0.00

Observed – Expected Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	-4.51	1.64	2.87	0.00
CA	4.51	-12.00	-2.87	0.00

Observed values exceed expected for:
contracts where monitoring is easy or mixed
CA where monitoring is Difficult

$i=1...r$ [(O _{ij} -E _{ij})x(O _{ij} -E _{ij})]/E _{ij}	$j=1...k$				Total
	column 1	column 2	column 3	column 4	
row 1	1.40	0.26	0.26		1.92
row 2	1.51	7.20	0.28		8.98
Total	2.91	7.46	0.53		10.90

Statistic: **10.90**

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (3-1) = 2$

2 degrees of freedom

Critical values:

1% significance 9.21

5% significance 5.99

10% significance 4.61

Conclusions: Tables A5

Reject the null at one percent. The two factors are dependent.

Tables A6. Asia's sample

Type of executing organization used vs. Difficulty in quality monitoring

Observed values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Total

Monitoring difficulty (j)					
Difficult	Easy	Mixed	Unknown	Total	
5	5	24	0	34	
11	8	21	0	40	
8	4	9	0	21	
3	3	6	0	12	
1	0	2	0	3	
28	20	62	0	110	

Expected values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Monitoring difficulty (j)				
Difficult	Easy	Mixed	Unknown	
8.65	6.18	19.16	0.00	
10.18	7.27	22.55	0.00	
5.35	3.82	11.84	0.00	
3.05	2.18	6.76	0.00	
0.76	0.55	1.69	0.00	

Observed – Expected
Method of allocation (i)
 For profit
 Non-profit Charities
 Non-profit Non-charities
 Government Agencies
 Unknown

Monitoring difficulty (j)				
Difficult	Easy	Mixed	Unknown	
-3.65	-1.18	4.84	0.00	
0.82	0.73	-1.55	0.00	
2.65	0.18	-2.84	0.00	
-0.05	0.82	-0.76	0.00	
0.24	-0.55	0.31	0.00	

i=1...r j=1...k
 $[(O_{ij}-E_{ij}) \times (O_{ij}-E_{ij})] / E_{ij}$

row 1

row 2

row 3

row 4

row 5

Total

r=5 k=3				
column 1	column 2	column 3	column 4	Total
1.54	0.23	1.22		2.99
0.07	0.07	0.11		0.24
1.32	0.01	0.68		2.01
0.00	0.31	0.09		0.39
0.07	0.55	0.06		0.68
3.00	1.16	2.15		6.31

Statistic:

6.31

Degrees of freedom: $(r-1) \times (k-1) = (5-1) \times (3-1) = 8$

8 degrees of freedom

Critical values: Ref. Chi-square table of Page 895

1% significance 20.10

5% significance 15.50

10% significance 13.40

Conclusions: Tables A6

The null cannot be rejected at ten percent. The two factors are independent.

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (4-1) = 3$

3 degrees of freedom

Critical values:

1% significance	11.30
5% significance	7.81
10% significance	6.25

Conclusions: Tables A7

Reject the null at one percent. The two factors are dependent

Tables A8. All branches' sample

Type of executing organization used vs. Difficulty in quality monitoring

Observed values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Total

Monitoring difficulty (j)

Difficult	Easy	Mixed	Unknown	Total
24	22	56	2	104
52	18	40	2	112
22	14	19	0	55
10	8	16	1	35
6	3	11	1	21
114	65	142	6	327

Expected values

Executing organization (i)

For profit

Non-profit Charities

Non-profit Non-charities

Government Agencies

Unknown

Monitoring difficulty (j)

Difficult	Easy	Mixed	Unknown
36.26	20.67	45.16	1.91
39.05	22.26	48.64	2.06
19.17	10.93	23.88	1.01
12.20	6.96	15.20	0.64
7.32	4.17	9.12	0.39

Tables A9 to A16 explore the same links as the above tables A1 to A8 but using the amount of dollars assigned through each type of allocation method or to each type of executing agency.

Tables A9

America's sample

Project allocation method used vs. Difficulty in quality monitoring

Dollar Amount (\$ millions)

Observed values or Oij	Monitoring difficulty (j)				
Method of allocation (i)	Difficult	Easy	Mixed	Unknown	Total
Contract	194	172	479	122	967
CA	578	219	445	10	1,252
Total	772	391	924	132	2,219

Expected values or Eij	Monitoring difficulty (j)			
Method of allocation (i)	Difficult	Easy	Mixed	Unknown
Contract	336	170	403	58
CA	436	391	521	74

Observed - Expected	Monitoring difficulty (j)			
Method of allocation (i)	Difficult	Easy	Mixed	Unknown
Contract	-142.42	1.61	76.34	64.48
CA	142.42	-172.00	-76.34	-64.48

Note that:

Observed values exceed expected for:
contracts where monitoring is easy or mixed
CA where monitoring is difficult

i=1...r	j=1...k	r=2	k=4		
[(Oij-Eij)x(Oij-Eij)]/Eij		column 1	column 2	column 3	column 4
row 1		60.29	0.02	14.47	72.27
row 2		46.57	75.66	11.18	55.82
Total		106.86	75.68	25.65	128.09
					336.28

Statistic: 336.28

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (4-1) = 3$

3 degrees of freedom

Critical values:

1% significance	11.30
5% significance	7.81
10% significance	6.25

Conclusions: Tables A9

Reject the null at one percent. The two factors are dependent.

Tables A10

America's sample

Type of executing organization used vs. Difficulty in quality monitoring

Dollar amount (\$ millions)

Observed values	Monitoring difficulty (j)				
Executing organization (i)	Difficult	Easy	Mixed	Unknown	Total
For profit	101	172	500	3	776
Non-profit Charities	462	184	252	10	908
Non-profit Non-charities	142	36	92	0	270
Government Agencies	67	0	70	118	255
Unknown	0	0	10	0	10
Total	772	392	924	131	2,219

Conclusions: Tables A10

Reject the null at one percent. The two factors are dependent.

Tables A11**Africa's sample****Project allocation method used vs. Difficulty in quality monitoring****Dollar Amount (\$ millions)**

Observed values or Oij Method of allocation (i)	Monitoring difficulty (j)				
	Difficult	Easy	Mixed	Unknown	Total
Contract	652	1,404	1,072	39	3,167
CA	1,289	765	329	6	2,389
Total	1,941	2,169	1,401	45	5,556

Expected values or Eij Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	1,106	1,236	799	26
CA	835	2,169	602	19

Observed – Expected Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	-454	168	273	13
CA	454	-1,404	-273	-13

Observed values exceed expected for:

Contracts where monitoring is easy or mixed

CA where monitoring is Difficult

i=1...r j=1...k

	r=2 k=4				Total
	column 1	column 2	column 3	column 4	
[(Oij-Eij)x(Oij-Eij)]/Eij					
row 1	187	23	94	7	310
row 2	247	909	124	9	1,290
Total	434	932	218	16	1,599

Statistic: 1,599

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (4-1) = 3$

3 degrees of freedom

Critical values:

1% significance	11
5% significance	8
10% significance	6

Conclusions: Tables A11

Reject the null at one percent. The two factors are dependent.

Tables A12

Africa's sample

Type of executing organization used vs. Difficulty in quality monitoring

Observed values Executing organization (i)	Monitoring difficulty (j)				
	Difficult	Easy	Mixed	Unknown	Total
For profit	658	655	714	39	2,066
Non-profit Charities	874	272	151	3	1,300
Non-profit Non-charities	249	373	127	0	749
Government Agencies	131	515	216	0	862
Unknown	29	354	193	3	579
Total	1,941	2,169	1,401	45	5,556

Expected values Executing organization (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
For profit	722	807	521	17
Non-profit Charities	454	508	328	11
Non-profit Non-charities	262	292	189	6
Government Agencies	301	337	217	7
Unknown	202	226	146	5

Tables A13

Asia's sample

Project allocation method used vs. Difficulty in quality monitoring

Dollar Amount (\$ millions)

Observed values or Oij Method of allocation (i)	Monitoring difficulty (j)				
	Difficult	Easy	Mixed	Unknown	Total
Contract	309	529	1,749	0	2,587
CA	648	279	886	0	1,813
Total	957	808	2,635	0	4,400

Expected values or Eij Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	563	475	1,549	0
CA	394	808	1,086	0

Observed - Expected Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
Contract	-254	54	200	0
CA	254	-529	-200	0

Observed values exceed expected for:
contracts where monitoring is easy or mixed
CA where monitoring is Difficult

$i=1...r$ $j=1...k$	$r=2$		$k=3$		column	Total
	column 1	column 2	3	column 4		
$[(O_{ij}-E_{ij}) \times (O_{ij}-E_{ij})]/E_{ij}$						
row 1	114	6	26			146
row 2	163	346	37			546
Total	278	352	62			693

Statistic: **693**

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (3-1) = 2$
2 degrees of freedom

Critical values:

1% significance	9
5% significance	6
10% significance	5

Conclusions: Tables A13

Reject the null at one percent. The two factors seem to be dependent.

Tables A14**Asia's sample****Type of executing organization used vs. Difficulty in quality monitoring**

Observed values Executing organization (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
For profit	242	262	1,108	
Non-profit Charities	493	333	765	
Non-profit Non-charities	172	125	330	
Government Agencies	49	88	426	
Unknown	2	0	5	
Total	958	808	2,634	0

Expected values Executing organization (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
For profit	351	296	965	0
Non-profit Charities	346	292	952	0
Non-profit Non-charities	137	115	375	0
Government Agencies	123	103	337	0
Unknown	2	1	4	0

Observed - Expected Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
For profit	-109	-34	143	0
Non-profit Charities	147	41	-187	0
Non-profit Non-charities	35	10	-45	0
Government Agencies	-74	-15	89	0
Unknown	0	-1	1	0

Expected values or E_{ij}	Monitoring difficulty (j)			
Method of allocation (i)	Difficult	Easy	Mixed	Unknown
Contract	2,026	1,860	2,738	98
CA	1,644	3,369	2,221	79

Observed - Expected	Monitoring difficulty (j)			
Method of allocation (i)	Difficult	Easy	Mixed	Unknown
Contract	-871	245	561	64
CA	871	-2,105	-561	-64

Observed values exceed expected for:
 contracts where monitoring is easy or mixed
 CA where monitoring is Difficult

i=1...r	j=1...k	r=2	k=4			
		column				
[(Oij-Eij)x(Oij-Eij)]/Eij		column 1	column 2	3	column 4	Total
row 1		374	32	115	42	564
row 2		461	1,315	142	52	1,971
Total		836	1,348	257	94	2,535

Statistic: 2,535

Degrees of freedom: $(r-1) \times (k-1) = (2-1) \times (4-1) = 3$
 3 degrees of freedom

Critical values:

1% significance	11
5% significance	8
10% significance	6

Conclusions: Tables A15

Reject the null at one percent. The two factors seem to be dependent.

Tables A16

All branches' sample

Type of executing organization used vs. Difficulty in quality monitoring

Observed values Executing organization (i)	Monitoring difficulty (j)				
	Difficult	Easy	Mixed	Unknown	Total
For profit	1,001	1,088	2,321	42	4,452
Non-profit Charities	1,828	789	1,167	13	3,797
Non-profit Non-charities	562	534	549	0	1,645
Government Agencies	247	603	713	120	1,683
Unknown	32	354	209	3	598
Total	3,670	3,368	4,959	178	12,175

Expected values Executing organization (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
For profit	1,342	1,232	1,813	65
Non-profit Charities	1,145	1,050	1,547	56
Non-profit Non-charities	496	455	670	24
Government Agencies	507	466	686	25
Unknown	180	165	244	9

Observed - Expected Method of allocation (i)	Monitoring difficulty (j)			
	Difficult	Easy	Mixed	Unknown
For profit	-341	-144	508	-23
Non-profit Charities	683	-261	-380	-43
Non-profit Non-charities	66	79	-121	-24
Government Agencies	-260	137	27	95
Unknown	-148	189	-35	-6

i=1...r j=1...k

r=5 k=4

$[(O_{ij}-E_{ij}) \times (O_{ij}-E_{ij})]/E_{ij}$

row 1

row 2

row 3

row 4

row 5

Total

column				
column 1	column 2	3	column 4	Total
87	17	142	8	254
408	65	93	33	599
9	14	22	24	68
134	41	1	370	545
122	215	5	4	346
759	351	263	438	1,812

Statistic: 1,812

Degrees of freedom: $(r-1) \times (k-1) = (5-1) \times (4-1) = 12$

12 degrees of freedom

Critical values:

1% significance 26

5% significance 21

10% significance 19

Conclusions: Tables A16

Reject the null at one percent. The two factors seem to be dependent.

Appendix B. The Normal test.

This study is another way of confirming the test described in Appendix A. Assuming that the sample proportion follows the Normal distribution¹⁰, this study consists of constructing confidence intervals around the sample proportion and comparing the subsample proportions of interest. For example, if the sample proportion of difficult-to-measure projects is 33 percent and there is a confidence interval defined around 33 percent, the proportion of difficult-to-measure projects assigned through contracts (rather than contribution agreements) is compared to the interval boundaries. If found that the proportion of difficult-to-measure projects that are assigned specifically through contracts is below the lower boundary, there is evidence supporting the hypothesis that difficult-to-measure projects tend to be assigned by means other than the competitive mechanism.

Results in the Americas branch:

In the Americas branch, the sample size is 76 projects, the percentage of difficult-to-measure projects (type one) is 33 percent, and the percentage of easy-to-measure projects (type three) is 14 percent. The following tables illustrate the proportion of projects type one and type three assigned through contracts and contribution agreements, as well as the proportion of such projects assigned to different types of organizations, such as charities or for-profit firms.

¹⁰ It is worth mentioning that this test is not the one commonly used to show the link between two characteristics of the variables involved. It should also be stated that the proportions being compared add to the number used as a reference, therefore may not be independent. We decided to add this test as a ways of showing the remarkable regularities found in the data in favour of the links found in Appendix A.

Tables B1. America**Percentages of Type of Project by Type of Contract and Type of Organization.****America.**

Type of Project	Type of Monitoring Difficulty		Total
	Difficult	Easy	
Contract	17%	21%	32%
CA	40%	12%	68%
Total	33%	14%	100%

Organization Type	Type of Monitoring Difficulty		Total
	Difficult	Easy	
Unknown			1%
Charities	51%	11%	49%
NFP	30%	20%	13%
FP	9%	23%	29%
Gov	17%		8%
Total	33%	14%	100%

Three confidence intervals were constructed at one, five and ten percent margin of error around the sample proportions 33 percent and 14 percent for difficult-to-measure projects and easy-to-measure projects respectively.

Difficult-to-measure project. America. Sample 76 projects. Sample proportion 33 percent.

Margin of Error	Lower Limit	Upper Limit
1%	19%	47%
5%	22%	44%
10%	24%	42%

Easy-to-measure project. America

Sample of 76 projects. Sample proportion 14 percent.

Margin of Error	Lower Limit	Upper Limit
1%	4%	24%
5%	6%	22%
10%	7%	21%

The following is a test of the link between the type of project with respect to quality monitoring difficulty and the type of contract agreement for difficult-to-measure projects:

Chart B1. Difficult-to-measure projects. America. Confidence Intervals and Relative Position of Type of Project Percentages.

The proportion of difficult-to-measure projects assigned through contracts in America, which is 17 percent, is significantly low compared to the average of 33 percent for difficult-to-measure projects in the same sample.

The proportion of difficult-to-measure projects assigned through contribution agreements in America, which is 40 percent, is very close to the upper limit of the 10 percent confidence interval. It could be considered high compared to the average of 33 percent for difficult-to-measure projects in the same sample, although not significantly high.

The following is a test of the link between the type of project with respect to quality monitoring and the type of executing agency, using the sub sample of difficult-to-measure projects.

Chart B1. Difficult-to-measure projects. America. Confidence Intervals and Relative position of Type of Organization Percentages.

The proportion of difficult-to-measure projects assigned to charities in America, which is 51 percent, is significantly high compared to the average of 33 percent for the same type of projects in the same sample.

The proportion of difficult-to-measure projects assigned to FPs in America, which is nine percent, is significantly low compared to the average of 33 percent for the same type of projects in the same sample.

The following is a test of the link between the type of project with respect to quality monitoring and the type of contract agreement for easy-to-monitor projects.

Chart B1. Easy-to-measure projects. America. Confidence Intervals and Relative Position of Type of Project Percentages.

The proportion of easy-to-measure projects assigned through contracts in America, which is 21 percent, equals the upper limit of the confidence interval for the proportion of the same type of projects in the sample, so it could be considered high compared to the average of 14 percent for the same type of projects in the same sample.

The proportion of easy-to-measure projects assigned through contribution agreements in America, which is 12 percent, is lower than the average for the sample, which is 14 percent, but it is still within the limits of the 10 percent confidence interval, therefore not to be considered significantly lower.

The following is a test of the link between the type of project with respect to quality monitoring and the type of organization for easy-to-monitor projects:

Chart B1. Easy-to-measure Projects. America. Confidence Intervals and Relative position of Type of Organization Percentages.

The proportion of easy-to-measure projects assigned to charities in America, which is 11 percent, is lower than the average of 14 percent for the same type of projects in the same sample, although it is still within the limits of the confidence interval and cannot be considered to be significantly low.

The proportion of easy-to-measure projects assigned to FPs in America, which is 23 percent, is significantly higher than the average of 14 percent for the same type of projects in the same sample.

Results in the Africa branch.

In the Africa branch, the sample size is 141 projects, the percentage of difficult-to-monitor projects is 43 percent, and the percentage of easy-to-measure projects is 24 percent. The following tables illustrate the proportion of difficult-to-measure projects and easy-to-measure projects assigned through contracts and contribution agreements as well as to different types of organizations such as charities or FP firms.

Tables B2. Percentages of Type of Project (according to difficulty in quality monitoring), Type of Contract and Type of Organization. Africa.

Type of Project in terms of Quality Monitoring Difficulty			
Type of Contract	Difficult	Easy	Total
Contract	29%	30%	54%
CA	60%	17%	46%
Total	43%	24%	100%

Type of Project in terms of Quality Monitoring Difficulty			
Organization Type	Difficult	Easy	Total
Unknown	29%	18%	12%
Charities	63%	17%	25%
NFP	46%	33%	17%
FP	35%	25%	34%
Gov	35%	29%	12%
Total	43%	24%	100%

Three confidence intervals were constructed at one percent, five percent and ten percent margin of error around the sample proportions 43 percent and 24 percent for difficult-to-monitor projects and easy-to-monitor projects respectively.

Difficult-to-measure projects. Confidence Intervals. Africa

Difficult-to-measure project. Africa. Sample 141 projects. Sample proportion 43 percent

Margin of Error	Lower Limit	Upper Limit
1%	32%	54%
5%	35%	51%
10%	36%	50%

Easy-to-monitor projects. Africa. Confidence Intervals.

Sample 141 projects. Sample proportion 24 percent.

Margin of Error	Lower Limit	Upper Limit
1%	15%	33%
5%	17%	31%
10%	18%	30%

The following is a test of the link between the type of project with respect to quality monitoring and the type of contract agreement for difficult-to-monitor projects.

Chart B2. Difficult-to-measure Project. Africa. Confidence Intervals and Relative Position of Type of Project Percentages.

The proportion of difficult-to-measure projects assigned through contracts in Africa, which is 29 percent, is significantly low compared to the average of 43 percent for difficult-to-measure projects in the same sample.

The proportion of difficult-to-measure projects assigned through contribution agreements in Africa, which is 60 percent, is significantly higher compared to the upper limit of the 10 percent confidence interval.

The following is a test of the link between the type of project with respect to quality monitoring and the type of executing agency, using the sub sample of difficult-to-measure projects.

Chart B2. Difficult-to-measure Projects. Africa. Confidence Intervals and Relative position of Type of Organization Percentages.

The proportion of difficult-to-measure projects assigned to charities in Africa, which is 63 percent, is significantly high compared to the average of 43 percent for the same type of projects in the same sample.

The proportion of difficult-to-measure projects assigned to FPs in Africa, which is 35 percent, is significantly low compared to the average of 43 percent for the same type of projects in the same sample.

The following is a test of the link between the type of project with respect to quality monitoring and the type of contract agreement for easy-to-monitor projects.

Chart B2. Easy-to-measure Projects. Africa. Confidence Intervals and Relative Position of Type of Project Percentages.

The proportion of easy-to-measure projects assigned through contracts in Africa, which is 30 percent, equals the upper limit of the confidence interval for the proportion of the same type of projects in the sample, so it could be considered high (not significantly high) compared to the average of 24 percent for the same type of projects in the same sample.

The proportion of easy-to-measure projects assigned through contribution agreements in Africa, which is 17 percent, could be considered low compared to the average for the sample, which is 24 percent.

The following is a test of the link between the type of project with respect to quality monitoring and the type of organization for easy-to-monitor projects:

Chart B2. Easy-to-monitor Project. Africa. Confidence Intervals and Relative position of Type of Organization Percentages.

The proportion of easy-to-measure projects assigned to charities in Africa, which is 17 percent, is low compared to the average of 24 percent for the same type of projects in the same sample.

The proportion of easy-to-measure projects assigned to FPs in Africa, which is 25 percent, is higher compared to the average of 24 percent for the same type of projects in the same sample, but only slightly higher, not significantly higher.

Results in the Asia branch

In the Asia branch, the sample size is 110 projects, the percentage of difficult-to-measure projects is 25 percent, and the percentage of easy-to-measure projects is 18 percent. The following tables illustrate the proportion of difficult-to-monitor projects and easy-to-monitor projects assigned through contracts and contribution agreements as well as to different types of organizations such as charities or FP firms.

Tables B3. Percentages of Type of Project by Type of Contract and Type of Organization. Asia.

Type of Project According to Quality Monitoring Difficulty			
Type of Contract	Difficult	Easy	Total
Contract	18%	21%	52%
CA	34%	15%	48%
Total	25%	18%	100%

Type of Project According to Quality Monitoring Difficulty			
Organization Type	Difficult	Easy	Total
Unknown	33%	0%	3%
Charities	28%	20%	36%
NFP	38%	19%	19%
FP	15%	15%	31%
Gov	25%	25%	11%
Total	25%	18%	100%

Three confidence intervals were constructed at one percent, five percent and ten percent margin of error around the sample proportions of 25 and 18 percent for difficult-to-measure projects and easy-to-measure projects respectively.

Difficult-to-measure Projects. Asia. Sample 110 projects. Sample proportion 25 percent. Confidence Intervals

Margin of Error	Lower Limit	Upper Limit
1%	14	36
5%	17	33
10%	18	32

Easy-to-measure Projects. Asia. Sample 110 projects. Sample proportion 18 percent.
Confidence Intervals.

Margin of Error	Lower Limit	Upper Limit
1%	9	27
5%	11	25
10%	12	24

The following is a test on the link between the type of project with respect to quality monitoring and the type of project for difficult-to-monitor projects.

Chart B3. Difficult-to-monitor Projects. Asia. Confidence Interval and Relative Position of Type of Project Percentages.

The proportion of difficult-to-measure projects assigned through contracts in Asia, which is 18 percent, is equal to the lower boundary of the confidence interval, therefore not significantly lower than the average of 25 percent for difficult-to-measure projects in the same sample.

The proportion of difficult-to-measure projects assigned through contribution agreements in Asia, which is 34 percent, is significantly higher compared to the upper limit of the 10 percent confidence interval.

The following is a test of the link between the type of project with respect to quality monitoring and the type of executing agency, using the sub sample of difficult-to-measure projects.

Chart B3. Difficult-to-measure Projects. Asia. Confidence Intervals and Relative position of Type of Organization Percentages.

The proportion of difficult-to-measure projects assigned to charities in Asia, which is 28 percent, is higher than the average of 25 percent for the same type of projects in the same sample, although still within the limits of the confidence interval, therefore not to be considered significantly higher.

The proportion of difficult-to-measure projects assigned to FPs in Asia, which is 15 percent, is significantly low compared to the average of 25 percent for the same type of projects in the same sample.

The following is a test of the link between the type of project with respect to quality monitoring and the type of contract agreement for easy-to-monitor projects.

Chart B3. Easy-to-measure Projects. Asia. Confidence Intervals and Relative Position of Type of Project Percentages.

The proportion of easy-to-measure projects assigned through contracts in Africa, which is 21 percent, is higher than the average of 18 percent for the same type of projects in the same sample, however it is still within the limits of the confidence interval so it cannot be considered significantly higher.

The proportion of easy-to-measure projects assigned through contribution agreements in Asia, which is 15 percent, is lower than the average of 18 percent for the same type of projects in the same sample, however it is still within the limits of the confidence interval so it cannot be considered significantly lower.

The following is a test of the link between the type of project with respect to quality monitoring and the type of organization for easy-to-monitor projects:

Chart B3. Easy-to-measure Projects. Asia. Confidence Intervals and Relative Position of Type of Organization Percentages.

The proportion of easy-to-measure projects assigned to charities in Asia, which is 15 percent, is low compared to the average of 18 percent for the same type of projects in the same sample, but not significantly low.

The proportion of easy-to-measure projects assigned to FPs in Africa, which is 20 percent, is high compared to the average of 18 percent for the same type of projects in the same sample, but only slightly higher, not significantly higher.

Chapter 3: Theoretical aspects

3.1: Introduction

In Chapter 2 we learned the history of the different channels through which the Canadian International Development Agency (CIDA) relates to its domestic partners. In this chapter we will review the existing economic theories that help us understand the competition for CIDA's funding between the not-for-profit and for-profit sectors. We develop a new model that links two important bodies of economic literature, the not-for-profit literature and auction theory.

CIDA relies on links to Canadian organizations from the private sector, both for-profit and not-for-profit firms, to procure services related to development projects in developing countries. In Chapter 2 we identified the channels through which CIDA relates to the private sector. There is one branch at CIDA, Canadian Partnership, that offers funds directly to not-for-profits or for-profit firms to support their activities in developing countries. The bilateral branches, which is intended to deal with government-to-government cooperation agreements, also uses domestic sectors but in this case as executing agencies. Bilateral branches have two ways to relate to domestic executing agencies. First, CIDA can sign a contribution agreement through which it contributes to a project originating within the domestic partner, provided the project falls within the framework approved by government. Second, CIDA can hire a domestic partner to simply execute a contract. It is in the latter case that CIDA's bilateral branches auction each project as a contract, and award it to the bidder that submits the best bid in a sealed envelope.

Initially, CIDA restricted the bidding for contracts to for-profit firms. In 1997, however, the bidding process was altered to permit not-for-profits to bid as well. The new process did more than expand the number of bidders; now there was another distinct type of possible executing agency. The consequences are therefore conceivably quite different than would occur simply as a result of more bidders.

The central question for this chapter is to identify the conditions under which a not-for-profit firm might win a CIDA contract in competition against for-profit firms. Several related questions emerge as a consequence. First, the distinct bidding groups may have different qualities that imply different monitoring costs to CIDA, a feature that CIDA may identify through the quality screening process it uses, or which may arise from its own ex-ante expectations with respect to both groups.

Second, it may be that the payment to the bidder is the variable that determines the winner, which in turn is influenced by the cost to the bidder of executing the project. If that is the case, the not-for-profit group may win either way. It could win because it is the low-cost bidder. Alternatively, it could win because of a case described by auction theory in which the winner of the auction may not necessarily be the bidder with the lowest cost. This is because the bid of the low cost firm will attempt to balance its desire to ensure that it wins with its quest for maximum profits. This chapter then also looks into the questions: Under what circumstances would low cost firms lose because they bid too high? Will the entrance of a new and distinct group of competitors affect this process?

Can we identify the probability distributions of costs that would result in a discriminatory asymmetric government procurement first-price auction where the lowest-cost bidder does not win the contract?

Third, CIDA may prefer one group to the other for some non-economic reason. This may be so even if the monitoring cost and payments are not different. How might perceptions of quality affect the bidding process? Under what circumstances will CIDA “prefer” one group over another? Finally, can we say anything about CIDA’s welfare under these different bidding scenarios?

To answer these questions we first define the government’s problem, then turn to the existing not-for-profit theory to define the problem faced by the not-for-profit firms when competing with for-profit firms, and to specify their interactions with government. Then we turn to auction theory to answer questions related to our government procurement auction case. We find in these two separate bodies of theory the closest references to our case, and from them we develop a new model that borrows aspects of both in order to answer the preceding questions.

What distinguishes our model from others is that while the not-for-profit literature refers to interactions between private for-profit firms, the not-for-profit sector, and government, it does not incorporate the insights from auction theory. The existing auction theory, however, does not deal with not-for-profit firms. In auction theory, the closest references are to the case of government procurement auctions with two types of bidders, domestic

and foreign firms. The source of asymmetry between the domestic and foreign firms is purely anecdotal; the papers that describe this case do not formalize the problem faced by the typical bidder in each group, nor do they refer to our auction rules, which are those of first-price sealed-bid auction. In both the not-for-profit and auction literatures there is mention of the increasing importance of their respective objects of study. Not-for-profit firms are seen more often as being in competition with their for-profit counterparts, including competition for government contracts, while procurement auctions are mentioned as occupying an increasingly important place in current economic life. Despite the growing importance of these two areas of research, however, the links between them remain largely unexplored. Our model tries to fill some of the gaps.

3.2: Literature review

3.2.1: The literature on not-for-profit firm production theory

In one of the earliest formal analyses of not-for-profits, Joseph Newhouse (1970) models the incentives and optimization problem faced by a not-for-profit firm. He develops a diagrammatic model to predict the levels of quantity and quality that a not-for-profit firm will produce; assuming the presence of a utility maximizing administrator whose preference function depends on the quantity and quality of services provided. While he examines the hospital industry specifically, the model is applicable to other fields where the presence of not-for-profits is relevant. He finds that there may be a bias against producing lower quality products in the not-for-profit sector. Each not-for-profit firm faces a market demand curve that shifts to the right with quality increases and a cost curve that shifts upward with quality increases. These conditions imply a frontier of

quantity and quality that serves as a constraint with respect to utility maximization. The not-for-profit administrator chooses a combination of quantity and quality that is optimal for him, but which is not necessarily socially optimal. Specifically, there may be consumers who are willing to accept lower quality levels for lower prices. Consequently, the model explains the presence of for-profit firms in mixed industries in order to service the portion of the market that prefers lower quality and price.

Schiff and Weisbrod (1991) also examine a model with not-for-profits competing with a for-profit sector. They model a not-for-profit firm that produces both a not-for-profit output and a commercial output, and that maximizes utility rather than profit. In the simple one-period model, the not-for-profit's utility depends on quantities of a not-for-profit output and a commercial output. There is no mention of quality as an element to be included in the maximization problem. Not-for-profit output is directly related to the activity for which the organization has received its not-for-profit status. It is financed directly by donations and indirectly by profits from commercial activities when donations are not high enough. Not-for-profit output increases utility, while commercial output is sold to consumers at a market price and its production decreases utility. Managers of not-for-profits are assumed to produce commercial output to cross-subsidize the not-for-profit output when donations are low. The firm is subject to a one-period budget constraint. The result is that the not-for-profit sector will overproduce the not-for-profit output and underproduce the commercial output. Overproduction and underproduction are defined relative to the production that would be optimal for profit maximization.

The two papers discussed above represent the most important contributions to our research from the non-profit literature. While they introduce important aspects of non-profit behaviour, including the role of donations and quality in shaping the behaviour of not-for-profits, as well as their interaction with for-profit firms, they do not incorporate government procurement and auction theory.

3.2.2: The literature on auction theory

To guide our review of the vast and rich auction literature we need to define the technical characteristics of our case. It is a first-price sealed-bid government procurement auction that has asymmetry in the sense that there are two types of bidders. There is a quality component as well as a price assessed by the auctioneer. We assume our case has private values, and not common values.¹ We are also interested in finding specific probability distributions of the costs for the two groups of bidders in an asymmetric auction where the result is discriminatory against the lowest-cost bidder.² By “discriminatory” we mean

¹ Private values means that the source of uncertainty relates to the fact that information about own cost is private information to each bidder but there is no uncertainty coming from the cost of the project itself that is common to all bidders. This is a strong assumption especially when dealing with overseas projects, but it could be assumed to simplify the analysis on the basis that bidders have enough experience in the field to estimate the cost of the project to them while being uncertain about the cost of the project to its competitors. It should also be taken into account that the bidders belong to different sectors, not-for-profit and for-profit.

² It is convenient to summarize the main concepts in auction theory at this point. The contents in this footnote follow from Section II page 701 of McAfee and McMillan (1987). They define four basic types of auctions: (a) the English auction in which the auctioneer raises the price until only one bidder remains and all bidders know the level of the current best bid; (b) the Dutch auction in which the auctioneer announces an initial high price and then calls successively lower prices until one of the bidders accepts the price; (c) the first-price sealed-bid auction in which bidders submit their bids in sealed envelopes all at once (the bidders cannot observe other bids) and the best price wins – widely used in government procurement; (d) the second-price sealed-bid auction in which

that the auction rules can lead to the lowest bid being offered by a firm that does not have the lowest cost.

There is a rich and abundant literature that has examined auction theory from an economic perspective. Among the first of such papers in the economics literature that mark the birth of auction theory as a game is Vickrey (1961). This seminal work compares the revenue that results from alternative auctions and explores these results when some of the assumptions of the basic case are relaxed. This paper defines the core statement in auction theory, the revenue equivalence theorem, and discusses some departures from its basic assumptions that have generated most of the more recent literature on the subject. Bidders in his analysis are players who make their bids according to their knowledge of a common probability distribution wherefrom all the valuations (in the case where bidders are buyers) of the object being sold are drawn. He points out that a solution for such a game under certain assumptions is a Nash equilibrium defined as a set of bidding functions for each individual bidder that depends on his or her own valuation. The analytical determination of the equilibrium is not solved in the paper, but examples are provided for the case of a uniform distribution on the interval $(0,1)$. One of the most important results is that different auctions, such as the progressive auction and the Dutch auction, assuming the uniform distribution, produce the “same average expected price and hence the same average expected gains to the

bidders submit their sealed bids all at once knowing that the best price wins but the payment to be required of the winner does not equal his own bid but rather the second-best bid.

buyers and sellers, respectively” (Vickrey, 1961: 17), which is considered to be the first seed of the revenue equivalence theorem.

Vickrey (1961) also analyzes the possibility of departures from the basic assumptions such as asymmetry among bidders and multiple auctions. His case of asymmetry is very simple —using two types of bidders and the uniform distribution, he compares the Pareto-optimality results of progressive and Dutch auctions. He concludes that in the presence of this type of asymmetry the progressive auction is still Pareto optimal while the Dutch auction is not; therefore he anticipates that revenue equivalence will not hold. A similar situation in which revenue equivalence is absent is the case of multiple auctions in which more than one identical object is to be sold. Here again Vickrey (1961) uses a simple uniform-distribution case to show the failure of revenue equivalence. His paper also includes comparisons between the sealed-bid first-price auction and the Dutch auction, and between the second-price sealed-bid auction and the progressive auction. The second-price sealed bid auction is known as a “Vickrey auction” in recognition of his contribution. Almost all of the subsequent papers in auction theory elaborate on Vickrey’s postulates or on the ramifications of his results.

Closer to our case, with a more elaborate mathematical treatment is Riley and Samuelson (1981). They distil a wide family of auction designs into a more general statement of the revenue equivalence theorem and also analyze risk aversion as a departure from the basic result. There is a remarkably straightforward and precise mathematical treatment of the bidding function for a first-price, high-bid or Dutch auction in the form of a

maximization problem from the bidder's perspective, where bidders are buyers. Their derivation of the bidding function is used in some of the more recent literature such as Che (1993), for example. Riley and Samuelson (1981) also conclude that in the presence of risk aversion, under all other basic assumptions, bids become higher in the first-price auction and the auctioneer enjoys higher expected profit. It is their analysis that serves as a starting point in our derivation of the bidding function for the first-price auction. The differences with our case are that they assume symmetry and work with bidders that are buyers instead of sellers.

McAfee and McMillan (1987) survey the developments of auction theory, reviewing the existing mathematical and theoretical tools in a very detailed yet relatively accessible way. This paper reproduces the Riley and Samuelson (1981) method of deriving the bidding function in the high-bid or first-price auction. The paper also presents the main results reached in asymmetry, royalties, and incentive payments, among other results. It does not present the government procurement case, however.

One of the first papers to treat the issue of asymmetry among bidders is Maskin and Riley (1985). It states the revenue equivalence theorem in a model with only two bidders, which contrasts with our case of multiple bidders of each type. The model compares the open auction and the sealed-bid auction with respect to the optimal, revenue-maximizing auction. They conclude that both the open and the sealed-bid auctions differ from the optimal auction. If two distributions are assumed, the sealed-bid auction may generate more or less revenue than the open auction depending on the shapes of the two

distributions being considered. These basic results are based on the following assumptions: risk neutrality, the same probability distributions for the values of bidders, and the independence of values among bidders. The paper also explores the results obtained by dropping each assumption in turn. If risk aversion is assumed, they conclude that the optimal auction revenue is not affected. In the presence of correlated reservation prices across bidders, they find revenue equivalence among the auctions although the results do not generalize to all distributions when there are more than two bidders, unless bids are monotonic in reservation prices.

Among the interesting papers that are relevant to our government procurement case is Luton and McAfee (1986), which applies the tools of auction theory to a government procurement auction in two stages. Governments use auctions to award contracts in more than one period. In a second stage or period, the firm that won the contract in the first period—the incumbent—must compete with other bidders again. In this paper the authors derive a mechanism that maximizes the revenues and minimizes the expected procurement costs of the two projects. The auction rules assumed are those of the English or second-price auction. The results from this model are that the optimal mechanism is discriminatory. “Discrimination” is a term that can have different meanings in auction theory. In Luton and McAfee (1986), it is used to mean that the auctioneer applies a rule that discriminates against the incumbent, given that the second-stage rules ask for the incumbent to significantly reduce his cost in order to win against other bidders. They mention the example of Ontario Hydro where the incumbent has to lower costs by 15% in order to stay. In other words, in order to win, the incumbent needs a cost that is lower

than their rivals'. In the second stage, the rivals need to beat the incumbent's first-stage *price* in order to win while the incumbent must beat his own first-stage *cost*.

Yet another example of government procurement is found in McAfee and McMillan (1989). It includes a model of an English or second-price auction applied to government procurement with two types of bidders, local and foreign. There are multiple bidders in each group. It also includes data supporting the main predictions. It predicts that there will be discrimination against one of the groups in some cases but does not present a specific probability function that would lead to this result. In McAfee and McMillan (1989), the term "discrimination" is used in two ways: one is the discrimination that comes from the probability distributions for the costs that make bidders from different groups behave in such a way that the low-cost bidders bid higher and lose the contract. This is said to be a discriminatory auction against the low-cost bidders. Discrimination is also used in this paper to mean that the auctioneer imposes an extra cost on a group of bidders. Unfortunately for our case, as in Luton and McAfee (1986), this paper does not refer to the case of a first-price auction, which is the auction rule often used by governments.

Among the most recent papers that introduce competition in terms of quality as well as price is Che (1993). This paper models a government procurement auction where each bidder selects a level of quality and price. The paper introduces a model and alternative auction rules, then derives the equilibrium under each rule and discusses the optimal mechanism. This author calls the set of auction rules that define the winner the *scoring*

rule. The results from this model are that the optimal scoring rule could be implemented for the open and high-bid auctions. For the optimal scoring rule, the auctioneer needs strong commitment power that is not always present in real-life situations. Under this model, all bidders can access the whole range of quality levels but there is no asymmetry in the sense that they draw their cost parameters from the same distribution. Naegelen (2002) also assumes a trade-off between price and quality for the buyer. As in Che (1993), there is no asymmetry in the sense that all bidders are of the same type and draw their valuations or costs from the same probability distributions.

Naegelen and Mougeot (1998) try to find the optimal auction in a government procurement setting with asymmetry when it is assumed that there is one bidder of each of two types. The purpose of their model is to find the optimal auction, and they define the conditions for discrimination, where discrimination comes from the probability distributions themselves, by constructing a complex public economics model with taxation. However, while Naegelen and Mougeot (1998) provide the general condition for discrimination, they do not identify a specific probability distribution that will lead to this outcome.

The most recent paper on asymmetric discriminatory auctions is Maskin and Riley (2000). In this paper, “discrimination” takes on yet another subtle meaning. If choosing the high cost-bidder solves the auctioneer’s ex-ante problem because of its lower expected payment, then they call the result discrimination. But they also provide an example of a pair of discrete probability distributions whereby the results are

discriminatory against the low-cost bidder due to the distributions themselves and the bidding strategies of both bidders. For simplicity, however, they assume only one bidder from each group. The other characteristic of their result that makes it difficult to apply to our derivation of the bidding function is that their probability distributions for the two bidders are discrete. The paper also describes a general case of a discriminatory auction and one example of continuous distributions that may result in discrimination when bidders are buyers, which does not directly apply to procurement auctions. More details of this paper and other auction theory papers are provided in the discussion of our asymmetric auction with discrimination below.

One of the valuable approaches of Maskin and Riley (2000) is that they define a condition for auctioneer revenue maximization, and analyze the auction rule and bidder characteristics that will match it. This is the approach we take for our case. We first develop a utility maximization problem for the government, then establish the conditions under which utility is maximized. Then we go a step further to discuss when it is that the bidding functions corresponding to the two types of bidders (not just the expected payment conditions as in Maskin and Riley, 2000) will match these criteria.

The remainder of this chapter presents theoretical explanations of why a member of the NFP group may become an executing agency of a CIDA project. At the end of that discussion we analyze CIDA's welfare heuristically. The next section, Section 3.3, describes a basic model of government procurement with the problems confronted by the government facing each type of bidder. A maximization problem for the government is

analyzed, integrating the expected payment conditions found in Maskin and Riley (2000), which in turn borrows from McAfee and McMillan (1989). We state the conditions for government utility maximization, although our purpose is not to analyze CIDA's welfare at that point, but rather the different conditions that would lead to the not-for-profit group to win a contract.

From Section 3.3 we can identify three reasons for the not-for-profit group to be chosen. One is that CIDA simply prefers the not-for-profit group as it entails lower monitoring costs. Second, CIDA may prefer the not-for-profit group because of the lower payment associated to it. The lower payment could either be the result of the not-for-profit group being the low-cost group, or the result of an auction that yields these results due to the nature of the probability distributions of cost involved. Third, CIDA may just value the not-for-profit group more highly for some non-economic reason.

Next, Section 3.4 focuses on the payment as the variable that determines the winner and then uncovers which group is the high-cost, high-quality bidder. We find that the not-for-profit group will emerge as a high-quality group. While this section borrows from public economics, not-for-profit, and auction theory, it focuses primarily on linking the not-for-profit theoretical contributions of Newhouse (1970) and Schiff and Weisbrod (1991).

The subsequent sections then assume the not-for-profit group as the high-cost bidder and analyze a number of possibilities under which this high-cost group may win according to auction theory. In Section 3.5, the first-price, sealed-bid procurement auction is analyzed

from the perspective of a maximization problem of each bidder, as in Riley and Samuelson (1981). We derive a pair of bidding functions, which actually decide if the auction will be discriminatory against the low-cost bidder as a consequence of the government optimization results of Section 3.3. Section 3.6 discusses the specific functional form of the probability distributions that would yield discriminatory results and describes how the presence of not-for-profits affects the outcome for the auctioneer in the case of a uniform distribution. At the end of Section 3.6 there is a discussion on CIDA's welfare. Section 3.7 concludes.

3.3: The government's problem

This section assumes that a donor government wishes to carry out a project in a developing country. The government selects a domestic organization that will do the job in exchange for a payment. The selected executing agency will have to be monitored to make sure certain quality parameters are met. CIDA is characterized as having the following expected utility problem: the government agency maximizes

$$E(U) = \pi_1 (V_1 - P_1 - M_1) + \pi_2 (V_2 - P_2 - M_2) . \quad (1)$$

Hereinafter, bidders are divided into two groups: group 1 is the not-for-profit group; group 2 is the for-profit group.

The relevant features of the objective function (1) are: $E(U)$ is the expected utility to be maximized, π_i is the probability that group i ($i=1,2$) will win the auction, V_i is the

monetary value to CIDA if group i wins the auction, P_i is the expected payment to the bidder from group i that wins the auction,³ and M_i is the monitoring cost associated with the bidder from group i that executes the project.

There are two sources of uncertainty in our problem: CIDA does not know the cost of each domestic firm, and it does not know the quality level that each domestic firm will deliver, hence the need for monitoring efforts. They do know from the not-for-profit maximization problem (developed in detail in Section 3.4 below) that not-for-profits are expected to deliver a higher quality level. However, it is expected that, *ceteris paribus*, when CIDA cannot easily monitor the quality associated with a project, it will favour the not-for-profits. In other words, when monitoring costs are very high as is the case for certain projects, CIDA will choose the not-for-profits⁴ as a way to guarantee a certain quality level while saving monitoring costs.

Monitoring costs are assumed to be linked to the type of project. If the executing agency, no matter its type, is supposed to deliver a certain amount of merchandise or build a

³ If we take P_i as the expected payment, then this payment equals the bid, which is a function of the probability distributions. This is the equivalent to $J=v-[(1-F)/f]$ in Riley and Samuelson (1981). In our case, and using similar notation to that of the referenced papers in the literature, identifying J as the expected payment equal to $J=c+(F/f)$, where c is the cost of a particular bidder and F and f the cumulative and density functions of the cost for all bidders, respectively. Notice that this approach is somewhat similar to the more complex analysis of Maskin and Riley (2000) when comparing the maximization of revenue under the two types of auction rules. Our government agency utility equation is, therefore, very similar to their equation 3.10.

⁴ When the term “not-for-profit” is used in this discussion with regard to CIDA’s preferences, it is assumed that the not-for-profit organization is a charity as defined by Revenue Canada and follows the non-distribution constraints assumed by the not-for-profit literature that differentiate it from the for-profit group.

school or a bridge, it is clear that the quality of the services provided is relatively easy to measure. In contrast, the quality of a project that involves raising community awareness of women's rights, for example, may be difficult to monitor.

The fact that most contribution agreements are allocated to not-for-profits without competition processes might suggest that CIDA chooses the highest quality group for those projects where quality is not easily monitored. It is as if in (1), V_i minus P_i yields similar amounts for both groups but M_1 is significantly lower than M_2 , because group 1 will reach a higher quality level due to its own incentives and not due to a higher monitoring effort, which makes it optimal for CIDA to simply set π_1 equal to 1. Thus, one hypothesis that emerges from this theoretical approach is that contribution agreements should involve projects that are more difficult to monitor in terms of quality.

For those types of projects where quality is easier to measure, and both monitoring costs and the value to CIDA are similar for both groups, it is important to determine which group requires the lower payment. An auction is used to determine the winner in this case. Here the optimal outcome is the lowest payment that produces at least the desired level of quality. Because the project is always awarded to one or the other of the two groups, so that $\pi_1 + \pi_2 = 1$, (1) becomes:

$$E(U) = \pi_1 [(V_1 - P_1 - M_1) - (V_2 - P_2 - M_2)] + (V_2 - P_2 - M_2) \quad (2)$$

There are three different scenarios for CIDA when maximizing expected utility given by (2).

3.3.1: Type A Projects: Monitoring costs (M_i) are significantly different while $V_i - P_i$ is roughly the same for both groups; quality is unobservable.

V_i minus P_i are assumed to be similar for both groups whereas the M_i s are significantly different, M_2 is significantly higher than M_1 . CIDA knows that the not-for-profit will reach a certain quality level even if M_1 is low. This is why we should expect all type A projects to be assigned to not-for-profits. Before 1996, contribution agreements were limited to not-for-profits exclusively. Since 1997, for-profits have been allowed to present unsolicited proposals for contribution agreements. CIDA is opening the doors to “innovative proposals that make good development sense”⁵ from both sectors. In the empirical chapter of the present dissertation, there is an analysis of the success rates of both groups after the change was introduced.

3.3.2: Type B Projects: Payments (P_i) are significantly different; value and monitoring costs are similar; quality is observable.

Expected payment becomes the relevant variable in the government maximization problem while V_i and M_i are roughly the same for both groups.

⁵ From CIDA’s document on open competition: “Improvements to the Contracting Regime”, in its Section 3: “Why improvements are needed at this time”, date: December

In this case, we argue that the winner is determined by an auction. CIDA's approach before 1996 was to limit competition for contracts to for-profits. After 1997 not-for-profits were also allowed to enter the competition for CIDA contracts. The argument in favor of including not-for-profits in such auctions is that "by eliminating at the outset access to one sector or the other, we are depriving ourselves of highly-qualified sources" (CIDA: 1996, Section 3). Therefore, one reason that CIDA is including not-for-profits in its auctions is because they expect to raise the quality of the bidders by doing so.

Group 1 is the high-cost not-for-profit group and group 2 is the low-cost for-profit group (as is argued in the next section); however, the *high*-cost group 1 may have a *lower* expected payment P_1 . When $P_2 > P_1$, CIDA maximizes its expected utility by setting the probability that group 1 wins equal to one; i.e., it chooses the high-cost not-for-profit group in this case, when $P_2 > P_1$.

Is it possible for the high-cost not-for-profit bidder to have a lower expected payment than the low-cost for-profit bidder? In the case of a pair of uniform distributions over cost of the bidders such as the ones described in McAfee and McMillan (1989, Corollary 5) where one of the distributions is shifted to the right, their expected payment J_1 (equivalent to our P_1) is actually lower than J_2 (which is their notation for our P_2 or the expected payment for the typical bidder in the low-cost bidder group 2) so that CIDA maximizes expected utility by buying from the high-cost bidder, the not-for-profit.

1996, source CIDA's web site <http://www.acdi-cida.gc.ca> posted since December 30,

We have just concluded that CIDA maximizes its expected utility by choosing the high-cost bidder. At this point it seems logical to assume that the auction is discriminatory against the low-cost group. However, CIDA has to commit itself to follow the rules of a first-price sealed-bid auction. Will it still get to buy from the high-cost bidder?

If the auction is a first-price sealed-bid auction where each bidder will bid according to a bidding function, the expected payment is not necessarily the payment the bidder will receive. The expected payment is equal to the bid times the probability of winning. The bid becomes a function of the maximized expected payment over the probability of winning. That is, the payment is determined by the bidding function, which is derived in Section 5 below and is very difficult to evaluate using an actual probability distribution, even in the simplest cases as is discussed in Section 5 below. We should expect contribution agreements to match type A projects and contracts to match type B projects.

3.3.3: Type C Projects: V_i s are significantly different; P_i s and M_i s are similar.

The value of the project to CIDA is the relevant variable in the government maximization problem while P_i and M_i are roughly the same for both groups.

Here CIDA values the performance of one of the two groups significantly more than the other for some non-economic reason, such as identification of non-tangible values of CIDA's staff with colleagues from not-for-profit agencies. This makes it maximize its

1996. This document will be identified as CIDA (1996).

utility by choosing the group it values the most. This case would justify the allocation of funds to contribution agreements with the not-for-profit group; it also appears to explain the empirical results obtained in the next chapter of this research when we observe a bias in favour of the not-for-profit competitors. How can CIDA introduce such a bias in a first-price sealed-bid auction? It must be recalled that CIDA contract auctions do have an implicit two-stage aspect to them, in which CIDA first evaluates bids along the dimensions of experience and staff before examining the bid prices.

3.3.4: General remarks on the government's problem.

If V_i and M_i are similar for both groups and the relevant variable is the payment, as with type B projects, CIDA maximizes (1) if the high-cost not-for-profit group wins and the expected payment to the for-profits, P_2 , is higher than the expected payment to not-for-profits P_1 . In other words, CIDA maximizes its expected utility by buying from the high-cost executing agency if it has a lower expected payment (i.e., the bid for the contract).

If we let c be the cost of each bidder, and let G and g be the cumulative distribution and density functions of the cost across bidders, respectively, then the expected payment is given by the expression

$$P = J = c + \frac{G(c)}{g(c)} \quad (3)$$

According to (3), and if there is a pair of uniform distributions where the not-for-profit firms draw their costs from a distribution G_1 that is shifted to the right (higher costs) by a

constant “ a ”, as described in Maskin and Riley (2000, p. 421), the not-for-profit group has a lower expected payment P_1 or J_1 equal to $2c-a$; i.e., two times its cost minus the constant “ a ”, compared to the expected payment for the for-profit group, which is only two times its cost or $2c$.

The potential for high-cost bidders to submit the lowest bid is also described in McAfee and McMillan (1989, p. 297), where Corollary 5 states “the government optimally gives preferential treatment to the ... firms with the comparative disadvantage.” If the conditions of this corollary are met,⁶ and in the presence of two types of bidders, the payment is lower for the domestic firms that have higher costs. The next stage in their reasoning is how to implement an auction that generates these results. One of the solutions proposed by McAfee and McMillan (1989) is that the auctioneer builds in discrimination by imposing some extra cost on the non-favoured firms’ bids. In our case the lower payment would correspond to the not-for-profit firms with the higher cost.

An auction that discriminates against the low-cost bidder, whether administratively via an explicit scoring rule imposed by the auctioneer or as a consequence of the functional form of the probability distributions involved, is beneficial for CIDA in this case. And, of course, this line of reasoning is valid if, assuming everything else to be equal, the value of the project being executed by a specific agent to CIDA and monitoring costs are equal.

⁶ The conditions of Corollary 5 are: (i) that the distributions of domestic and foreign costs are related in such a way that on average a domestic bidder has a higher cost than a foreign bidder, although the extent of cost variation among firms is the same for both groups, the distributions differ only on location; (ii) the ratios of the cumulative and density functions for the two groups are increasing in cost.

Imposing a penalty on the low-cost bidders is what CIDA may be doing at present by screening out potential bidders in terms of staff, experience, and methodology. The question would be: Is the cost of the screening process to CIDA higher than the advantages to CIDA from getting the high-cost bidder that bids a lower bid on a discriminatory auction, or some other advantages related to CIDA's preferences over one group of bidders? Another interesting question would be: What is the point in screening out some of the bidders if the value to CIDA is assumed to be the same?

The next point to consider would be: Is it realistic to assume that the high-cost bidder may submit the lowest bid? Given that CIDA has to commit itself to a first-price sealed-bid auction where the winner has the lowest bid, is it possible to follow the auction rules and award the contract to the high-cost not-for-profit bidder at the same time? In other words, could the high-cost not-for-profit bidder come up with a bid that is lower than the low-cost for-profit bidder's bid and maximize its expected gain at the same time?

We know from Riley and Samuelson (1981) that bidders in a first-price sealed-bid auction solve a maximization problem to find a bidding function that determines their bid. They do not bid their expected payment. The expected payment in this type of auction equals the probability of winning times size of the bid. Therefore, the bid is not equal to the expected payment. By comparing expected payments we cannot determine who the winner will be. Only by comparing the bidding functions can we predict the winner. In the next section we derive the bidding functions with multiple bidders and asymmetry.

3.4: Adding the two types of bidders

Who are the two types of bidders that the government described in the previous section has to face as potential executing agencies? The first part of this section describes the problem faced by the typical not-for-profit bidder and the typical for-profit bidder in a monopolistically competitive market.

3.4.1: *The not-for-profit problem*

Not-for-profits, as in Schiff and Weisbrod (1991), maximize a utility function that depends on a commercial good and a not-for-profit output. With respect to CIDA, the not-for-profit output could be those contribution agreement projects and the commercial output resulting from the contracts obtained from the bilateral branch in competition with the for-profit organizations. We also introduce quality as a component that the not-for-profit firm would like to maximize. This honours the approach in some of the papers in the not-for-profit literature such as Newhouse (1970), Rose-Ackerman (1996), and Bilodeau and Slivinski (1998), which identify the ideology or a certain quality of the output as an important characteristic that defines the not-for-profit group. We assume a monopolistically competitive setting where price is a decreasing function of quantity and an increasing function of quality.

The not-for-profit firm maximizes its utility, which depends on three elements. The first two elements are borrowed from the approach of Schiff and Weisbrod (1991). One is the not-for-profit output z , which increases utility as Schiff and Weisbrod (1991) define it. It is this type of output for which the not-for-profit receives its tax-exempt status. It is the

output that stems from the ideology or philosophy that sustains the organization, as Rose-Ackerman (1996) would put it. Second, utility depends on a commercial output x , also provided by the for-profit competitors. The production of commercial output x affects the utility function negatively as managers use it only as a source of income and see it as a distraction from its most important or pure objectives. The third element is our contribution to the not-for-profit problem. We introduce quality q as a separate element that increases the value of the not-for-profit's utility function. This quality is linked to the commercial output as well, as we assume that once the not-for-profit commits itself to providing services it has to be consistent and cannot provide different quality levels across types of output. Quality is also tied to the not-for-profit output to make sure that when not-for-profit output is overproduced, quality is overproduced as well and not left at a minimum level. The quality dimension is a non-tangible trait that characterizes the not-for-profit as such.

Each not-for-profit denoted by ' i ' solves

$$\max_{z_i, x_i, q_i} U = U(z_i, x_i, q_i) \quad (4)$$

subject to

$$D(z_i, x_i, q_i, S, z_{-i}, x_{-i}, q_{-i}) - S + p(x_i, q_i, x_{-i}, q_{-i})x_i - C(z_i, x_i, q_i) = 0 \quad (5)$$

and

$$q_i \geq \underline{q} \quad (6)$$

Expressions (4) to (6) comprise the utility maximization problem. Utility is maximized with respect to the not-for-profit output z_i described above, commercial output x_i , and quality of the overall output q_i . That is, the organization will choose a level of quality and production of both types of goods.

Equation (5) is the budget constraint the organization faces—in broad terms it is simply income minus expenses⁷. Income may come from donations D that, in turn, entail a fundraising activities expense S . The other source of income is the sale of commercial output, defined as the product of p times x_i , where p is the price of the commercial output. Sales of commercial output imply a cost C given by the cost function $C(\bullet)$. CIDA also establishes a minimum quality level defined by a project-specific set of criteria that is expressed as $\underline{q}$. Inequality (6) establishes a minimum quality $\underline{q}$ that the potential bidder has to offer. The subscript i indicates the levels of output and quality of the organization solving the maximization problem, while the subscript $-i$ indicates equivalent values with respect to other organizations.

Characterization of the utility function:

⁷ The not-for-profit organization is assumed to make zero profits. One of the reasons behind this apparently more restrictive assumption is that the existence of more than one period is beyond the scope of the present research. Over the long run, or under the assumption of one period, it is reasonable to model a not-for-profit organization that will not accumulate a profit and will re-use any surplus. The other reason behind the zero-profit constraint comes from empirical observation of CIDA's regulations. Contribution agreement funds are given to the executing agency under the assumption of zero profits.

There is little evidence to suggest that it is possible to measure the utility derived from producing or not producing a certain type of output or quality of services. As a matter of pure practicality, utility could not be considered to be cardinal for the purposes of this research. Unfortunately, there is no practical way of ranking the services or products offered by not-for-profit managers in a way that ordinal utility concepts are meaningful either. This being the case we resort to a convenient theoretical way of presenting the problem in question that enables us to discuss the associated marginal utility and other useful related concepts by assuming cardinal utility as a common-place theoretical tool as if it were possible to measure it in the same way as physical characteristics such as weight and height. We also assume that $U(\bullet)$ is a twice continuously differentiable function, and that $D(\bullet)$, $p(\bullet)$ and $C(\bullet)$ are once continuously differentiable functions.

First partial derivatives:

It is assumed that the not-for-profit managers enjoy producing the type of output for which they receive their tax-exempt status and also enjoy a high level of a certain quality, which is why utility increases when either the level of not-for-profit output or quality increase as expressed by the positive sign of the first partial derivatives of U with respect

to z_i and q_i : $\frac{\partial U}{\partial z_i} > 0$ and $\frac{\partial U}{\partial q_i} > 0$. However, the not-for-profit managers are assumed to

dislike producing the commercial output, which is why the first partial derivative of the

objective function with respect to x_i is negative: $\frac{\partial U}{\partial x_i} < 0$.

Second partial derivatives:

$\frac{\partial^2 U}{\partial z_i^2} < 0$, the not-for-profit managers enjoy producing the type of output for which they receive their tax-exempt status at a decreasing rate.

$\frac{\partial^2 U}{\partial x_i^2} < 0$, the not-for-profit managers dislike producing the commercial output at a decreasing rate.

$\frac{\partial^2 U}{\partial q_i^2} < 0$, the not-for-profit managers enjoy higher quality levels at a decreasing rate.

To keep the problem tractable we assume that the second cross-partial-derivatives with respect to the three variables are assumed to be zero (see Appendices C and D). With the cross derivatives being zero, and the second derivatives on the principal diagonal being negative, the matrix of second derivatives of the objective function $U(\bullet)$ is negative definite and hence the second-order conditions are necessary and sufficient for the optimization problem. Alternatively it would be appropriate to assert that the second-order conditions hold, which seems to be effectively what Schiff and Weisbrod (1991) do, as they do not include any mention of the second derivatives nor a proof involving the second-order conditions.

The economic interpretation of the assertion of zero cross-derivatives is that the three components not-for-profit output, commercial output, and quality are perfect substitutes that effectively enter the utility function of the not-for-profit additively. More precisely, the increase in utility derived from, say, an additional degree of quality does not depend on the levels of not-for-profit and commercial output. While this is perhaps a restrictive assumption, it is sufficient to permit the assertion that the first-order conditions characterize a maximum.

Characterization of the donation function:

First partial derivatives:

$\frac{\partial D}{\partial z_i} > 0$, ceteris paribus, donations increase when not-for-profits focus more on the output for which they receive their tax-exempt status.

$\frac{\partial D}{\partial x_i} < 0$, ceteris paribus, donations decrease when not-for-profits produce more of the commercial output.

$\frac{\partial D}{\partial q_i} > 0$, ceteris paribus, donations increase with higher quality levels.

$\frac{\partial D}{\partial S} > 0$, ceteris paribus, donations increase as the not-for-profits spend more on fundraising.

Characterization of the price as a function of commercial output quantity and quality:

First partial derivatives:

$\frac{\partial p}{\partial x_i} < 0$, as quantity increases, price decreases. This relationship arises because there is monopolistic competition and increasing quantity reduces the scarcity of the good. It could also be explained by the law of demand with respect to the existence of close substitutes.

$\frac{\partial p}{\partial q_i} > 0$, as quality of output increases, ceteris paribus, the firm is able to charge a higher price.

Characterization of the cost function:

First partial derivatives:

$\frac{\partial C}{\partial z_i} > 0$, ceteris paribus, cost increases when not-for-profits produce more of the not-for-profit output.

$\frac{\partial C}{\partial x_i} > 0$, ceteris paribus, cost increases when not-for-profits produce more of the commercial output.

$$\frac{\partial C}{\partial q_i} > 0, \quad \text{ceteris paribus, cost increases with higher quality levels.}$$

The Lagrangean for the not-for-profit decision problem is

$$L = U(z_i, x_i, q_i) + \lambda_i [D(z_i, x_i, q_i, S) - S + p(x_i, q_i)x_i - C(z_i, x_i, q_i)] + \mu_i (q_i - \underline{q}) \quad (7)$$

The associated Kuhn-Tucker conditions are:

$$\frac{\partial L}{\partial z_i} = \frac{\partial U}{\partial z_i} + \lambda_i \left(\frac{\partial D}{\partial z_i} - \frac{\partial C}{\partial z_i} \right) = 0 \quad \text{assuming that } z_i > 0 \quad (8)$$

$$\frac{\partial L}{\partial x_i} = \frac{\partial U}{\partial x_i} + \lambda_i \left(\frac{\partial D}{\partial x_i} + \frac{\partial p}{\partial x_i} x_i + p - \frac{\partial C}{\partial x_i} \right) = 0 \quad \text{assuming that } x_i > 0 \quad (9)$$

$$\frac{\partial L}{\partial q_i} = \frac{\partial U}{\partial q_i} + \lambda_i \left(\frac{\partial D}{\partial q_i} + \frac{\partial p}{\partial q_i} x_i - \frac{\partial C}{\partial q_i} \right) + \mu_i = 0 \quad \text{assuming that } q_i > 0 \quad (10)$$

$$\frac{\partial L}{\partial \lambda_i} = D(z_i, x_i, q_i, S) + p(x_i, q_i)x_i - C(z_i, x_i, q_i) - S = 0 \quad \text{assuming that } \lambda_i > 0 \quad (11)$$

$$\frac{\partial L}{\partial \mu_i} = q_i - \underline{q} \geq 0 \quad (12)$$

$$\mu_i \geq 0 \quad (13)$$

$$\mu_i \frac{\partial L}{\partial \mu_i} = 0 \quad (14)$$

From (14) and the maintained assumptions

$$\text{if } \mu_i = 0, \quad \frac{\partial L}{\partial \mu_i} \geq 0 \quad \text{so that} \quad q_i \geq \underline{q}_i$$

$$\text{if } \mu > 0, \quad \frac{\partial L}{\partial \mu} = 0 \quad \text{so that} \quad q = \underline{q}.$$

We also assume that conditions (8) through (14) hold for all the monopolistic competitors; that is, these conditions are assumed to be evaluated at the optimum values that solve a similar maximization problem faced by the competitors. For example, from (8),

$$\frac{\partial C(z_i^*, x_i^*, q_i^*)}{\partial z_i} = \frac{1}{\lambda_i^*} \frac{\partial U(z_i^*, x_i^*, q_i^*)}{\partial z_i} + \frac{\partial D(z_i^*, x_i^*, q_i^*, z_{-i}^*, x_{-i}^*, q_{-i}^*)}{\partial z_i} \quad (15)$$

From (10),

$$\mu_i^* = \lambda_i^* \left(\frac{\partial C^*}{\partial q_i} - \frac{\partial D^*}{\partial q_i} - \frac{\partial p^*}{\partial q_i} x_i^* \right) - \frac{\partial U^*}{\partial q_i} \quad (16)$$

Therefore, an optimal not-for-profit level of quality would equal the minimum quality when

$$\mu_i^* \geq 0 \quad \text{or, equivalently,}$$

$$\frac{\partial C^*}{\partial q_i} \geq \frac{\partial D^*}{\partial q_i} + \frac{\partial p^*}{\partial q_i} x_i^* + \frac{\partial U^*}{\partial q_i} \frac{1}{\lambda_i^*} \quad \text{since } \lambda_i^* > 0 \text{ by assumption} \quad (17)$$

Clearly, an optimal level of quality would exceed the minimum quality only if

$$\frac{\partial L}{\partial \mu_i} > 0 \quad \text{so that} \quad q_i > \underline{q}$$

and only if (18) holds

$$\frac{\partial C^*}{\partial q_i} = \frac{\partial D^*}{\partial q_i} + \frac{\partial p^*}{\partial q_i} x_i^* + \frac{\partial U^*}{\partial q_i} \frac{1}{\lambda_i^*} \quad (18)$$

If (18) holds the optimal level of quality could either exceed or equal the minimum level of quality. However, if the left-hand-side of (18) is strictly greater than its right-hand-side—in other words, if the marginal cost of quality is strictly greater than its marginal benefits—the not-for-profit will not exceed the minimum level of quality.

Assuming all relevant second-order conditions are satisfied (see Appendix C), we can characterize the levels of z , x and q that maximize utility for the not-for-profits subject to the constraints.

From (8), the optimal level of the not-for-profit output would be the level of z_i that satisfies

$$\frac{\partial C}{\partial z_i} = \frac{1}{\lambda_i} \frac{\partial U}{\partial z_i} + \frac{\partial D}{\partial z_i} \quad \text{when} \quad x_i = x_i^*, q_i = q_i^*, \text{ and } \lambda_i = \lambda_i^* \quad (19)$$

In words, the marginal cost of the not-for-profit output equals the marginal benefits.

Because both utility and donations are increasing functions of the not-for-profit output, z_i *is overproduced, compared to what a similar for-profit competitor would produce under similar circumstances*. Since the first derivative of the donation function with respect to the not-for-profit output is assumed to be greater than zero, the right-hand side of (19) has an extra positive term augmenting the marginal benefit term.

As long as λ is greater than the ratio of marginal utility over the marginal cost of not-for-profit output, even in the case where marginal cost is greater than marginal utility of the not-for-profit output, λ could be less than one, equal to one, or greater than one—it does not have to be equal to one.

It should be noted that λ is the marginal utility of income. The value of the Lagrange multiplier λ at the optimum is the increase in the maximal value of the utility function

when we relax the equality constraint; that is, when we change income represented by the budget constraint by changing the associated parameters, not the variables; e.g., reducing fundraising activities expenses S by one unit.

From (9), the optimal level of the commercial output would be the level of x_i that satisfies

$$\frac{\partial C}{\partial x_i} = p_i + \frac{\partial p}{\partial x_i} x_i + \frac{1}{\lambda_i} \frac{\partial U}{\partial x_i} + \frac{\partial D}{\partial x_i} \quad \text{when } x_i = x_i^*, q_i = q_i^*, \text{ and } \lambda_i = \lambda \quad (20)$$

Commercial output is produced at a point where marginal cost is less than its price. This is not only because price is a decreasing function of x_i but because utility and donations are decreasing functions of x_i . Commercial output is *underproduced, compared to what a similar for-profit competitor would produce under similar circumstances*.

From (10), the optimal level of quality would be the level of q_i that satisfies

$$\frac{\partial C}{\partial q_i} = \frac{1}{\lambda_i} \left(\frac{\partial U}{\partial q_i} + \mu_i \right) + \frac{\partial D}{\partial q_i} + \frac{\partial p}{\partial q_i} x_i \quad \text{when } x_i = x_i^*, q_i = q_i^*, \lambda_i = \lambda_i^*, \text{ and } \mu_i = \mu_i^* \quad (21)$$

The not-for-profit *overproduces quality compared to what a similar for-profit competitor would produce under similar circumstances*, since its marginal cost is higher than its marginal utility (because donations are an increasing function of quality and price is an increasing function of quality). It also may produce a quality level that is higher than the minimum quality established by CIDA.

The result will be that the not-for-profit “overproduces” both its quality level and not-for-profit output level, *beyond the point where it would be optimal for a for-profit competitor*. Not-for-profits maximize utility with respect to not-for-profit output z , commercial output x , and the quality level of both together.

The constraints are very similar to those in Schiff and Weisbrod (1991), except for the introduction of quality in the function that determines donations and price, and the assumption of monopolistic competition. The higher the quality of services provided, the higher the level of donations and price. This relationship is what justifies the fact that the not-for-profit will have an incentive to provide a certain quality level in its commercial output as well. For example, when selling post cards, the not-for-profit firm will ensure that these carry a certain ideological message, or are produced in a manner consistent with the firm’s objectives.

We say that the not-for-profit will *overproduce quality* relative to what would be optimal, or relative to what a for-profit counterpart would produce, because from the first-order conditions for the not-for-profit problem we know that quality will be produced in accordance with (21) where we have extra positive terms compared to the equivalent expression taken from the for-profit problem which is that the for-profit competitor will produce quality in accordance with:

$$\frac{\partial p}{\partial q} x = \frac{\partial C}{\partial q}.$$

There are no extra terms that would make the marginal cost of quality lower for the for-profit firm.

With respect to commercial output, we know from the first-order conditions of the not-for-profit problem that we have an optimal level of x produced in accordance with

$$\frac{\partial p}{\partial x} x + p + \frac{1}{\lambda} \frac{\partial U}{\partial x} + \frac{\partial D}{\partial x} = \frac{\partial C}{\partial x}.$$

Therefore, the commercial output for the not-for-profit is produced at a point where marginal cost is lower than the marginal cost of the for-profit maximization. Since

$$\frac{\partial U}{\partial x} < 0 \text{ and } \frac{\partial D}{\partial x} < 0,$$

both the utility of not-for-profit managers and the level of donations decrease as more of the commercial output is produced. Consequently, the *not-for-profit underproduces commercial output*.

The for-profit will produce a level of output x that satisfies

$$\frac{\partial p}{\partial x} x + p = \frac{\partial C}{\partial x}$$

Notice the absence of any negative terms that would make the for-profit marginal cost of commercial output higher. We now turn to the for-profit problem.

3.4.2: The for-profit problem

The preceding results come from the following for-profit firm, which is assumed to maximize profit and reach a minimum observable quality level that allows it to enter the price auction. In order to avoid repetition, we have not included the conditions for monopolistic competition in the for-profit problem; they are assumed to hold in a way similar to that described for the not-for-profit problem.

Letting p denote the market price of the commercial output, x the quantity of commercial output, C the cost, q the quality of output and $\underline{q}$ the minimum quality level established by CIDA, the for-profit problem is

$$\max p(x, q)x - C(x, q) \quad (22)$$

with respect to x and q subject to

$$q \geq \underline{q} \quad , \quad (23)$$

with p a function of quantity and quality as in the not-for-profit problem.

Characterization of the cost function:

Cost increases when firms produce more of the commercial output in accordance with

$\frac{\partial C}{\partial x} > 0$; it also increases with higher quality levels as is expressed by the sign of the first

partial derivative of the cost function with respect to the quality level $\frac{\partial C}{\partial q} > 0$.

The associated Lagrangean is

$$L(x, q, \mu) = p(x, q)x - C(x, q) + \mu(q - \underline{q}) \quad (24)$$

Taking the partial derivatives of the Lagrangean with respect to x , q and μ and setting each equal to zero yields the first-order conditions

$$\frac{\partial L}{\partial x} = \frac{\partial p}{\partial x}x + p - \frac{\partial C}{\partial x} = 0 \quad \text{assuming that } x > 0 \quad (25)$$

and

$$\frac{\partial L}{\partial q} = \frac{\partial p}{\partial q}x - \frac{\partial C}{\partial q} + \mu = 0 \quad \text{assuming that } q > 0 \quad (26)$$

The remaining Kuhn-Tucker conditions are

$$\frac{\partial L}{\partial \mu} = q - \underline{q} \geq 0 \quad (27)$$

$$\mu \geq 0 \quad (28)$$

and the complementary slackness condition

$$\mu \frac{\partial L}{\partial \mu} = 0 \quad (29)$$

From (29) and (27)

$$\text{if } \mu = 0, \quad \frac{\partial L}{\partial \mu} \geq 0 \quad \text{so that } q \geq \underline{q}$$

and

$$\text{if } \mu > 0, \quad \frac{\partial L}{\partial \mu} = 0 \quad \text{so that } q = \underline{q}.$$

From (26)

$$\mu = \frac{\partial C}{\partial q} - \frac{\partial p}{\partial q} x \quad (30)$$

As before, the for-profit will not exceed the minimum level of quality when the marginal cost of quality is higher than the marginal benefit associated with that quality level. If marginal cost and marginal benefit are equal, then the for-profit will either exceed the minimum quality level or produce the minimum quality level.

Solving (25) to (29) simultaneously, the optimal level of commercial output and quality level are the levels of x and q respectively, that satisfy

$$\frac{\partial p}{\partial x} x + p = \frac{\partial C}{\partial x}. \quad (31)$$

and

$$\frac{\partial p}{\partial q} x = \frac{\partial C}{\partial q} \quad \text{if } \mu = 0. \quad (32)$$

Comparison of the corresponding first-order conditions makes it easy to see that the not-for-profit overproduces quality and underproduces commercial output relative to the for-profit.

From the first-order conditions for the not-for-profit problem, we know that x will be

produced in accordance with $\frac{\partial p}{\partial x} x + p + \frac{1}{\lambda} \frac{\partial U}{\partial x} + \frac{\partial D}{\partial x} = \frac{\partial C}{\partial x}$; i.e., the commercial output

for the not-for-profit is produced at a point where marginal cost is lower than the

marginal cost for the for-profit maximization, since $\frac{\partial U}{\partial x} < 0$ and $\frac{\partial D}{\partial x} < 0$.

Quality is overproduced by the not-for-profit since its marginal benefit from quality is higher than that of its for-profit competitor. This is because donations and utility both increase when quality increases in the case of the not-for-profits.

In the case described by Schiff and Weisbrod (1991) where only two goods are produced, not-for-profit and commercial output, if one is overproduced the other necessarily is underproduced. Now with the introduction of quality we could have the commercial output underproduced and the other two overproduced but that does not mean quality in particular is overproduced. This is why we need to stress the need of an extra assumption of some link between the not-for-profit output and quality that ties the amounts of these two variables in the optimal solution together.

From the first-order conditions for the not-for-profit problem we know that

$$\frac{\partial p}{\partial q} x + \frac{1}{\lambda} \left(\frac{\partial U}{\partial q} + \mu \right) + \frac{\partial D}{\partial q} = \frac{\partial C}{\partial q},$$

where

$$\frac{\partial U}{\partial q} > 0 \text{ and } \frac{\partial D}{\partial q} > 0.$$

For both groups, not-for-profit and for-profit firms, when marginal cost of quality is higher than its marginal utility, they would not exceed the minimum level of quality,

therefore an increased marginal cost of quality, *ceteris paribus*, increases the chances that they will produce only at the minimum quality level.

An obvious observation at this juncture is that the not-for-profit is likely to produce a higher level of quality and a lower quantity of the commercial output. Therefore, its price for commercial output is definitely higher than the for-profit price for the same good. The for-profit produces a lower quality and higher quantity but sets a lower price. These are results that Newhouse (1970) showed with graphs.

Why would consumers buy commercial output from the not-for-profits if it comes at a higher price? Consumers not only donate to not-for-profits as a way of supporting their activities, they also buy commercial output at a higher price from them as a way of supporting their ideology, or as a way of obtaining a different quality. Not-for-profits are tax exempt: they cross-subsidize their not-for-profit output with donations and income from the sales of commercial output. In a sense, then, the commercial output from not-for-profits is not really identical to the commercial output of for-profits; simply having the product sold by a not-for-profit provides an additional attribute to the good that some consumers are prepared to pay more for.

3.5: Bidding functions for the two groups: A model of an asymmetric auction with multiple bidders

This section derives the bidding function for each type of bidder described in the previous section. Each bidder solves a maximization problem to decide what amount to bid based on partial information about other bidders' costs and full information about its own cost. We discuss the conditions that would yield discrimination against the low-cost, low-quality bidder, which is the for-profit bidder. Here we use the term discrimination in the sense that the low-cost bidder will bid higher than the high-cost bidder due to the auction rules and probability distributions involved, not due to any extra cost imposed by the auctioneer. The existence of discrimination is one reason why a high-cost not-for-profit firm could win a contract from CIDA through the bidding process. The auction is assumed to occur for those type B projects where value and monitoring costs are the same for CIDA and payment to the bidder is the only variable that will have a considerable weight in the final decision.

Following the Riley and Samuelson (1981), asymmetry resulting from having two types of bidders and multiple bidders of each type, and assuming government procurement, the bidding functions are derived as follows. Suppose not-for-profit bidders have cost distributions $f(c)$ and for-profit bidders draw their cost from a distribution $g(c)$. Each bidder strategy can be characterized by the following derivations.

The expected return from a bid for each bidder, no matter the group, can be expressed as

$$\left\{ \begin{array}{c} \text{Expected} \\ \text{bidder} \\ \text{gain} \end{array} \right\} = \left\{ \begin{array}{c} \text{Expected} \\ \text{payment} \end{array} \right\} - \left\{ \begin{array}{c} \text{Bidders'} \\ \text{cost} \end{array} \right\} \left\{ \begin{array}{c} \text{probability of} \\ \text{winning} \end{array} \right\}. \quad (33)$$

In this section, each type 1 or not-for-profit bidder bids an amount b_i that depends on its cost c_i with $i = 1, \dots, n_1$

$$b_i = b(c_i) \quad (34)$$

and each type 2 or for-profit bidder bids an amount β_j that depends on its cost t_j with $j = 1, \dots, n_2$

$$\beta_j = \beta(t_j) \quad (35)$$

Suppose there is a not-for-profit bidder i with cost c that bids

$$b_i = b(c),$$

and a for-profit bidder j with cost t that bids

$$\beta_j = \beta(t) .$$

How do we know bidders will actually behave this way? The equilibrium occurs if all type 1 bidders find it most convenient to bid according to (34) and all type 2 bidders bid according to (35). If we prove that $c = c_i$ and $t = t_j$ we have shown that the equilibrium bidding strategies are giving by (34) and (35) for bidders i and j respectively.

The payment p to be received by each bidder depends not only on all other bids coming from all other bidders in its own group and all the bids coming from all bidders in the other group, but also on its bid being smaller than all other bids coming from all other bidders in its own group and all the bids coming from all bidders in the other group. If its bid is not the smallest, its payment is zero as it loses the auction. If its bid is the smallest, its payment equals its bid and its gain equals its bid minus its cost. How high could its bid be? Its bid will be its cost plus the distance between its cost and the second lowest cost or, under uncertainty, its cost plus the distance between the first-order and second-order statistics of the distributions.

If the bidder is of type 1, its payment p depends on

$$p = p(b_2, \dots, b_{n_1}, \beta_1, \beta_2, \dots, \beta_{n_2})$$

$$p = p(b(c_2), \dots, b(c_{n_1}), \beta(t_1), \beta(t_2), \dots, \beta(t_{n_2}))$$

If the bidder is type of type 2, its payment p depends on:

$$p = p(b_1, b_2, \dots, b_{n_1}, \beta_2, \dots, \beta_{n_2})$$

$$p = p(b(c_1), b(c_2), \dots, b(c_{n_1}), \beta(t_2), \dots, \beta(t_{n_2}))$$

The arguments of the function $p(\bullet)$ are order statistics. That is, the lowest argument is denoted with subscript 1. Notice that as long as we have our bidders bid as the first-order statistic, the sequence of all other bids within its own group does not matter. Expected payment could be defined as the expectation over all the bids where our bidder's bid is the lowest compared to all other bids.

If we define $\text{prob}(W)$ as the probability that a bidder of type 1 will win, this is the probability that bidder i has the smallest cost within its own type and compared to all other costs. Letting $\text{prob}(V)$ denote the probability that a bidder of type 2 will win, and bidder j being the lowest bidder of both groups and letting P denote the payment to be received by the bidder if he wins, then the expected gain functions for the two groups are

$$\pi(c, c_1) = P(c) - c_1(\text{prob}(W)) \quad (36)$$

and

$$\gamma(t, \beta_1) = P(t) - t_1(\text{prob}(V)) \quad (37)$$

respectively

Notice that, from the maximization problem that each bidder faces, an expected payment will emerge that takes form of equations (42) and (43) below. It is incorrect to assume that each bidder expects its payment to be $P = J = c + \frac{G(c)}{g(c)}$, as in McAfee and McMillan (1989), given that they are using a second-price auction rather than a first-price auction.

As we mentioned before, for (34) and (35) to be the equilibrium bidding strategies, bidder i 's optimal choice must be to select $c = c_1$ and bid $b(c_1)$. Then bidder i 's maximized expected gain is $\pi(c_1, c_1)$, and bidder j 's optimal choice must be to select $t=t_1$ and bid $\beta(t_1)$. Then bidder j 's maximized expected gain is $\gamma(\beta_1, \beta_1)$.

The first-order condition that must hold for each type 1 bidder is

$$\frac{\partial \pi}{\partial c} = \frac{\partial P}{\partial c} - c_1 \frac{d \text{prob}(W)}{dc} = 0 \quad (38)$$

and the first-order condition that must hold for each type 2 bidder is

$$\frac{\partial \gamma}{\partial t} = \frac{\partial P}{\partial t} - t_1 \frac{d \text{prob}(V)}{dt} = 0 \quad (39)$$

If we define c^* and t^* as the costs that are sufficiently high to discourage bidders of type 1 and 2 respectively from joining the auction, then (38) and (39) hold for all $c_1 \leq c^*$ and $t_1 \leq t^*$ where c^* and t^* satisfy

$$\pi(c^*, c^*) = P(c^*) - c^* \text{prob}(W) = 0 \quad (40)$$

$$\gamma(t^*, t^*) = P(t^*) - t^* \text{prob}(V) = 0 \quad (41)$$

Setting $c=c_1$ and $t=t_1$ in (38) and (39), integrating from c_1 to c^* and from t_1 to t^* , and using (40) and (41), we obtain the following expressions for the expected payments:

$$P(c_1) = c_1 \text{prob}(W) + \int_{c_1}^{c^*} \text{prob}(W) d\xi \quad (42)$$

and

$$P(t_1) = t_1 \text{prob}(V) + \int_{t_1}^{t^*} \text{prob}(V) d\psi. \quad (43)$$

According to first-price sealed-bid auction rules,

$$P(c) = \{\text{prob}(W)\} b(c) \quad (44)$$

and

$$P(t) = \{\text{prob}(V)\} \beta(t). \quad (45)$$

Substituting (44) and (45) into (42) and (43), we obtain the bidding functions for each bidder:

$$b(c_i) = c_i + \frac{\int_{c_i}^{c^*} [prob(W)] dx}{prob(W)} \quad (46)$$

and

$$\beta(t_j) = t_j + \frac{\int_{t_j}^{t^*} [prob(V)] dy}{prob(V)} . \quad (47)$$

By $prob(W)$ we denote the probability that bidder i will be the lowest-cost bidder of the two groups; while $prob(V)$ is the probability that bidder j will be the lowest-cost bidder of the two groups.

Both $prob(W)$ and $prob(V)$ are joint probabilities whereby the cost of one of the bidders is compared to the costs of the bidders of the other group, which are drawn, according to asymmetry, from a different probability distribution. Naegelen (2002) and Riley and Samuelson (1981) use the inverse functions and a single bidder of each type to make their analyses simpler.

If $F(c)$ is the cumulative density function (c.d.f.) for costs of bidders of type 1 and $G(t)$ is the c.d.f. for the costs of bidders type 2, then

$$prob(W) = [1 - F(c)]^{n_1 - 1} [1 - G(t=c)]^{n_2} \quad (48)$$

and

$$prob(V) = [1 - F(c=t)]^{n_1} [1 - G(t)]^{n_2-1}. \quad (49)$$

Equations (46) and (47) here differ from equation (1) in McAfee and McMillan (1989, p. 294) and equation (3.9) in Maskin and Riley (2000, p. 419). Our bid functions (46) and (47) may be confused with an expected payment equation such as equation (1) in McAfee and McMillan (1989, p. 294) or even equation (3.9) in Maskin and Riley (2000, p. 419), since all those are equations that predict what the bid or payment will be by linking the bidders cost (or value to the bidders) to the bidders cost distribution (or value distribution). Our (46) and (47) are the bidding functions of a first-price sealed-bid auction, found after a maximization process where each bidder chooses its bid based on its beliefs of other bidders' information. Equation (1) in McAfee and McMillan (1989, p. 294) is the expected payment assuming a second-price sealed-bid auction or English auction where the expected payment is just the expected value of J_i in equation (1) McAfee and McMillan (1989, p. 294). Equation (3.9) in Maskin and Riley (2000, p. 419) also assumes a second-price sealed-bid or English auction and, notice also that they do not assume a procurement auction where bidders sell their services based on the cost to them (our case), but an auction where bidders are buying a good that they value.

Substituting $F(c)$ and $G(c)$ with specific functional forms and solving for (46) and (47) would prove that a first-price auction is discriminatory against the low-cost bidder if we show that for any $c_i > t_j$, (46) and (47) would yield $b_i = b(c_i)$ less than $\beta_j = \beta(t_j)$.

Evaluating any probability distribution in this type of formula is an extremely difficult

mathematical task. In the next section we take the case of two uniform distributions that is common in auction theory (for obvious reasons) and show how a lower expected payment does not necessarily lead to a lower bid.

3.6: Specific functional forms and discrimination

Here we use the simplest probability distributions to shed more light on the question at hand. Is there some pair of probability distributions that will yield discrimination in the sense that the low-cost bidder will bid higher? Suppose $f(c)$ and $g(t)$ are both uniform distributions, but $g(t)$ is taller and thinner than $f(c)$; i.e.,

$$f(c) = \begin{cases} \frac{1}{\beta - \alpha} & \alpha < c < \beta \\ 0 & \text{otherwise} \end{cases}$$

and

$$g(t) = \begin{cases} \frac{1}{\beta - \gamma} & \alpha < \gamma < t < \beta \\ 0 & \text{otherwise} \end{cases}$$

Assuming $\beta=1$, $\alpha=0$ and two bidders i and j , of types 1 and 2, respectively, i 's bid is

$$b(c) = c + \left[\frac{1}{3}(1-c) \right] = \frac{2c+1}{3} \quad (50)$$

and bidder j 's bid is

$$\beta(t) = t + \left[\frac{1}{3}(1-t) \right] = \frac{2t+1}{3} \quad (51)$$

Note that these bidding functions are exactly the same.

With these probability functions we do not have discrimination, since lower cost bidders will always produce a bid that is lower than the bid coming from the high-cost bidder. Therefore, the low-cost bidder is more likely to win the auction and the result does not solve the ex-ante maximization problem for CIDA since the low-cost bidder is the bidder with the highest expected payment. By running a first-price sealed-bid auction and assuming a pair of uniform distributions such as those described above, CIDA may end up buying from the low-cost bidder group, which is not optimal ex-ante as they require a higher expected payment, but is optimal ex-post as they require a lower actual payment. Had CIDA imposed a scoring rule that benefited the high-cost bidder trusting ex-ante that a lower expected payment would maximize its utility as auctioneer, it would have faced the tradeoff described by McAfee and McMillan (1989, p. 297): “Favouring high-cost firms raises the probability that a high-cost firm will win. But it also increases the competitive pressure on the low-cost firms, forcing them to bid lower.” Notice that the low-cost bidder inflates its bid more than the high-cost bidder trusting its increased chances of winning the auction. More competition would lower the bids, which is good for CIDA even though introducing a high-cost bidder in the presence of discrimination arising from the probability distribution may imply CIDA is buying from the high cost bidder.

It is beyond the scope of the present research to estimate the cost distributions that the bidders may have, and even if we had them, it is hard to evaluate who will win in a first-price sealed-bid auction, because of the difficulties in evaluating other functional forms that do not merely follow the uniform distribution. We cannot predict the bids and compare them unless we have information on the cost distributions and are able to solve the problem of integrals; all we are doing is describing the potential different scenarios that may determine the outcome, not predicting which one will occur.

This result occurs because $\left[\frac{1}{3}(1-\phi) \right]$ is a decreasing function of ϕ : the higher the bidder's cost, the smaller the difference between its own cost and its bid. The expression is also a decreasing function of the number of bidders. The higher the number of bidders, the smaller the difference between own cost and own bid. It is not a function of the probability of the other group, however.

The presence of high-cost bidders, especially if they are favoured by CIDA, seems to increase the probabilities of lower bids as it is more likely to have bids coming from a bidder with a bidding function in which the second term is lower, thereby forcing the low-cost bidders to lower their bids accordingly.

For the case of two uniform distributions with one of them compressed to the right as described above, it is easy to verify that the expected payment for the high-cost not-for-profit group equals $J = 2c - \gamma$, while the corresponding expression for the other group is $J = 2t$. This is precisely the result used in McAfee and McMillan (1989) and Maskin and

Riley (2000) to prove the existence of discrimination, where discrimination is understood as the fact that the auctioneer maximizes its objective by buying from the high-cost bidder with lower expected payment.

Now, if one takes the bidding function

$$b(c) = c + \left[\frac{1}{3}(1-c) \right],$$

and compares it to

$$\beta(t) = t + \left[\frac{1}{3}(1-t) \right],$$

under what conditions with respect to c and t would the two bids be different? When is the bid coming from the high-cost group actually lower than the bid coming from the low-cost group?

The inequality

$$b(c) = c + \left[\frac{1}{3}(1-c) \right] < t + \left[\frac{1}{3}(1-t) \right] = \beta(t),$$

is equivalent to $c < t$. In words, the lowest bid always comes from the lowest-cost bidder in this case.

We not only need J to be lower for the not-for-profit but the actual bid coming from its bidding function to be lower as well. It is difficult to find an example in the literature of a specific functional form that would result in the high-cost bidder bidding according a bidding function that yields a winning bid. The closest seems to be Example 3 in Maskin and Riley (2000, p. 417). If we translate that example into procurement auction terms, we would have a low-cost bidder that always has a low cost, which in our case would be a for-profit firm that always chooses a quality level lower than the not-for-profit quality level, and would be the strong bidder. The high-cost bidder exhibits a low cost half of the time and a high cost the other half of the time, making it a weak bidder. This high-cost bidder would be a not-for-profit firm that chooses a high quality level at least half the time because its managers and donors encourage this behaviour. As Maskin and Riley (2000) prove, the high-cost bidder can win for certain by bidding slightly less than the low-cost bidder and still generate a positive payoff. There could exist an equilibrium in which the not-for-profit bidder wins by bidding lower even though it exhibits higher cost on average and at the same time all bidders are reaching a positive payoff and pursuing their own interest and not the auctioneer's.

We now present an example in a discrete context that is the adaptation to government procurement of Example 3 in Maskin and Riley (2000).

Consider two bidders: a not-for-profit bidder called bidder 1 and a for-profit bidder called bidder 2. On the one hand, bidder 1 is the high-cost or weak bidder because there is a probability of 0.5 attached to this bidder having a low cost of, say, 1, and a probability of

0.5 attached to this bidder having a high cost of, say, 3. On the other hand, bidder 2 is the low-cost or strong bidder because there is a probability of 1 attached to this bidder having a low cost of 1, while the probability of this bidder having a cost different than 1 is zero.

There is a total of four cases but only two of them are relevant. The four cases are: case A, where bidder 1's cost equals 1 and bidder 2's cost also equals 1; case B, where bidder 1's cost still equals 1 but bidder 2's cost is higher than 1 —obviously the probability of case B is zero; case C, where bidder 1's cost is 3 and bidder 2's cost is 1; and a final case D, where bidder 1's cost is 3 and bidder 2's cost is higher than 1, which occurs with probability zero.

The probability of winning for the strong bidder equals the probability of cases A and C times the probability that its bid will be lower, given that the probability of cases B and D is zero. Let us call the probability of the strong-bidder-winning event SW:

$$\begin{aligned}\text{Prob (SW)} &= (\text{Prob of Case A}) (\text{Prob } b_s < b_w) + (\text{Prob of Case C}) (\text{Prob } b_s < b_w) \\ &= \frac{1}{2} (\text{Prob } b_s < b_w) + \frac{1}{2} (\text{Prob } b_s < b_w) ,\end{aligned}$$

where b_s is the bid coming from the strong bidder and b_w the bid from the weak bidder.

If event C happens, the weak bidder will have to bid more than 3 and the strong bidder will win for sure by bidding less than 3 which it can do since its cost in this case is one.

This is why the Prob (SW) is at least 0.5

The strong bidder wins with probability at least 0.5 if it bids more than one and just below 3. Its expected payoff from doing so is at least 1.5 (which is the Prob (SW) times his bid of almost 3).

What is the bid that results in an expected payoff of at least 1.5?

If we let the difference of bid minus cost be the expected payoff, then for an expected payoff strictly higher than 1.5 and a cost equal to 1 we need a bid strictly higher than 2.5. Therefore, the strong bidder strategy is to bid more than 2.5, or at least 2.5. And the weak bidder will win if bidding less than 2.5. What is the weak bidder's expected payoff from doing so? The answer is $\frac{1}{2} [(2.5-e)-1] = \frac{1}{2} (1.5-e)$, which is positive for a sufficiently small $e > 0$. Therefore we have a case where the weak, high-cost, not-for-profit bidder will win while both bidders maximize their respective expected payoffs.

We next present a continuous distribution that would yield similar results.

3.6.1: The Beta Distribution. The continuous analogue to the discrete example of discrimination against the low-cost bidder.

Can we find a continuous distribution that resembles the discrete example presented above? There is a probability distribution where all the probability could be tilted into one of the ends or separated into two main groups toward the ends: namely, the Beta distribution, given as

$$f(x) = \begin{cases} \frac{x^{a-1}(1-x)^{b-1}}{\int_c^d x^{a-1}(1-x)^{b-1} dx} & c < x < d \\ 0 & \text{otherwise} \end{cases}$$

The weak bidder distribution would be represented by this formula when a and b are equal and less than 1, ($a = b < 1$). This is a continuous distribution where most of the probability is separated into two equal groups toward the ends. If $1 < a < b$, then the lower values of the distribution are more likely to occur. This would be the distribution for the strong bidder, the low-cost for-profit bidder.

This probability function is too complex to evaluate any of the associated formulae — either the bidding functions or the expected payments— in a straightforward manner, making it very difficult to prove the existence of discrimination. Consequently, we do not actually evaluate the probability distributions in the bidding functions and leave this possibility open to future work.⁸

Finally, in which of the different scenarios described above is CIDA better off?

Assuming the not-for-profit group implies lower monitoring costs, and everything else to

⁸ Although it would be difficult to evaluate equations (46) and (47) with respect to the Beta distribution, if it could be done, it would be interesting to prove a case where a high-cost bidder actually wins the auction and at the same time maximizes its expected gain in a first-price sealed-bid auction.

be equal, obviously CIDA is better off by choosing the not-for-profit group explicitly, which is what it seems to happen with the policy towards contribution agreements, before and after 1997.

If the payment to the winner is the most relevant variable, an auction seems to be the preferred option, which is what happens under contracts. Is it optimal for CIDA to open the auction to both groups as it did in 1997? This question opens a wide set of answers. If our Section 3.4 conclusions are wrong and the not-for-profit group is low-cost compared to the for-profit group, then CIDA is better off by choosing them either by a direct administrative mechanism that favours them or by an auction that does not discriminate against them. If the auction discriminates against them, CIDA should estimate the bias and design a policy that overcomes the results of the auction and favours the not-for-profit group.

If our results of Section 3.4 are correct, that is if the not-for-profit group is high-cost, CIDA's welfare depends on two states of the world: the two cost distributions corresponding to each group may overlap or not.

If they do not overlap, including the not-for-profit group in the auction may have the effect of keeping the bids at the same level as before, in which case CIDA would be indifferent. This is if the two cost distributions are too far apart and the pool of for-profit competitors remains unchanged. In this case the for-profit group may not see the not-for-

profit group as a real threat and keep their bids at the same level due to the presence of the same pool of for-profit competitors.

Now, if the pool of for-profit competitors shrinks as a consequence of the presence of the not-for-profit group and if, in addition, the remaining for-profit competitors do not see the not-for-profit group as a real threat, the bids may increase. This will be a case in which CIDA would be worse off by including the not-for-profit group.

Including a group of not-for-profit competitors with a cost distribution that overlaps the existing cost distribution of the for-profit group may be beneficial to CIDA. This is because the for-profit group may perceive a higher risk of losing the contract due to the presence of the not-for-profit group and lower the bids. Even though the not-for-profit group is high-cost it may be perceived as a real threat in the case of a discriminatory auction.

A final case remains which is the one in which CIDA prefers one group to the other for some non-economic reason. Obviously here CIDA is better off by choosing the group they prefer directly, not by an auction.

3.7: Conclusions

This chapter began with a review of the relevant literature on not-for-profit production decisions and that on auction theory. The formal model began with a description of the government problem: we examined the optimization problem for the government agency

involved in a procurement auction and allocation of funds to executing agencies, under different assumptions about the observability of quality. A statement of the predicted behaviour of both not-for-profit and for-profit firms, and their choices of the quantity and quality of output followed. Finally, we explored the bidding behaviour and functional forms for the typical not-for-profit and for-profit firms involved in an auction for contracts in which quality is observable.

At the outset we stated that several questions relating to the chances of the not-for-profit group being chosen as the winner of a CIDA contract would be answered. The not-for-profit group may be the winner of a CIDA contract due to explicit choice by CIDA or due to the nature of their cost distribution and the characteristics of the auction set by CIDA.

CIDA may choose one of the groups because it values that group more for some non-economic reason. The empirical results obtained in the next chapter of this dissertation indicate that even the projects that are auctioned correspond to this category as we observe a bias in favour of the not-for-profit bidders. Alternatively, it is the degree of difficulty in quality monitoring that decides the executing agency. In one case quality is not observable, which would make the monitoring costs very high in order to encourage higher quality. In this case hiring a not-for-profit executing agency solves the problem, as they will provide a higher quality level even at a low monitoring cost. This result emerges from the not-for-profit's maximization problem where quality increases utility and donations. This is why we would predict that for projects for which quality is

unobservable, CIDA will not auction the contract but rather choose the not-for-profit directly, which is the case of projects funded as contribution agreements.

If we assume that the not-for-profit wins due to an auction that discriminates against the low-cost group we need to establish the differences in cost distribution. In order to be able to assume different cost distributions for the two groups of bidders we solved the maximization problem of the not-for-profit and for-profit firms in a monopolistically competitive setting where they both have the quality level of their services in their respective objective functions. The not-for-profit group emerges as the higher quality group.

It is here where there arises a scenario in which quality is easier to observe. What matters now to CIDA is the payment given to the executing agency. We argue that in this case CIDA will auction the right to execute the contract. Solving its maximization problem, CIDA will choose the bidder with the lowest expected payment. Assuming the expected payment equals the bidder's own cost plus the difference between the first-order and second-order statistics, and the standard pair of uniform distributions described in McAfee and McMillan (1989), CIDA may maximize its utility by choosing the not-for-profit or high-cost bidder, though it may also end up choosing a low-cost for-profit bidder, as a member of this group may also provide the lowest bid. The group of winning bidders may thus include both for-profits and not-for-profits.

However, when allocating contracts, CIDA does not use the English auction assumed by McAfee and McMillan (1989), but rather a first-price sealed-bid auction. In this type of auction the results do not actually depend on CIDA; instead they depend on the bidding functions of the bidders involved once the auction rules are announced and enforced.

Solving for the bidding functions from the perspective of a bidder's maximization problem yields the bidding functions for a typical bidder from each group. The bidding functions under our assumptions are similar for both groups. The amount by which each bidder inflates its cost is a decreasing function of the bidder's own cost. The presence of high-cost bidders tends to lower the bids in the sense that they shave their bids more than the low-cost bidders do, forcing the low-cost bidders to bid lower as well. Now, with the pair of uniform distributions and the auction rules set by CIDA, the not-for-profit group would not win.

The high-cost bidders have a lower expected payment as also shown by Maskin and Riley (2000) also show for the case of an auctioneer who is a seller of the good being auctioned. For the case of uniform distributions we evaluate the bidding functions and prove that it is not necessarily the bidder with the lower expected payment, which is the not-for-profit bidder, who submits a lower bid. This result emerges from an examination of their bidding function after applying the scoring rule relevant to our case, which is the first-price sealed-bid auction. With a pair of uniform distributions the auction will result in the low-cost bidder winning. CIDA will therefore buy, in theory, from the low-cost bidder.

However, the presence of a second group of bidders, the not-for-profit firms, results in an asymmetric auction as they draw their costs from a different distribution. It could be the case in theory that not-for-profit bidders are bidding lower⁹ than the for-profit bidders even though they have a higher cost and higher quality, thereby winning the auction, which makes this auction discriminate against the for-profit bidders.

This is where the third question arises: if there is discrimination against the low-cost for-profit group as a result of the probability distributions, auction rules and bidding functions, what do those probability distributions look like? An example was provided of a discrete distribution that offers these results and we have also presented a case of a continuous distribution that would appear to do the same. Finally we conclude that in any of the cases CIDA is either indifferent or better off by including the not-for-profit group in the auction, assuming it is the high-cost group. Except for the case where the presence of the not-for-profit group has the effect of shrinking the pool of existing for-profit bidders and thereby raising the bids.

In summary, the bias observed empirically in Chapter 2 and confirmed again in Chapter 4 by CIDA towards the not-for-profit sector may be explained by either a preference by CIDA as argued in Section 3.3 or as the results of an asymmetric auction as explained in Sections 3.5 and 3.6.

⁹ They may reduce their bids due to the characteristics of the cost distribution and auction rules. Knowing they are the high-cost group the NFPs may decide to reduce their bids in order to win the contract.

Chapter 2 of this study finds evidence that projects that are easy to monitor tend to be assigned through open competition to for-profit agencies and projects that are hard to monitor according to quality are assigned to non-profit agencies through contribution agreements. The result is consistent across different geographic recipient country areas. The result confirms some of the theoretical explanations advanced in Section 3.3 in this chapter.

In Chapter 4, we explore empirically the results of the auction for projects that are not assigned through contribution agreements. We observe that the not-for-profit group has a higher probability of winning even though they are a much smaller group of bidders. These empirical results suggest that not-for-profits are more successful as a group; if it is true that they are a higher quality, higher cost group, it may be that they bid lower due to the nature of their probability functions, which confirms the validity of the explanations advanced in Sections 3.5 and 3.6 of this chapter.

Appendix C. Second-order sufficient conditions: the not-for-profit problem

If (z_i^*, x_i^*, q_i^*) with $q_i^* = \underline{q}$ solves the not-for-profit problem, then the relevant bordered

Hessian matrix is

$$H^* = \begin{bmatrix} L_{zz}^* & L_{zx}^* & L_{zq}^* & g_z^* & 0 \\ L_{xz}^* & L_{xx}^* & L_{xq}^* & g_x^* & 0 \\ L_{qz}^* & L_{qx}^* & L_{qq}^* & g_q^* & -1 \\ g_z^* & g_x^* & g_q^* & 0 & 0 \\ 0 & 0 & -1 & 0 & 0 \end{bmatrix},$$

where

$$L_{zz}^* = U_{zz}^* - \lambda_i^* (D_{zz}^* - C_{zz}^*),$$

$$L_{zx}^* = L_{xz}^* = U_{xz}^* - \lambda_i^* (D_{xz}^* - C_{xz}^*),$$

$$L_{zq}^* = L_{qz}^* = U_{qz}^* - \lambda_i^* (D_{qz}^* - C_{qz}^*),$$

$$L_{xx}^* = U_{xx}^* - \lambda_i^* (D_{xx}^* + p_{xx}^* x_i^* + 2p_x^* - C_{xx}^*),$$

$$L_{xq}^* = L_{qx}^* = U_{qx}^* - \lambda_i^* (D_{qx}^* + p_{qx}^* x_i^* + p_q^* - C_{qx}^*),$$

$$L_{qq}^* = U_{qq}^* - \lambda_i^* (D_{qq}^* + p_{qq}^* x_i^* - C_{qq}^*),$$

$$g_z^* = D_z^* - C_z^*,$$

$$g_x^* = D_x^* + p_x^* x_i^* + p^* - C_x^* ,$$

$$g_q^* = D_q^* + p_q x_i^* - C_q^* ,$$

and

$$g(z_i, x_i, q_i) := [D(z_i, x_i, q_i; S, z_{-i}, x_{-i}, q_{-i}) - S + p(x_i, q_i; x_{-i}, q_{-i})x_i - C(z_i, x_i, q_i)] .$$

The second-order sufficient condition for (z_i^*, x_i^*, q_i^*) with $q_i^* = \underline{q}$ to solve the not-for-profit problem is $|H^*| < 0$, which is equivalent to

$$L_{xx}^* (g_z^*)^2 + L_{zz}^* (g_x^*)^2 < 2L_{xz}^* g_x^* g_z^* .$$

Clearly, this inequality holds if $L_{xx}^* < 0$, $L_{zz}^* < 0$, and $2L_{xz}^* g_x^* g_z^* = 0$.

Since it is assumed that $U_{xz}^* = 0$,

$$L_{xz}^* = U_{xz}^* - \lambda_i^* (D_{xz}^* - C_{xz}^*) = 0$$

is implied by $D_{xz}^* = C_{xz}^* = 0$; since it is assumed that $U_{zz}^* < 0$ and $\lambda_i^* > 0$,

$$L_{zz}^* = U_{zz}^* - \lambda_i^* (D_{zz}^* - C_{zz}^*) < 0$$

is implied by $D_{zz}^* \geq C_{zz}^*$; and since it is assumed that $U_{xx}^* < 0$ and $\lambda_i^* > 0$,

$$L_{xx}^* = U_{xx}^* - \lambda_i^* (D_{xx}^* + p_{xx}^* x_i^* + 2p_x^* - C_{xx}^*) < 0$$

is implied by $D_{xx}^* + p_{xx}^* x_i^* + 2p_x^* \geq C_{xx}^*$. Since

$$p_{xx}^* x_i^* + 2p_x^* = \frac{\partial}{\partial x_i} (p_x^* x_i^* + p^*) = \frac{\partial}{\partial x_i} \left[p^* \left(\frac{p_x^* x_i^*}{p^*} + 1 \right) \right] = \frac{\partial}{\partial x_i} \left[p^* \left(1 - \frac{1}{\varepsilon_{xx}^*} \right) \right],$$

assuming a downward-sloping demand curve for commercial output $p_x^* < 0$ and that the corresponding own-price elasticity ε_{xx} is a constant function of x_i ,

$$D_{xx}^* + p_{xx}^* x_i^* + 2p_x^* \geq C_{xx}^*$$

is implied by

$$D_{xx}^* - C_{xx}^* \geq p_x^* \left(\frac{1}{\varepsilon_{xx}^*} - 1 \right).$$

If (z_i^*, x_i^*, q_i^*) with $q_i^* > \underline{q}$ solves the not-for-profit problem, then the relevant bordered Hessian matrix is

$$\tilde{H}^* = \begin{bmatrix} L_{zz}^* & L_{zx}^* & L_{zq}^* & g_z^* \\ L_{xz}^* & L_{xx}^* & L_{xq}^* & g_x^* \\ L_{qz}^* & L_{qx}^* & L_{qq}^* & g_q^* \\ g_z^* & g_x^* & g_q^* & 0 \end{bmatrix}.$$

The second-order sufficient condition in this case is $|\tilde{H}^*| < 0$, which is difficult to

evaluate due to the dimensionality and general lack of sparseness of $\tilde{H}^*$. However, since

it is assumed that $U_{xz}^* = U_{qz}^* = U_{qx}^* = 0$,

$$L_{zx}^* = L_{xz}^* = U_{xz}^* - \lambda_i^* (D_{xz}^* - C_{xz}^*) = 0,$$

$$L_{zq}^* = L_{qz}^* = U_{qz}^* - \lambda_i^* (D_{qz}^* - C_{qz}^*) = 0,$$

and

$$L_{xq}^* = L_{qx}^* = U_{qx}^* - \lambda_i^* (D_{qx}^* + p_{qx}^* x_i^* + p_q^* - C_{qx}^*) = 0$$

are implied by $D_{xz}^* = C_{xz}^* = 0$, $D_{qz}^* = C_{qz}^* = 0$, and $D_{xx}^* + p_{qx}^* x_i^* + p_q^* \geq C_{xx}^*$, respectively.

Under these additional assumptions,

$$|\tilde{H}^*| = \begin{vmatrix} L_{zz}^* & 0 & 0 & g_z^* \\ 0 & L_{xx}^* & 0 & g_x^* \\ 0 & 0 & L_{qq}^* & g_q^* \\ g_z^* & g_x^* & g_q^* & 0 \end{vmatrix} = -L_{xx}^* L_{qq}^* (g_z^*)^2 - L_{zz}^* L_{qq}^* (g_x^*)^2 - L_{zz}^* L_{xx}^* (g_q^*)^2.$$

Since it is assumed that $U_{zz}^* < 0$ and $\lambda_i^* > 0$,

$$L_{zz}^* = U_{zz}^* - \lambda_i^* (D_{zz}^* - C_{zz}^*) < 0$$

is implied by $D_{zz}^* \geq C_{zz}^*$; since it is assumed that $U_{xx}^* < 0$ and $\lambda_i^* > 0$,

$$L_{xx}^* = U_{xx}^* - \lambda_i^* (D_{xx}^* + p_{xx}^* x_i^* + 2p_x^* - C_{xx}^*) < 0$$

is implied by $D_{xx}^* + p_{xx}^* x_i^* + 2p_x^* \geq C_{xx}^*$; and since it is assumed that $U_{qq}^* < 0$ and $\lambda_i^* > 0$,

$$L_{qq}^* = U_{qq}^* - \lambda_i^* (D_{qq}^* + p_{qq}^* x_i^* - C_{qq}^*) < 0$$

is implied by $D_{qq}^* + p_{qq}^* x_i^* \geq C_{qq}^*$.

Appendix D. Second-order sufficient conditions: the for-profit problem

If (x^*, q^*) with $q^* = \underline{q}$ solves the for-profit problem, then the relevant bordered Hessian matrix is

$$H^* = \begin{bmatrix} L_{xx}^* & L_{xq}^* & 0 \\ L_{qx}^* & L_{qq}^* & -1 \\ 0 & -1 & 0 \end{bmatrix},$$

where

$$L_{xx}^* = p_{xx}^* x^* + 2p_x^* - C_{xx}^*,$$

$$L_{xq}^* = L_{qx}^* = p_{qx}^* x^* + p_q^* - C_{qx}^*,$$

and

$$L_{qq}^* = p_{qq}^* x^* - C_{qq}^*.$$

The second-order sufficient condition in this case is $|H^*| > 0$, which is equivalent to

$$p_{xx}^* x^* + 2p_x^* < C_{xx}^*.$$

In words, this inequality says that the marginal cost curve cuts the marginal revenue curve from below.

If (x^*, q^*) with $q^* > \underline{q}$ solves the for-profit problem, then the relevant bordered Hessian matrix is

$$\tilde{H}^* = \begin{bmatrix} L_{xx}^* & L_{xq}^* \\ L_{qx}^* & L_{qq}^* \end{bmatrix}.$$

The second-order sufficient condition in this case is

$$\left| \tilde{H}^* \right| = L_{xx}^* L_{qq}^* - \left(L_{qx}^* \right)^2 > 0$$

with $L_{xx}^* < 0 \left(\Rightarrow L_{qq}^* < 0 \right)$, which is equivalent to

$$p_{xx}^* x^* + 2p_x^* < C_{xx}^* ,$$

$$p_{qq}^* x^* < C_{qq}^* ,$$

and

$$\left(p_{xx}^* x^* + 2p_x^* - C_{xx}^* \right) \left(p_{qq}^* x^* - C_{qq}^* \right) > \left(p_{qx}^* x^* + p_q^* - C_{qx}^* \right)^2 .$$

Chapter 4: An Econometric Analysis of Bidding for CIDA Contracts

4.1: Introduction

Canada has been a leader in using the non-profit sector to facilitate government assistance for international development. Due to the nature of development projects, CIDA has in the past had to rely primarily on private for-profit firms to execute the large infrastructure projects in developing countries that were popular during the early years of development assistance programming. Over the past forty years, however, not-for-profit and for-profit Canadian firms have been competing directly (via bidding for contracts) or indirectly (through CIDA financing structures) for CIDA funding. There is very little analysis in the literature about the composition of the current executing agencies and about what determines the chances of winning a particular bid for a particular bidder. This study represents the first attempt to undertake an econometric analysis of the bidders and winners of CIDA development contracts.

The most comparable studies have been CIDA's own two recent analyses of the results of the open competition for projects. These analyses focus on evaluating the open competition process. The most significant finding of these descriptive studies is simply the increased participation of all sectors in the competition process, though the studies lack any econometric analysis of the data. This chapter addresses this shortcoming by using formal estimation procedures to determine the extent of any bias in CIDA's treatment of for-profit firms and their rival bidders in the general not-for-profit sector, and the charitable sector specifically. This study looks at whether the status of the bidder

affects the success of winning a bid and examines if any bias is associated with the ease of monitoring the project.

To answer these questions, a unique data set was painstakingly constructed—a process that is detailed in the next section. Formal definitions of the variables appear in the chapter's appendix. The third section discusses the econometric challenges and techniques appropriate for examining the questions at hand. It then reports and discusses in detail the results that arise from the empirical investigation. In Section 4.4, we create a unique variable that attempts to capture the ease with which any given project can be monitored. We then use this variable to help further discern the factors that determine a winning bid. A final section concludes the chapter.

4.2: Database construction

CIDA's bilateral branches select their executing agencies for a project by posting the contracts through an electronic tendering service called MERX and screening the bids for the best value-to-money results. Any analysis of the probability of winning a CIDA contract has to include the characteristics of the bidders and the winner. The sample of bidders for a CIDA contract is available to MERX members only. It was collected through a membership in MERX for the purposes of this research. The sample consists of the most recent contracts available at the time of the research, covering a period of two years.

Gathering the relevant data for the empirical side of this research started in September 2003. Table 4.1 indicates the number of contracts listed per year and some descriptive statistics. There are about one thousand contracts listed with an average of 121 contracts per year.

The years 2002 and 2003 were chosen as those were the most recent years not covered by previous CIDA studies. This sample of 203 contracts represents 18 percent of all contracts listed through MERX during the life of the open competition process. The sample includes only those contracts for which there was open competition directed through CIDA to developing countries. Therefore, some exclusions were necessary from this initial sample.

Table 4.1	
CIDA Contracts listed through MERX. 1995-2003	
Period	Number of contracts
January 1995-January 1996	112
January 1996-January 1997	171
January 1997-January 1998	98
January 1998-January 1999	145
January 1999-January 2000	121
January 2000-January 2001	123
January 2001-January 2002	117
January 2002-January 2003	100
January 2003-October 2003	103
Open opportunities Oct 10 2003	17
Descriptive statistics	
Average	121
Median	117
Max	171
Min	98
StDev	24

Source: Database constructed by this research from MERX contracts in the years 2002 and 2003.

Under the terms used within MERX, there are some contracts posted under the title “Advance Contract Award Notices” or ACANs. In these contracts, the winner is already selected and posted by CIDA, which uses MERX in these cases only to announce and explain its predetermined choice of executing agency. ACANs represented close to 20 percent of the 2002-03 sample, and were not considered in this study, as the winner is

assigned by CIDA without an open competition even though the contract is included in the list of opportunities listed through MERX.¹ There were 23 ACAN contracts in 2002 and 17 in 2003.²

There are 18 contracts (nine percent of the sample) listed through MERX under CIDA that are actually contracts with international multilateral organizations. These include the World Bank or the Inter-American Development Bank. Eastern Europe is not included in this study and therefore contracts for that region are not included in the sample. Eastern Europe is omitted because it is not a traditional recipient of foreign aid in the same way as the other regions in which CIDA operates. Assistance in these cases was often directed more towards issues of making the transition to markets rather than development per se, and programs for the region are already being phased out. There were seven contracts directed to Europe in 2002 and eight in 2003, representing close to seven percent of the total sample.

¹ There are some differences between the samples in Chapter 2 and Chapter 4. In Chapter 2, the sample is taken from CIDA's published list of current contracts and contribution agreements being executed, while in Chapter 4 the sample is only of contracts published through MERX for open competition. Chapter 4 excludes contribution agreements. In Chapter 2, the list of contracts being executed does not specify if the winning executing agency won by open competition or by ACAN. Therefore, if there are some ACANs, they are not excluded as they are in Chapter 4. In Chapter 2, the sample excludes contracts over \$100,000 because those are not published in CIDA's list of currently executed contracts, while Chapter 4 includes all contracts posted for open competition, including contracts under \$100,000. Most ACANs are under \$100,000.

² The composition of ACANs in the year 2002 sample is as follows: 47% are awarded to for-profit organizations, 29% to individuals, none to not-for-profit organizations, and 24% are not identified. Except for one ACAN for \$1.3 million where the winner is not determined, the rest of the ACANs in 2002 average under \$100,000. In the 2003 sample, only 3 ACANs have a winner identified: one for-profit organization and two individuals.

If we exclude all these special cases —ACANs, contracts in Europe, and funds to multilateral organizations—, the available contract list for our study is reduced from 203 to 130 contracts in 2002-2003. Of these 130 closed contracts suitable for our study, only 40 contracts (30 percent) had a winner published through MERX when the data were collected. Of these 40 winners, 27 were for contracts listed in 2002 and 13 were for contracts listed in 2003. A total of 573 bidders submitted their bids to CIDA through MERX for these 40 contracts.

Column one of Table 4.2 presents the descriptive statistics for the variable “number of bidders per contract” in our sample of 40 contracts. Column 2 provides the comparable data for bidders for the full 2002-2003 sample (published through MERX) that are not possible to include in our study due to the lack of a published winner.

Table 4.2		
Number of bidders per contract. Comparison		
Statistics	Our sample	Full 2002-03 sample
Average	24	26
Median	23	21
Standard Dev	12	22
Minimum	2	2
Maximum	66	192

Source: Database constructed by this research from MERX contracts in the years 2002 and 2003.

Removing the one extreme value of a contract with 192 bidders, corresponding to a small contract within Canada for training or complementary services to CIDA staff, the full-sample maximum number is 70 bidders per contract, and the standard deviation is 14, not far from what we have in our sample. Thus our sample seems to be representative of the full population of contracts over this period.

The data in Table 4.2 do not include the ACAN contracts where there is effectively only one “bidder.” Theoretically, there are a number of days when other potential bidders could challenge CIDA’s decision to award the contract, but in all cases, the number of bidders is recorded as zero in the MERX database. The lack of expressed interest in these contracts suggests that the cost of making a challenge and submitting a proposal exceeds the expected profit from being awarded the contract.

Table 4.3 provides the descriptive statistics of the variable “size of the contracts” in our sample of 40 contracts with winners identified, compared with the larger MERX sample of bids with and without announced winners.

Table 4.3		
Size of the contracts		
Millions \$		
Statistics	Our sample	Full 2002-03 sample
Average	2.03	2.50
Median	0.29	0.30
Standard Dev	3.60	4.50
Min	0.03	0.01
Max	14.70	25.10

Source: Database constructed by this research from MERX contracts in the years 2002 and 2003.

There are only four contracts in the full MERX sample, not included in our sample, that exceed the \$14.7 million maximum contract size of our sample. It is safe to say that the sample analyzed appears to be representative of the smaller contracts that make up the largest component of the full sample, as indicated by the difference between the median and average contract sizes.

Looking for the characteristics of the 573 bidders for the 40 contracts in the sample object of study was not an easy task. There is no unique source for such information and many bidders do not publish information on their size, experience or other characteristics. The main sources of information for our database on bidders and bids included the “Strategies” database on the Web site of Industry Canada, as well as the list of charities with their performance report from the Web site of Revenue Canada. Other sources were

the lists of the Branham Group for the information technology sector firms in Canada for 2002-2004, and the list of Canadian nonprofits involved in development published by the Canadian Council of International Cooperation in 2003. Finally, in several instances it was necessary to examine the individual Web sites of the bidders themselves.

For each bidder, it was necessary to identify the specific contracts for which they had bid, whether or not they won the bid, their status as a for-profit, charity or other not-for-profit firm, their number of employees, annual gross revenue, and years of operation as of 2002. The lack of availability of specific information on bidders reduced our sample further. There are only 135 bidders —23 percent of the original 573 bidders— that make available *all* the required information about their companies either on their own Web site, in a yearbook, or on government Web sites such as Industry Canada Strategies or the Revenue Canada list of charities.

It is important to note that the samples used in this study include two types of bidders: for-profit bidders and not-for-profit firms. Other not-for-profit organizations (such as quasi-governmental organizations) did not have sufficiently comparable information available to remain in the analysis. As the composition of the not-for-profit sector is only charities in this sample, the terms are therefore equivalent.

The 40 contracts chosen yield a sample of 573 bidders, as mentioned above. Within the 573-bidder sample, a smaller sub-sample of 438 observations (or 76 percent) could be defined as those bidders whose status (not-for-profit or for-profit) is known. Within the

sub-sample of 438 bidders whose status, in terms of profit distribution is known, 87 percent are for-profit firms and 13 percent are not-for-profit organizations. When the other variables such as number of employees, revenue and years of experience of the bidder are added, the sample is reduced to 135 bidders. Within the reduced 135-bidder sample, the proportion of not-for-profit bidders rises from 13 percent in the bigger sample to 16 percent, while the proportion of for-profit bidders goes down to 84 percent. Therefore, the nonprofits are slightly over-represented in the sample of 135 observations where all the information for the bidder is known. This overrepresentation may be due to the higher transparency that nonprofits are encouraged to show in order to attract donations. All the charities are supposed to publish financial and other figures at the Revenue Canada Web site, which is not a requirement for the for-profit firms.

The empirical analysis in this chapter uses two dimensions of the constructed database. In Section 4.3, we examine how the characteristics of the 135 individual bidders affect the probability of winning a contract. In Section 4.4, we examine the 459 bids coming from these 135 bidders on the 40 contracts to examine what determines the probability of any given bid being successful. In Section 4.5, we extend the analysis of the 459 bids to include the monitoring characteristics of the projects on which there was bidding.

4.3: Explaining the characteristics of successful bidders

Using the first data set described above, namely the sample of bidders, we now turn to a formal analysis of the probability that any given bidder would win a contract. The dependent variable is thus a dichotomous one, taking on the value one if the bidder is

successful and zero otherwise. Of the several ways in which such a model could be estimated, the probit and logit models are the most commonly employed. The main difference between these two procedures is in terms of the assumed underlying probability distribution for the data. The logit model assumes a logistic cumulative distribution function (CDF) which renders it much easier to estimate, while the probit model assumes a normal distribution. In the past, when the logistic CDF presented an easier mathematical option, the logit would have been the model of choice.

The analysis is thus focused on firms that bid for contracts being offered through MERX in open competition or auction. The question that motivates this research is whether and how the for-profit or not-for-profit status of a firm affects its success in bidding to execute development assistance projects. The empirical analysis of this question, of course, should also include other characteristics of the bidder that may influence its probability of winning a contract.

The empirical analysis in this study uses two basic samples. The first of these is the sample of bidders, where each bidder represents only one observation in the sample.

Who are the bidders for contracts through the open competition process in our sample? This question deals with the first sample. There are 573 bidders for the 40 contracts in the sample. A majority of them —67 percent— belong to the for-profit sector, only ten percent are not-for-profit organizations, and for 23 percent the not-for-profit or for-profit status is unknown.

Bidders averaged 1.7 bids each from the sample of 573 bidders. The maximum number of bids submitted by a bidder is 18 and of course the minimum is one, otherwise the bidder would not be in the sample. There are 38 bidders who won at least once, and five bidders who won twice. Obviously, with 48 winning bids and only 40 contracts some contracts must have had multiple winners, such as contract number ten, with three separate bidders—two for-profit firms and one not-for-profit organization—winning parts of the contract. This practice is encouraged by CIDA as a way to take advantage of the relative strengths of different bidders. Classifying the bidders according to the number of times they win and the average number of bids per bidder in that group offers interesting results. In the group of bidders that won one bid, the bidders averaged 2.7 bids each. For the bidders who won two bids, the average number of bids is substantially higher, at 8.6 bids. Losers have an average of only 1.6 bids, below the average for the whole sample. Therefore, those firms that bid more also seem to be more successful, though the direction of causality may easily run both ways.

We see significant differences between the percentage of nonprofits in the bigger sample and the percentage of nonprofits in the sample of winners. In the sample of winners there are 24 percent nonprofits as opposed to only ten percent in the sample of all bidders. Of all the winners who won one contract, 25 percent are nonprofits, of all winners who won two contracts, 25 percent are nonprofits. Even though there are more winners that are for-profit firms, nonprofits are overrepresented in the sample of winners as opposed to the whole sample. This preliminary evidence reinforces the analysis in Chapter 2 and

supports the general proposition of this thesis; namely that the not-for-profit sector is relatively more successful in competing for CIDA contracts.

Nonprofits bid more than for-profits with the average number of bids in the for-profit group being 1.8, while the average number of bids per bidder in the nonprofit group is 2.3. Tables 4.4A and 4.4B below present an analysis of the number of bids per bidder depending on the nonprofit status and the number of winning bids. It seems from the comparison of the percentage of winners who bid more than four times in both groups that nonprofits bid more than for-profits and they win proportionately more bids as a consequence of this behaviour. It seems there is a relationship between the number of bids and the probability of winning that will be explored later in this chapter. For both nonprofit and for-profit firms, winners bid more often than losers. The for-profit group has more losers (as a percentage) than the nonprofit group and bids less often.

Table 4.4A	
Average number of bids and percentage of losers for NFPs and FPs	
FPs Average Number of Bids	1.8
NFPs Average Number of Bids	2.3
% of FPs losers	94%
% of NFPs losers	86%

Table 4.4B Differences between NFPs and FPs in terms of percentage of winners and number of bids per bidder			
Percentages	Bid only once	Bid 1 to 4 times	Bid 5 to 11 times
% of FPs losers	69.8%	95.8%	4.2%
% of NFPs losers	53.2%	91.5%	8.5%
% of FPs winners	32.0%	68.0%	32.0%
% of NFPs winners	37.5%	62.5%	37.5%
% of FPs one-time winners	33.3%	71.4%	28.6%
% of NFPs one-time winners	42.9%	71.4%	28.6%
% of FPs two-time winners	25.0%	50.0%	50.0%
% of NFPs two-time winners	0.0%	0.0%	100.0%

Source: Database constructed by this research from MERX contracts in the years 2002 and 2003.

We have three other variables that characterize the for-profit and not-for-profit bidders: the number of employees, annual revenue, and experience as measured by the number of years since the firm started. The difficulties in collecting data for each bidder reduced the sample from 573 to only 135 bidders for which values for all three variables were available.

In this reduced sample of 135 bidders, the percentage of for-profits is 84 percent and the percentage of nonprofits is 16 percent. There are no unknown values so both groups are compared to the wider sample of 573 bidders. The percentage of for-profits is relatively higher than nonprofits.

Table 4.5			
Size and experience of both sectors			
FPs 113 / 135 obs	Years	Number of Employees	Revenue
Average	27	2,304	405,437,811
Min	5	1	50,000
Max	164	103,000	13,000,000,000
NFPs 22 / 135 obs	Years	Number of Employees	Revenue
Average	52	629	77,204,274
Min	7	22	2,418,763
Max	135	3,800	333,634,631

Source: Database constructed by this research from MERX contracts in the years 2002 and 2003.

The data in Table 4.5 indicate that for-profits are bigger, on average, than nonprofits, but are less experienced. This difference in average size occurs despite the fact that the for-profit bidder group includes individuals, such as consultants, which is not the case for the nonprofit group. The influence of these individual operations on for-profit averages is cancelled by the fact that there are also several very large corporations bidding on CIDA

contracts. Hence the range of size for the for-profit bidders is much larger than for nonprofits.

Now let us turn into the model description. The dependent variable for the analysis is binary, and equals one if the bidder won at least one bid in the sample, and zero otherwise. The sample for the estimation consists of the 135 bidders for which complete data are available. The explanatory variables are the number of bids entered by the bidder in the sample period, an indicator of whether the bidder is a nonprofit (value of one) or for-profit (value of zero), the number of employees, and years of experience. Generally, according to what we were able to find through CIDA's documents and interviews with CIDA staff and experienced individuals, success is expected to be positively correlated with the experience, methodology applied, and staff assigned to a project. This is why the choice of independent variables was the number of bids and variables indicating size and experience of the bidder such as the years of experience, the number of employees and the revenue for each bidder as indicators of the bidder's ability to comply with CIDA's requirements.

One variable of importance is clearly missing: the bid price. Not surprisingly these data were not available as they constitute proprietary information for the losing bidders. However, the available regressors detailed above are supposed to constitute the key determinants of success. Interviews with CIDA desk officers indicated that when examining a bid, experience, methodology and staff comprise 80 percent of their assessment. The residual 20 percent is assigned the bid price. So, while we cannot be

sure of the marginal effect of price, the analysis should at least be capturing the bulk of the characteristics used to assess bids.

For this research, the variable of particular interest is the indicator of not-for-profit status of the bidder. If the estimated coefficient for this variable is positive and significant, it would indicate a general bias in favour of not-for-profit bidders at CIDA, either due to their status alone or possibly because these bidders have some cost advantage. Of course, the results may show a similar bias in favour of for-profit firms (a statistically significant negative estimated coefficient) or no bias at all (statistically insignificant estimated coefficient).

Before turning to the estimation results from the probit analysis, a number of econometric issues have to be addressed. First, we need to be concerned about multicollinearity. In particular, although we have information on both the number of employees and the annual revenue of bidders, they are likely to be highly correlated with each other and hence, cannot both be used in the same regression model. Indeed, the correlation matrix for all the relevant regressors in the sample of bidders in Table 4.6 reveals a degree of correlation of 0.9224 between the number of employees and revenue of each bidder.

Table 4.6
Correlation matrix. Sample of Bidders
 135 Observations

Variables	Winner	Number of bids	Not-for-profit	Years of experience	Employment	Revenue
Winner	1.0000					
Number of bids	0.3880	1.0000				
Not-for-profit	0.1618	0.1449	1.0000			
Years of experience	0.0248	0.2711	0.3535	1.0000		
Employment	-0.0560	0.0233	-0.0614	0.1473	1.0000	
Revenue	-0.0606	0.0539	-0.0751	0.2838	0.9224	1.0000

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

Thus, we use only employment data, due to the fact that employment numbers were more reliably available. Furthermore, since some organizations may have large revenues that are simply passing through in the form of high non-personnel-related costs, such as large intermediate input costs, it was determined that the number of employees is the better of the two for the purposes of the present.

It is also possible that the type of bidder, the number of years of experience the bidder has, and the bidder's size in terms of number of employees or revenue may well be linearly related as well. Auxiliary regressions for each of the variables involved were performed. Table 4.7 shows the results of each auxiliary regression that reveals other links between the variables involved not present in the correlation matrix. The statistically significant links in Table 4.7 seem to be as follows: not-for-profits are more experienced and larger in terms of employees, but make less revenue; more experienced bidders bid more often, have fewer employees, and have a larger revenue; and, as expected, bidders with more employees also make more revenue. This result is expected since the correlation matrix also suggested that larger bidders, in terms of employees, are also larger in terms of revenue. The economic explanations of these results may be that long-lived firms may well have been able to grow, leading to more revenue. Experience, however, may also imply more efficiency in terms of fewer employees per dollar of revenue. In addition, the years-to-employees ratio may be different according to the for-profit status of the organization. As noted earlier, the number of bids might lead to higher

success rates, but higher success rates may also induce more bids. Therefore, the number of bids and the success rate of a bidder may be jointly determined.

Table 4.7 Auxiliary Regressions. Sample of Bidders					
Dep Var	Number of bids	Not-for-profit	Years of experience	Employment	Revenue
Indep Var	Coeff (Prob)	Coeff (Prob)	Coeff (Prob)	Coeff (Prob)	Coeff (Prob)
Number of bids	-	0.0020 (0.650)	2.1527 (0.012)	12.18 (0.935)	-3,138,048 (0.891)
Not-for-profit	0.3143 (0.579)	-	25.288 (0.000)	1,766.4 (0.064)	-3.71E+08 (0.011)
Years of experience	0.0221 (0.012)	0.0022 (0.000)	-	-58.2 (0.000)	1.13E+07 (0.000)
Employment	4.23E-06 (0.935)	1.1E-04 (0.445)	-0.0019 (0.000)	-	142,466 (0.000)
Revenue	-4.63E-11 (0.891)	-2.5E-10 (0.093)	1.62E-08 (0.000)	6.06E-06 (0.000)	-
Constant	1.6226 (0.000)	-0.1463 (0.000)	20.2672 (0.000)	1,394.5 (0.013)	-2.22E+08 (0.010)
Prob>chi2 or Prob>F	0.034	0.000	0.000	0.000	0.000

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003. Note on Table 4.7: Probability values of the estimated coefficients appear in parentheses. The probability related to the significance of the regressor group appears at the bottom row.

The auxiliary regressions in Table 4.7 suggest that multicollinearity may be a problem.

Consequently, some of the independent variables are dropped in the probit and bivariate probit regressions used in this study in order to find a better fit in the presence of

multicollinearity. If it is true that dropping independent variables may hinder the model's ability to capture the complexity of the whole process, the fact that the regressors explain each other implies that dropping some of them in this sample may imply a better model due to simplicity and selection of only the essential regressors.

We begin the analysis of what determines the success of a bidder by examining three probit equations. In the first, the dependent variable of success is estimated as a function of all five independent variables in the model explaining a bidder's success or failure. These include the number of bids, status as a for-profit or not, number of employees, number of years in operation, and revenue. In the second equation, we drop revenue due to its high degree of correlation with the number of employees. In the third equation, we drop the number of bids due to the possibility that it is jointly-determined with the dependent variable. Finally, in the final two equations, we drop the years of experience and number of employee variables (respectively) to again minimize the possibility of multicollinearity. The results are shown in Table 4.8.

Table 4.8**Probit Regressions with Marginal Effects for the Sample of Bidders**

135 Observations

Dependent variable: Winner (probability of winning at least once)

Marginal Effects or $\delta F/\delta x$ of the explanatory variables (P-values in parentheses)					
Indep Var	Equation 1	Equation 2	Equation 3	Equation 4	Equation 5
Number of bids	0.0021 (0.001)	0.0040 (0.001)	-	-	-
Not-for-profit	0.0088 (0.286)	0.0150 (0.292)	0.0204 (0.200)	0.0316 (0.073)	0.1199 (0.082)
Years of experience	-0.0002 (0.830)	-0.0005 (0.797)	0.0008 (0.696)	-	-
Employment	-0.3858 (0.549)	-0.9614 (0.348)	-1.2116 (0.238)	-1.3640 (0.251)	-
Revenue	-0.0141 (0.819)	-	-	-	-
Prob >chi2	0.0021	0.0009	0.0907	0.0423	0.0896

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

The estimations presented in Table 4.8 indicate that the number of bids is the most statistically significant explanatory variable, and indeed the only one that is statistically significant at traditional levels. Dropping revenue does affect the magnitude of the marginal effects of other variables. When the number-of-bids variable is dropped, the estimating equation is barely significant at the ten percent level, though it is interesting to note that the statistical significance of the other explanatory variables (especially the not-for-profit status indicator) increases.

Equations 4³ and 5 provide weak evidence suggesting that not-for-profit bidders have a slightly higher (three and 12 percent respectively) chance of winning a CIDA contract. The level of significance is somewhat below five percent, but is significant for a ten percent one-tailed test. Together, the two explanatory variables, status of the bidder and its number of employees, seem to have a significant impact on the probability of being a winner at the four percent level according to the likelihood ratio test statistic. According to this model, a not-for-profit bidder is 12 percent more likely to win a contract, significant for a ten percent one-tailed test. This possible bias in favour of not-for-profit bidders will be explored further.

As noted in the earlier discussion about the estimating equations, there are theoretical grounds for expecting that the number of bids may be related to the other variables and, more importantly, may be determined endogenously with bidding success. This expectation seems to be confirmed by the estimations presented above. Rather than simply dropping the variables for the number of bids, as we did in equations 3 to 5 in Table 4.8, we can attempt to address the endogeneity problem more formally, and more appropriately, by using a bivariate probit technique.

In doing so, the number of bids was given a value of zero for those firms that bid only once, and one for firms that bid multiple times. The threshold was then changed in

³ An additional equation with the bidder's status and its experience as explanatory variables is presented in the appendix as equation 4a. The explanatory variables are not statistically significant as a group.

subsequent equations, so that the cut-off distinguishing the “zero” category and the “one” category was increased from this initial level of one. Thus, in the next equation, for example, zero was assigned to cases where the firm bid once or twice, and a value of one was assigned when the firm bid three or more times. Thus we could test to see whether the results were sensitive to how we divided up the number of bids for coding purposes.

Successful bidders remained coded as one, while unsuccessful bidders were still coded as zero. Therefore, we now have a two-equation system, equation A and equation B, where firms have to decide whether or not to bid more than once (or twice or whatever the defined threshold happens to be for a specific equation), and then CIDA chooses the winning bid. These two equations can be estimated using a bivariate probit procedure that takes account of the potential relationship between these two decisions. Table 4.9 presents the estimated marginal effects for the model when only revenue has been excluded, then other regressors are excluded and different thresholds are tried for the dependent variable that indicates the number of bids.⁴

⁴ Other thresholds for more than four and even more than five bids in the appendix show similar, although no better, results than the results in Table 4.9. The threshold of more than one and more than two bids is reasonable if we look at the composition of bidders. Most bidders bid only once or twice. The threshold of more than one and more than two bids offers a consistent result of 25 percent as the effect of the increment in the probability of winning as a result of being a not-for-profit bidder.

Table 4.9 Marginal Effects after Bivariate Probit for the Sample of Bidders 135 Observations. Marginal Effects of explanatory variables (P-values in parentheses)				
Dependent Variable in Equation A1, A2, A3, and A4: Qualitative number of bids (Qualbid), =1 if number of bids greater than X, =0 otherwise				
Indep. Variables	Number of bids > 1		Number of bids >2	Number of bids >3
	Equation A1 Marg. Eff. (P-value)	Equation A2 Marg. Eff. (P-value)	Equation A3 Marg. Eff. (P-value)	Equation A4 Marg. Eff. (P-value)
Not-for-profit	-0.0381 (0.762)	-0.0308 (0.806)	-0.0924 (0.442)	-0.0392 (0.739)
Employment	-0.1373 (0.764)	--	--	--
Years of experience	0.0079 (0.545)	0.0066 (0.601)	-0.0176 (0.130)	-0.0373 (0.000)
Dependent Variable in Equations B1, B2, B3 and B4: Winner,=1 if bidder successful, =0 otherwise				
Indep. Variables	Equation B1 Marg. Eff. (P-value)	Equation B2 Marg. Eff. (P-value)	Equation B3 Marg. Eff. (P-value)	Equation B4 Marg. Eff. (P-value)
Not-for-profit	0.0118 (0.751)	0.2523 (0.047)	0.2549 (0.050)	0.1975 (0.124)
Employment	-0.5081 (0.730)	--	--	--
Years of experience	-0.0019 (0.782)	-0.0818 (0.000)	-0.0864 (0.000)	-0.0861 (0.000)
Significance of Regressors as a group.	0.0000	0.0000	0.0000	0.0000
Rho Test on Dep Var being jointly determined.	0.0015	0.0063	0.0005	0.0000

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

The Chi-squared test on the significance of rho, the indicator for the joint significance of the two dependent variables, shown in the last row of Table 4.9, suggests that the joint model is indeed appropriate in all cases.⁵ The Chi-squared test on the significance of the regressors as a group, shown immediately above in the second line from bottom to top, also seems to suggest the regressors as a group explain the joint probability of the frequency of bids and the probability of winning; the probability of being a winner and bidding appear to be jointly determined and well explained by the experience, size, and status of the bidder.

As before, there are some theoretical and empirical grounds to be concerned about possible multicollinearity among the explanatory variables.⁶ Therefore, the bivariate probit model was re-estimated excluding the number of employees. The results, shown also in Table 4.9, largely confirm those of the previous estimations. Once the number of employees is excluded from the estimating equation, the statistical significance of each of the independent variables increases dramatically. Unexpectedly, and regardless of the threshold for coding bid frequency, less experienced bidders appear more successful and more likely to make multiple bids.

⁵ It should be noted that the rho test on the joint significance of the two dependent variables offers good results only when the option “noconstant” is applied.

⁶ An additional equation was estimated with the bidder’s status as the only regressor. This equation presents results that contradict the bias towards the NFP sector observed in all the other equations. It should be noted that the bidder’s status is a dummy variable explaining a set of dummy variables.

We might conjecture that this peculiar result may be due to one of two reasons. First, inexperienced bidders may simply have a poor understanding of the costs involved in executing a project, and hence make unrealistically low bids. Secondly, inexperienced bidders may be quite happy to underbid on a contract in order to gain a record of engagement with CIDA projects, establish their reputation and acquire contacts, or better place themselves for subsequent contracts⁷.

More importantly for our study are the results for the not-for-profit variable. For thresholds of more than one and two bids, the not-for-profit status of the bidder is statistically significant (at five percent) in explaining the probability of winning, improving their chances of winning over their for-profit competitors by as much as 25 percent. The weak evidence found before with the univariate probit model is now stronger: instead of four percent we now have a group of regressors, significant at zero percent, and we have a not-for-profit status as an independent variable significant at four and five percent instead of seven percent. The impact of the status of the bidder on the probability of winning is also more dramatic, increasing from three to 25 percent. From an a priori perspective, we should have more confidence in these stronger results since the bivariate probit makes more sense from an economic perspective due to the endogeneity of the decision to bid and the chances of winning. More successful bidders are expected to bid more often, and more frequent bidders might be presumed to have

⁷ Even if having multi period data, it would be difficult to differentiate between the two types of explanations. This is so since this research found that it is difficult for CIDA to evaluate bidders' performance and base the selection of a winner for new contracts on previous performance.

more success of winning a contract. The bivariate probit model estimates these two frequencies jointly.

Therefore, in terms of our research question, the analysis of bidder success provides some evidence that not-for-profit organizations have an advantage of as much as 25 percent in their bidding for CIDA contracts. In addition, while this finding is not always robust when variables are added to the estimating equation, the positive effect of not-for-profit status was present in the most parsimonious equations of both the univariate and bivariate probit estimations where multicollinearity is less likely to be a problem. It is also a good sign that the impact of the bidder's status is dramatically stronger in the most appropriate bivariate probit model that accounts for the endogeneity of the problem at hand.

4.4: Explaining the characteristics of successful bids

The second sample drawn from the data consist of the bids themselves, rather than the bidders. There are 985 bids coming from the 573 bidders for 40 contracts. There were 937 unsuccessful bids out of 985—a 95 percent failure rate. There were 48 successful bids for the 40 contracts due to the fact that some contracts had multiple winners. The average number of bids coming from bidders with unsuccessful bids is 3.2, while the same indicator for winners is higher by 0.7 points. This suggests a link between the total number of bids submitted and the probability of winning a particular bid. The successful bid's composition is as follows: 67 percent are for-profit, 19 percent are nonprofit and 15 percent have unknown status. When the variables size and experience are added to the

picture for those observations where the data quality is good, the sample of 985 bids is reduced to 459 bids.

The dependent variable is a dummy variable equal to one if the bid was successful, and zero otherwise. The independent variables are based on the ones used in the previous analysis: the status of the bidder submitting the bid and two index variables indicating the size and experience of the bidder submitting that bid with respect to other bidders for the same bid or contract. The number of bids is not included in this analysis as it is not specific to the actual contract being bid on (see footnote 4 above). The two index variables are the relative employment index and relative experience index. Each of these index variables was constructed in a similar way: for each bid within a contract a ratio was calculated by dividing the number of employees (or number of years experience) of the bidder by the number of employees (or number of years experience) of the largest (or more experienced) bidder within that bid or contract. That way, a maximum value of one was assigned to the index variables for the largest or more experienced bidder within a contract; smaller values indicate smaller or less experienced bidders.

Example: A is the largest bidder for the contract and has 50 employees.

	Number of employees:	Relative employment index:
Bid coming from bidder A:	for bidder A: 50 employees	$50/50=1$
Bid coming from bidder B :	for bidder B: 25 employees	$25/50=1/2=0.5$

As before, we explore the possibility of multicollinearity in this sample. This time, Tables 4.10A and 4.10B show the results of the correlation matrix and auxiliary regressions.

Table 4.10A
Correlation matrix. Sample of Bids
 459 Observations

Variables	Winner	Not-for-profit	Number of Bids	Relative Employment	Relative Experience
Winner	1.0000				
Not-for-profit	0.0974	1.0000			
Number of Bids	0.0845	0.0983	1.0000		
Relative Employment	-0.0127	-0.0067	0.0796	1.0000	
Relative Experience	-0.0279	0.1576	0.0963	0.3731	1.0000

Table 4.10B Auxiliary Regressions. Sample of Bids 459 Observations				
Dep Var	Number of bids	Not-for-profit	Relative Employment	Relative Experience
Indep Var	Coeff (Prob)	Coeff (Prob)	Coeff (Prob)	Coeff (Prob)
Number of bids	-	0.0085 (0.055)	0.0034 (0.252)	0.0034 (0.232)
Not-for-profit	0.9052 (0.059)	-	-0.0490 (0.105)	0.1036 (0.000)
Relative Employment	0.8514 (0.252)	-0.1236 (0.106)	-	0.3603 (0.000)
Relative Experience	0.9232 (0.232)	0.2579 (0.000)	0.3897 (0.000)	-
Constant	4.22 (0.000)	-0.3516 (0.000)	-0.0195 (0.398)	0.2575 (0.000)
Prob>chi2 or Prob>F	0.032	0.000	0.000	0.000

Source for tables 4.10A and B: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

Note to table 4.10B: Probability values of the estimated coefficient appears in parantheses. The probability related to the significance of the group of regressors appears as the bottom row.

Even though the correlation matrix does not show signs of correlation among the regressors above the 0.4 level, the auxiliary regressions show some degree of multicollinearity. From the analysis of Table 4.10B, it seems with this sample of 459 bids, instead of bidders, that the nonprofits bidding for a particular contract are more aggressive bidders than their for-profit competitors for the same contract. Table 4.10B, with the sample of 459 bids also indicates that nonprofits appear to be more experienced

than their for-profit competitors, this time within each contract, a result consistent with that reported in Table 4.7 with the sample of 135 bidders. Finally, more experienced bidders are now larger in terms of the relative number of employees for firms bidding on a contract, while in the sample of bidders the opposite result was found. It seems that the group of bidders for a particular contract corresponds to a group that has certain technical characteristics that make the number of employees and experience move together in the same direction.

We use univariate probit regressions to examine the determinants of successful bids.

Table 4.11 shows the results for the sample of bids.

Table 4.11 Probit Regressions with Marginal Effects for the Sample of Bids 459 Observations Dependent variable: Winner (probability of a successful bid)				
Marginal Effects ($\delta F/\delta x$) of the explanatory variables (P-values in parentheses)				
Indep Var	Equation 1	Equation 2	Equation 3	Equation 4
Not-for-profit	0.0633 (0.031)	0.055 (0.047)	0.0631 (0.031)	0.0554 (0.047)
Relative Employment	0.0038 (0.926)	-0.0122 (0.756)	--	--
Relative Experience	-0.0464 (0.324)	--	-0.0449 (0.307)	--
Prob >chi2	0.1795	0.1447	0.0868	0.0523

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

The estimating equations 1 and 2 are not strong, with only equation 3 having jointly significant regressors at the ten percent (one-tailed) level and equation 4 being significant at almost five percent. Of particular interest is the fact that in all equations, including those that perform better, the not-for profit status of the bidder increases the probability of a successful bid by around six percent—a result that is strongly significant (at the three percent level). This result supports the conclusions from the previous section that not-for-profit organizations seem to have an advantage in the competition for contracts.⁸

4.5: Introducing quality monitoring as an independent variable

Having determined that there does seem to be an empirically significant bias in favour of not-for-profit firms in the CIDA contracting process, it is useful to explore the potential sources of such a bias. One of the possible linkages between not for profits and bidding success that was identified in Chapter 3 is the problem of monitoring certain development projects. The theory suggested that CIDA may favour not-for-profits for those projects where monitoring performance quality was difficult, since it may be expected that the

⁸ It is an interesting question as to whether the number of bids made by a firm in the overall sample contains information relevant to the success of any individual bids. We excluded it in the analysis presented above on a priori grounds that it is not information specific to a single contract bid. However, it is possible that the number of bids may be linked endogenously to the likelihood of winning contracts, which may in turn reflect underlying advantages like cost competitiveness. In this case, the likelihood of winning a specific bid may be linked to factors that drive both overall success for the firm, and hence the frequency with which it bids. For example, low-cost firms may win more frequently and hence bid more frequently; a low-cost firm would also be expected to have a higher probability of winning any particular contract. When the analysis was redone including the number of bids as an explanatory variable the univariate probit results were not altered very much. When the potential for endogeneity was taken into account by again using a bivariate probit, the not-for-profit status of the bidder seemed to influence

not-for-profits acquire benefits from doing a job well. A for-profit firm, in contrast, may prefer to cut corners to save money if it knows that the chances of being caught are relatively low. To ensure a higher quality project, therefore, CIDA might be inclined to assign such difficult-to-monitor projects to not-for-profits.

To examine this possibility, a new independent variable was generated by estimating the degree of difficulty in quality monitoring in the same fashion as we did in Chapter 2, but this time using projects auctioned in MERX that conform to the database in the previous sections of this chapter. The projects for each bid were identified and tracked down in the report that CIDA makes twice a year on ongoing contracts. This report contains not only the name of the project but also a note for each project on the priorities of development the project addresses. If the project was addressing a technical task like advice on mining, or environmental technical issues, this study considers the project as easy-to-monitor, assuming there are a number of steps in the execution of the project stemming from the technical characteristics of the task at hand that would be relatively easy for CIDA to observe. If the project addresses priorities such as basic education, community work, or if the beneficiaries may be difficult to survey due to their number or location, or if the activities have an impact that is also difficult to measure, such as raising awareness on health or gender issues, the project would be considered difficult-to-monitor. Therefore, there are projects that address more than one type of priority that would be considered as mixed in terms of difficulty in quality monitoring.

the number of bids rather than the success of bidding, though the interpretation is difficult

Under this approach, the sample of 459 bids used in the probit estimations of Sub section 4.4 is separated into three groups: contracts that are difficult to monitor, those that are easy and those of mixed difficulty in terms of monitoring quality. There are 279 bids (61 percent) for contracts where quality is easy to measure, 75 bids (16 percent) for contracts where quality is difficult to measure, and 105 bids (23 percent) for contracts where the difficulty in quality monitoring is mixed.

Table 4.12 reproduces some descriptive statistics for the sub-sample of winning bids, but in a format that makes it easy to compare with subsequent tables.

since the not-for-profit bidders seem to bid more.

Table 4.12				
Total sample of bids versus sub-sample of winning bids				
Quality of data: good				
Descriptive statistics				
Total sample of bids, 459 Observations				
Variables	Min	Max	Mean	St.Dev.
Winner	0	1	0.0545	0.2272
Nonprofit Status	0	1	0.1983	0.3991
Relative employment index	1	45,000	856.6982	3,485.9262
Relative experience index	1	78	5.3224	5.5166
Number of bids	1	18	4.8148	4.0535
Descriptive statistics				
Sub-sample of winning bids only (Winner =1) Observations: 25				
Variables	Min	Max	Mean	St.Dev.
Winner	1	1	1	0
Nonprofit Status	0	1	0.36	0.50
Relative employment index	1	1,285.7	354.09	419.63
Relative experience index	1	16.4	4.91	3.34
Number of bids	1	18	6.24	5.05

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

Notice in Table 4.12 how the mean of the nonprofit status variable increases from 0.20 to 0.36, again indicating a higher success of the nonprofit bidders. Notice also that the average number of bids increases to 6.24 in the sub-sample of winning bids, compared to a 4.81 in the total sample.

The following Tables 4.13A, B, and C provide the descriptive statistics for the relevant variables by ease of monitoring, where A=easy, B=mixed, and C=difficult.

Tables 4.13A to C Partitioning the sample of bids into sub-samples according to monitoring difficulty. Comparison to the winning bid sub-samples within each sub-sample.				
Table 4.13 A: Sub-sample: Projects that are easy to monitor; quality = 3				
Quality of data: good Descriptive statistics Sub-sample of easy-to-monitor projects (Quality = 3) , Observations: 279				
Variables	Min	Max	Mean	St.Dev.
Winner	0	1	0.0502	0.2187
Nonprofit Status	0	1	0.1183	0.3235
Relative employment index	1	45,000	1,221.3589	4,401.9916
Relative experience index	1	78	5.6752	6.3084
Number of bids	1	18	3.9319	3.3574
Descriptive statistics Sub-sample of winning bids and easy-to-monitor projects only (Winner =1, Quality =3) Observations: 14				
Variables	Min	Max	Mean	St.Dev.
Winner	1	1	1	0
Nonprofit Status	0	1	0.3571	0.4972
Relative employment index	1	1,286	512.3291	499.7991
Relative experience index	1	10	4.2395	2.3278
Number of bids	1	11	4.5000	4.0144

Tables 4.13A to C Partitioning the sample of bids into sub-samples according to monitoring difficulty. Comparison to the winning bid sub-samples within each sub-sample.				
Table 4.13 B Sub-sample: Projects that are mixed in terms of monitoring difficulty Quality = 2				
Quality of data: good Descriptive statistics Observations: 105				
Variables	Min	Max	Mean	St.Dev.
Winner	0	1	0.0476	0.2140
Nonprofit Status	0	1	0.2286	0.4219
Relative employment index	1	3,750	265.9148	548.1770
Relative experience index	1	27	4.8622	4.3831
Number of bids	1	18	6.1048	4.7270
Descriptive statistics Sub-sample of winning bids and mixed level in terms of monitoring difficulty (Winner =1, Quality=2) Observations: 5				
Variables	Min	Max	Mean	St.Dev.
Winner	1	1	1	0
Nonprofit Status	0	1	0.2	0.447
Relative employment index	44	174	135.2	57.470
Relative experience index	2	7	3.8	1.904
Number of bids	6	18	10.2	4.712

Tables 4.13A to C Partitioning the sample of bids into sub-samples according to monitoring difficulty. Comparison to the winning bid sub-samples within each sub-sample.				
Table 4.13 C Sub-sample: Projects that are difficult to monitor, quality = 1				
Quality of data: good Descriptive statistics Observations: 75				
Variables	Min	Max	Mean	St.Dev.
Winner	0	1	0.0800	0.2731
Nonprofit Status	0	1	0.4533	0.5012
Relative employment index	1	6,667	327.2575	842.2416
Relative experience index	1	16	4.6545	3.2601
Number of bids	1	18	6.2933	4.5195
Descriptive statistics Sub-sample of winning bids only for projects that are hard to monitor (Winner =1, Quality=1) Observations: 6				
Variables	Min	Max	Mean	St.Dev.
Winner	1	1	1	0
Nonprofit Status	0	1	0.5	0.5477
Relative employment index	1	500	167.3	182.2659
Relative experience index	2	16	7.4	5.1392
Number of bids	1	18	7.0	6.1644

Source to Tables 4.13 A, B and C: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

Most —some 61 percent— of the winning bid sample falls into category A, 23 percent of the bids are of mixed difficult (B), and the remaining 16 percent fall into the category of being difficult to monitor (C). Interestingly, 20 percent of the entire sample of 459 observations is not-for-profit bidders of which 36 percent won their bids. However, not-for-profit firms only bid on 12 percent of the easy-to-monitor projects of which 36 percent, again, won their bids; 23 percent of the mixed-category projects were bid on by non-profits of which 20 percent won their bids, and a staggering 45 percent of the difficult-to-monitor projects were bid on by non-profit firms, one half of which won their

bids. Certainly, a cursory glance at these numbers would suggest that the ease with which project quality can be measured seems to matter when it comes to bidding and winning the contract.

We now turn to an analysis of the probability of winning a bid whenever the sample of bids is disaggregated according to monitoring difficulty.

Partitioning the sample of bids into three groups according to quality monitoring resulted in additional tests using the univariate probit model. The sub-sample of easy-to-monitor projects was the only case where we found statistically acceptable results.⁹ The not-for-profit status of the bidder increases the probability of a successful bid by 12 percent. This seems to be a perverse result in comparison to what we would expect from results in Chapter 2. We had observed in Chapter 2 that not-for-profit firms tend to execute difficult-to-monitor projects and that for-profit competitors tend to execute easy-to-monitor projects. Now notice that the results in Chapter 2 were obtained with different techniques and different samples. It is true that the time period is similar but in that chapter, there are projects given out as contribution agreements, whereas the sample in this chapter includes only contracts. Again, this apparently perverse result may be simply showing the bias in favour of the not-for-profit group that we observed in the previous sections with the sample of bidders and bids.

⁹ The other two sub-sample sizes were smaller.

Table 4.14 Probit Regressions with Marginal Effects for the Sample of Bids Introducing Quality but this time separating the sample into three groups instead of generating a product variable and testing the whole sample of bids as before Sub-sample of easy-to-monitor projects 279 Observations Dependent variable: Winner (probability of a successful bid)	
Indep Var	Marginal Effects ($\delta F/\delta x$) of the explanatory variables (Probability values in parentheses)
Not-for-profit	0.1207 (0.011)
Relative Employment	-0.0268 (0.583)
Prob >chi2	0.0472

Source: Database constructed for the purposes of this research with contracts auctioned by MERX in 2002 and 2003.

Table 4.14 shows the results of a univariate probit that estimates the probability of winning an easy-to-monitor project. Notice the strong result of a marginal effect of 12 percent, which is statistically significant at the two percent level. The sub-sample of difficult-to-monitor and mixed projects does not offer results that would be significant at statistically acceptable levels.

4.6: Conclusions

A database was constructed with contracts submitted to auction through the MERX electronic service by CIDA. Using a subscription to the MERX service, data were collected on all contracts offered by CIDA for the years 2002 and 2003. The resulting sample of 203 contracts represents 18 percent of all contracts listed through MERX

during the life of the open competition process opened by CIDA in 1997. The availability of winners at the time of data collection and a selection set of criteria, explained in Section 2 of this chapter, reduced the sample from 203 to 40 contracts, or 23 percent of the original sample.

The 40 contracts produced a sample of 573 bidders. A database was constructed using more than three existing databases and even the Web sites of bidders. Sizes of the bidders in terms of revenue and number of employees as well as experience in terms of number of years since the creation of the firm were the variables that, according to CIDA screening, were supposed to determine the winner. The price bid by each firm was unfortunately not available. The not-for-profit status of the bidder was also considered. The availability of data reduced the sample of bidders from 573 to 135 observations and the sample of bids from 985 to 459 observations.

According to our probit estimations of the probability of being a winner using the sample of 135 bidders, the not-for-profit status seems to explain the probability of being a winner with an acceptable level of significance (seven percent) for an estimated impact of three percent. We found that being a nonprofit was associated with a three percent increase in the probability of being a winner. The evidence indicates that CIDA does have a bias in favour of not-for-profit bidders. This result is reasonably robust across different equations and estimation procedures, including the use of a bivariate probit estimation to explain jointly both success and the frequency of bids made by a bidder.

Using the bivariate probit and different thresholds for the construction of the qualitative variables, we found again that being a nonprofit was associated with an increase of 25 percent in the probability of being a winner when this variable is jointly determined with the number of bids. This particular explanatory variable is statistically significant at the four percent level and the overall equation at the one percent level.

In addition to examining bidders, a sample of bids and the relative status of their bidders within a contract were also examined. The sample of 459 bids is larger than that available for bidders because some bid more than once, some more than ten times, and also because of the better availability of data at the time the studies with the sample of bids were conducted. Using this larger sample, we again find a bias towards the not-for-profit group.

When a bid comes from a nonprofit bidder, we found an associated increase in the probability of a successful bid of six percent, the particular significance of the explanatory variable is statistically strong, at three percent, and the overall equation, at eight percent. With the sample of bids we found that it is not theoretically meaningful to estimate the probability of a successful bid and the probability associated to the total number of times the bidder submitting the bid submits other bids since that is not contract-specific information.

Finally, the sample of bids was broken down according to the expected ease with which a project could be monitored by CIDA. By doing so, we found that being a not-for-profit

bidding for an easy-to-monitor contract was associated with an increase by 12 percent in the probability of winning. This result reinforces the bias in favour of the not-for-profit group. Estimations using the mixed and difficult-to-monitor projects yielded results that were not statistically significant.

In terms of our primary research question, the estimation results point to a general bias in favour of not-for-profit bidders in the CIDA contracting process. This bias appears in both the analysis of bidder success and the analysis of successful bids. In addition, and of potential significance, it is more apparent in projects that are easy to monitor.

Chapter 5: Conclusions

5.1: Findings and results

The main research question of this thesis concerns the relationship between CIDA, the for-profit (FP) and the not-for-profit (NFP) sectors. The first step of the analysis included a historical and a statistical study. Interviews, research into government documents, literature reviews and the construction of an original database were some of the resources applied to this first stage. A second step involved a review of the existing literature on auction theory and the economics of the not-for-profit sector. The purpose was to apply the findings by constructing a theoretical model to explain the diversity of aid delivery channels. Finally, a third step consisted of constructing a second database to use in a more formal empirical analysis, which was conducted to test the theoretical explanations advanced during the second stage of the research.

In examining the evolution of CIDA's partnership with domestic sectors, it is evident that both sectors have been related to the official aid program since its beginning. NFP and FP participation in the aid program has created a diversity of aid delivery mechanisms.

Official aid started as government-to-government aid with the help of domestic executing agencies from both sectors. Soon after, a specific channel for CIDA designed to favour the NFP sector appeared and grew. Even though the FP sector soon had a similar specific channel with CIDA's Canadian Partnership branch, it was much smaller and more limited in scope. Bilateral aid remained the almost exclusive domain of the FP sector until CIDA introduced the practice of funding big NFP organizations through bilateral aid as well.

However, while the FP potential partners had to compete for CIDA projects, the NFP partner organizations were assigned funds outside the competition process. After 1997, CIDA seemed to pursue more competition for both sectors and opened the competition for projects to the NFP sector. However, until 2003 it still assigned funds to the NFP sector outside this mechanism. There are a number of examples where the two sectors have pushed for more financing out of CIDA's programs. After almost six decades of aid a fairly stable distribution of the CIDA's funds between the two main domestic sectors emerged.

A question that still has no answer is how CIDA sets its preferences over each domestic partner in particular and over these partners as a group and recipient-country partner organizations. The results of the present research show a balanced amount of bilateral funds flowing through each of the two competing sectors, more NFP sector participation in the bilateral branches after 1997, relatively less bilateral funds through the FP sector after 1997, and definitely no change in the dominance of the NFP sector in the Canadian Partnership branch. A contribution of this research is to show the participation of the sectors in both Canadian Partnership and bilateral aid within CIDA as well as to show how these allocations are connected to the type of project and specifically to the ease with which project quality can be monitored.

Either because of direct choice, due to preferences or monitoring costs or because of the characteristics of the cost distributions involved and auction rules, the NFP sector may emerge as a winner in CIDA's competitive process. This thesis has provided a theoretical

framework from which the behaviour of both NFPs and FPs, and their choices of the quantity and quality of output, can be explained. The NFP group is assumed to be the high-cost high-quality group in an asymmetric auction model, which explains the conditions for the NFP sector to be successful as a potential executing agency. Finally, we explored the bidding behaviour and functional forms for the typical NFP and FP firm involved in an auction for contracts where quality is observable. There may be reasons supporting the idea of a winning NFP due to auction rules rather than direct preference or bias from CIDA, although the latter is also plausible.

A second question associated with this research was, how does the presence of NFPs affect the auction results? A contribution of this research is to use the economics of the NFP sector and also the economics of auctions to provide several theoretical explanations that shed some light onto the motivations for different methods of allocating funds within CIDA. CIDA maximizes its utility by using three different possible scenarios. In one of these scenarios, CIDA chooses the group that is most valuable to it for non-economic reasons. The empirical results obtained in the Chapter 4 indicate that even the projects that are auctioned correspond to this category as we observe a bias in favour of the NFP bidders. In the other two scenarios, it is the degree of difficulty in quality monitoring that decides the executing agency. In one case, quality is not observable, which would make the monitoring costs very high in order to encourage higher quality. In this case, hiring a NFP executing agency solves the problem, as they are assumed to provide a higher quality level even at a low monitoring cost. This result emerges from the not-for-profit's maximization problem where quality increases utility and donations. This is why we

would predict that for projects of unobservable quality CIDA will not auction the contract but rather choose the not-for-profit organization directly; which is the case with projects funded as contribution agreements.

The third scenario assumes a project for which quality is observable and that what matters to CIDA is the payment given to the executing agency. We argue that in this case CIDA will auction the right to execute the contract. Solving its maximization problem, CIDA will choose the bidder with the lowest expected payment. CIDA may maximize its utility by choosing the NFP or high-cost bidder. However, when allocating contracts, CIDA uses a first-price sealed-bid auction where the results do not actually depend on CIDA but rather on the bidding functions of the bidders involved once the auction rules are announced and enforced. Solving the bidder's maximization problem yields the bidding functions for a typical member of each group. The bidding functions, under our assumptions, are similar for both groups. The amount by which each bidder inflates its cost is a decreasing function of the bidder's own cost. The presence of high-cost bidders tends to lower the bids because they shave their bids more than the low-cost bidders do, forcing the low-cost bidders to bid lower as well.

For the case of uniform distributions, we evaluate the bidding functions and prove that it is not necessarily the bidder with the lower expected payment that yields a lower bid if we look at their bidding function after applying the scoring rule relevant to our case, the first-price sealed-bid auction. With a pair of uniform distributions, the auction will result

in the low-cost bidder winning. In theory, therefore, CIDA will buy from the low-cost bidder, which we assume to be the FP group.

However, the presence of a second group of bidders, the NFPs, results in an asymmetric auction as they draw their costs from a different distribution. It could be the case in theory that NFP bidders are bidding lower than the FP bidders even though they have a higher cost and higher quality, thereby winning the auction. This makes the auction “discriminatory” against the FP bidders. The term discriminatory refers to a technical peculiarity that results in lower bids by high-cost agents, and is not an indicative of a conscious effort to favour one group over another (although this too may exist).

This is where the third question arises. If there is discrimination, in the technical sense, against the low-cost FP group as result of the probability distributions, auction rules and bidding functions, what do those probability distributions look like? This research presents an example of a discrete distribution that offers relevant results. It also presents a continuous distribution that would appear to yield similar results.

In summary, CIDA’s bias towards the NFP sector was observed empirically in the first chapter and confirmed again in the last. The bias may be related to a number of potential explanations presented in Chapter 3. First, there may simply be a preference for NFPs on the part of CIDA, as argued in the government problem and introduced via the screening mechanisms or through other subjective aspects of the decision. Alternatively, it may be the result of an asymmetric auction, as explained in the latter part of Chapter 3. A brief

welfare analysis of CIDA under the different theoretical scenarios described is also included to close the theoretical chapter.

A more formal empirical analysis, Chapter 4, confirms the bias towards the NFP sector observed in Chapter 2. A second database was constructed with contracts submitted to auction through MERX, the electronic tendering service used by CIDA. Using a subscription to the MERX service, data were collected on all contracts offered by CIDA for the years 2002 and 2003.

A contribution of this research is the unique database of 40 contracts that produced a sample of 573 bidders. This database was constructed using more than three existing databases as well as the Web sites of bidders. According to CIDA screening, winners were determined by the size of the bidders in terms of revenue and number of employees as well as experience in terms of number of years since the creation of the firm. The price bid by each firm was unfortunately not available. The NFP status of the bidder was also considered. The availability of data reduced the sample of bidders from 573 to 135 observations and the sample of bids from 985 to 459 observations.

According to our probit estimations of the probability of being a winner using the sample of 135 bidders, the NFP status seems to explain the probability of being a winner with an acceptable level of significance (seven percent) for the estimated coefficient. We found that being a NFP bidder was associated with close to three percent increase in the probability of winning a contract.

The evidence indicates that CIDA does have a bias in favour of NFP bidders. This result is reasonably robust to different equations and estimating procedures, including the use of a bivariate probit estimation to explain jointly both success and the frequency of bids made by a bidder. In comparison to the univariate probit estimation results, the bivariate probit estimation generates a coefficient estimate for the NFP status indicator that is larger in magnitude (indicating a 25 percent advantage over FP firms) and with a higher level of statistical significance (significant at the five percent level). This result reinforces the bias towards the NFP sector.

In addition to examining bidders, a sample of bids and the relative status of their bidders within a contract were also examined. The sample of 459 bids is bigger than that available for bidders because some of them bid more than once, some even more than ten times. This is also due to better availability of data at the time the studies with the sample of bids were conducted. Using this bigger sample, we again find a bias towards the NFP group. At levels of three percent significance, the impact of being a NFP is a positive six percent —there is a six percent increase in the probability of winning a contract if the bid comes from a NFP bidder. It appears that the bias is not linked to hard-to-monitor projects. It is also unlikely that NFPs have generated a significant cost advantage, or that the distribution of bidding functions is producing consistently the conditions for technical auction discrimination. As a consequence, the most reasonable conclusion seems to be that the source of the bias is most likely to be due to CIDA preferences.

5.2: Contributions of the research to existing knowledge on the subject

This thesis makes four important contributions towards a better understanding of the relationship between the NFP sector, the FP sector, and CIDA. The first contribution is contained in Chapter 2, which presents the history of the relationship between the sectors in development aid. This chapter is the first research to present the evolution of the interactions of the three sectors involved in Canadian development projects not only from the official Canadian partnership but also within bilateral aid, from a historical and a statistical perspective. A brief analysis of government and domestic partner interactions shows that since a very early stage there are examples of NFP participation. There are also references to heavy participation of FP firms in the official bilateral government-to-government aid program. However, some of the aid channelled through the domestic sectors was not recorded as such, but as bilateral aid mixed with government-to-government or government-to-recipient-country-partners types of aid. It is not until 1987 that statistics on funds channelled through each sector are available. This study presents an unpublished report and analysis on the separation of bilateral aid by sector from 1987 to the present. It also updates CIDA's documents so as to make them comparable to the evolution of the links to the sectors in 2003.

A second important contribution of this research included in Chapter 2 is to look at the link between the ability to monitor projects and the executing agency of these projects. We find some evidence that suggests that projects that are difficult to evaluate tend to be executed by NFP companies, while easy-to-monitor projects tend to be executed by FP

companies. An original database was constructed to analyze the links between quality monitoring and project allocation mechanisms within CIDA's bilateral branches.

In terms of the theory, a third main contribution of this research is to link the economics literature on the NFP sector with the theory of auctions within the development aid framework. It opens the path for further research on the subject and identifies potential functional forms that could explain the results observed in the empirical sections.

Finally, the fourth contribution of this thesis is the creation of a unique database with which to analyze CIDA's contracting process. Chapter 4 describes this new database from different sources that allows us to compensate for the lack of information about prices that bidders submit. This chapter also identifies a bivariate probit model to link the independent variables that are relevant to the research question.

These contributions are presented in the context of development assistance and to provide micro foundations for examining the effectiveness of foreign aid. However the implications are also relevant to other government activities where for-profit and not-for-profit institutions compete to provide publicly funded goods and services. As governments continue to seek more efficient operating methods and contract out more and more of their operations, there will be many more examples of competition between for-profit firms and not-for-profit institutions.

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