The Effects of Untying Canadian Food Aid on the Price Sensitivity of Commodity Procurement Decisions

By

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ABSTRACT

Ninety percent of Canadian food aid donations were tied to domestic procurement sources until 2005. Procurement restrictions were reduced to 50% in 2005 and were eliminated in 2008. Implementing agencies are now free to procure commodities of their choice in locations of their choice. This study investigates whether the untying of Canadian food aid procurement in 2008 has made procurement decisions more responsive to changes in the relative prices of wheat, maize, and rice in Canadian cereal food aid baskets. It applies a pooled empirical model with regional fixed effects to regional price data and data on Canadian government-funded food aid shipments to five recipient regions. The results are mainly counterintuitive, which is partly attributable to a number of data and model limitations. Consequently, this study does not provide empirical evidence of cereal commodity substitution after the untying of Canadian food aid in 2008. However, there is still reason to believe that donor agencies substitute between cereal food aid commodities, especially after the elimination formal procurement restrictions. Further research is however needed to generate empirical evidence for this.

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CHAPTER ONE

INTRODUCTION

1.1 Background

Canada has a long history of international development assistance, especially its food aid program, which began in the early 1950s. Similar to its neighbour, the United States (US), Canadian food aid once served as a multi-faceted tool used for purposes such as surplus disposal, domestic farmer support, and export promotion (Barrett and Maxwell, 2005). Canadian food aid policies have however changed significantly within the past two decades, with one major development being the elimination in 2008 of a policy that 'tied' a large portion of Canadian government-funded food aid to domestic procurement (Cardwell, 2012).

Untying aid has been shown to improve efficiency in a number of areas, including more timely delivery and lower transport costs (Lentz, Passarelli, & Barrett, 2013; Haggblade and Tschirley, 2007). This study analyses another way in which untying aid from domestic procurement may have improved Canadian food aid deliveries. Specifically, it investigates whether the untying of Canadian food aid procurement has resulted in procurement decisions being more responsive to changes in the relative prices of commodities that comprise food aid baskets. This issue is relevant, particularly when an estimated 795 million people are chronically undernourished in 2014–2016 globally (FAO, IFAD & WFP, 2015), and also in the wake of several emergencies that are threatening the progress that has been made in the reduction of global hunger. If food aid baskets could be made larger with the same amount of funds, that is, if the amount of food aid provided per dollar could be increased, more beneficiaries can be reached, especially during

emergencies, when food is scarce and large numbers of people become vulnerable to famine. One way to do this would be to substitute relatively cheaper, but nutritionally-equivalent, commodities in food aid baskets. This study investigates the degree of commodity substitution in response to price changes among donor countries, specifically, the extent to which this substitution occurs, and whether the degree of substitution has been influenced by the change in tying policy.

Since food aid donor agencies typically operate on fixed budgets, being able to respond to relative price changes by readily substituting between nutritionally substitutable food aid commodities could lead to cost savings per calorie of food aid provided. Increasing the share of maize in a food aid basket when the relative price of rice increases, for example, would allow these agencies to provide larger volumes of food per dollar, *ceteris paribus*, thus enabling them to reach a larger number of beneficiaries. This issue is particularly relevant during periods of food price spikes.

Cardwell (2012) however suggests that the selection of nutritionally substitutable commodities in food aid baskets may exhibit small price responses for two reasons. The first reason is donor efforts to provide culturally appropriate food to recipients, regardless of price. Procuring agencies will typically provide commodities that are well suited to recipients' tastes and preparation methods, e.g. there may be a preference for donors to procure rice food aid for recipients in the Philippines, even if wheat was significantly cheaper.

Secondly, small price responses of commodity selection decisions can be attributed to tied aid policies that require specific commodities to be procured in donor countries. Some donor countries (most notably, the US) provide food aid in the form of in-kind donations which are directly linked to their domestic production. This point is illustrated by Canada's case in which

ninety percent of food aid donations were tied to domestic procurement sources until 2005. Food aid procured with Canadian government funds had to be sourced in Canada, particularly from the Canadian Wheat Board (CWB), which only sold wheat and barley. This policy restricted procuring agencies' (e.g. World Food Programme, CFGB) options, because most funds were spent on wheat from the CWB (Barrett and Maxwell, 2005). However, tying requirements were reduced in 2005, allowing procuring agencies to use fifty percent of donated funds to purchase commodities in and around recipient countries, thus taking advantage of lower prices and transportation costs. The tying requirements were eventually eliminated in 2008. In the absence of formal restrictions on procurement, implementing agencies are now free to procure commodities of their choice in locations of their choice.

This study focuses on the second probable reason for small price responses of food aid commodity procurement decisions, that is, tied aid policies that require food aid to be procured in donor countries (in this case, Canada). It employs the change in policy to identify the effects of untying Canadian procurement on price sensitivity.

1.2 Research Objective

This study investigates the hypothesis that untying Canadian food aid shipments allowed donor agencies to more efficiently allocate Canadian-funded donations by substituting commodities in food aid baskets based on relative price changes in order to generate larger food aid baskets. This study aims to answer the following research question:

How has the untying of Canadian food aid affected the price sensitivity of commodity procurement decisions?

This study employs a recipient-region fixed effects model (which is further discussed in the methodology section) and regression analysis as its mode of statistical inference.

1.3 Justification

The majority of food aid studies have focused on US food aid mainly because the US is the largest food aid donor and also because the best available data are for its food aid interventions. There are several studies on PL 480 and all the problems that have arisen due to the constraints imposed by US legislation in regards to food aid (Barret and Maxwell, 2005; Nunn and Qian, 2014a; Nunn and Qian, 2014b; Diven, 2001; Lentz and Barrett, 2014; Barrett, Mohapatra, and Snyder, 1999; Zahariadis, Travis, and Ward, 2000). In contrast, less work has been done on Canadian food aid. Additionally, recent food aid studies have focused on issues such as the effects of high food prices on food aid delivery (Cardwell, 2012), food aid allocation decisions (Neumayer, 2005; Nunn and Qian, 2010), and disincentive effects of food aid (Abdulai *et al*, 2005; Barrett, 2006). None have however tackled the effects of untying aid on commodity procurement decisions. Consequently, this study aims to help contribute to the literature on this subject.

The results from this research can also help inform the debate about tied aid (still a very controversial policy issue in the US) and provide insights for food aid practitioners in times of food price spikes.

1.4 Thesis Organization

This paper has five chapters. Chapter two reviews the literature on food assistance and provides definitions of some food aid terms. This chapter also addresses the history and evolution of food assistance and trends in both global and Canadian food assistance over the decades. Chapter

three presents the methodology including a description of the variables and data used in the analysis. Chapter four presents the results of the analysis and a discussion of those results. Study limitations are also addressed in this chapter. Chapter five presents the conclusions of this study and recommendations for future research.

CHAPTER TWO

OVERVIEW OF FOOD AID

2.1 Introduction

This chapter presents the classification of food aid and provides definitions of some terms in food aid. The history and evolution of food aid in general as well as Canadian food aid are discussed. This chapter also presents global and Canadian food aid trends from 1988 to 2012.

2.2 Food Aid: Classification and Definition of Terms

There exist a number of definitions of the term "food aid". Barrett and Maxwell (2005) define food aid as "the provision of food commodities for free or on highly concessional terms to individuals or institutions within one country by foreign donors". A broader definition that was developed in 2003 in Berlin defines it as "all food supported interventions aimed at improving the food security of poor people in the short and long term, whether funded via international, national public and private resources" (Lowder and Raney, 2005). Lowder and Raney (2005) describe the latter definition as apt for defining food based interventions which are designed to improve food security. The former definition limits food aid to international assistance and does not associate it with food security.

In recent years, the term "food aid" has evolved into the term "food assistance", reflecting a shift towards aid modalities that go beyond direct shipments of food (Harvey *et al*, 2010); WFP, 2010; WFP, 2012). FAO (1996) defines food assistance as "all actions that national governments, often in collaboration with non-governmental organisations and members of civil society, and with external aid when necessary, undertake to improve the nutritional well-being of their citizens,

who otherwise would not have access to adequate food for a healthy and active life". The WFP (2009) also defines it as "the set of instruments used to address the food needs of vulnerable people…; in-kind food aid, vouchers and cash transfers". These definitions go beyond traditional food transfers from donors to recipient countries.

Traditional food aid has evolved to include broader instruments and modalities. However, this thesis focuses on Barrett and Maxwell's (2005) definition of food aid because it uses data on only traditional food aid transfers. Hence, the term "food aid" in this thesis refers only to transfers of physical food. In addition, the scope of this study is limited to Canadian government-funded food aid.

2.2.1 Classification of Food Aid

Food aid may be classified into different categories based on the channel used, type of aid, mode of procurement, and its tying status.

Food aid may be channelled bilaterally (that is, on a government-to-government basis), multilaterally (that is, many donors giving to an organisation such as the WFP to be distributed to recipients), or through non-governmental organisations (NGOs).

There are three types of food aid; program, project and emergency food aid. Program food aid is aid channelled bilaterally "…. to meet balance of payments and budget support objectives" (Barrett and Maxwell, 2005). This type of aid usually "monetized" (that is sold in recipients' local markets) and is not targeted at a specific group of people. Project food aid is typically given in the form of a grant "for use in development or food projects" (Barrett and Maxwell, 2005). This type of aid is either distributed for free or monetized. It is targeted at specific beneficiary groups and "may be channelled bilaterally, multilaterally, or through NGOs" (WFP, undated (a)). Emergency food aid is aid that is freely distributed to specific beneficiary groups

during emergencies such as natural disasters, economic shocks, and war (Barrett and Maxwell, 2005). It is usually channelled multilaterally or through NGOs (WFP, undated (a)).

Based on the mode of procurement, food aid can be categorised into direct, local and triangular purchases. Direct transfers, also known as in-kind transfers, represent food that is delivered directly from the donor country to the recipient country (Barrett and Maxwell, 2005). Local purchases occur when the food is purchased from one (or more) part(s) of the recipient country are then distributed elsewhere in that same country (Barrett and Maxwell, 2005). Triangular purchases involve the donor purchasing and shipping food commodities from a country (which is not the recipient) for distribution in the recipient country (Barrett and Maxwell, 2005).

Based on tying status, food aid is classified as tied aid, partially untied, and untied aid. Aid tying is further discussed in Section 2.4.

2.3 History and Evolution of Food Aid

The concept of food aid was introduced in the post-World War II era when rapidly increasing cereal stocks in North America caused growing concern. At the seventh session of the FAO Conference in 1953, it was suggested that these surpluses be dealt with by "adopting policies for increasing consumption in the developing countries" (FAO, 2005). Further review by the FAO led to the development of the humanitarian use of food aid in developing countries. This also led to the development of new ideas such as "food-for-work projects" and special feeding programmes targeted at vulnerable people (FAO, 2005).

Despite these ground breaking developments, concerns arose about the potential implications that these new ideas could have on international trade and on the economies of developing countries. Thus in 1954, the Consultative Sub-Committee on Surplus Disposal (CSSD) was established to curb any market distortions that food aid may cause (Lowder and Raney, 2005).

Support for food aid as a surplus disposal tool was strengthened when a subsequent FAO study revealed that food aid positively impacted economic development through balance of payments and budgetary support.

Subsequently, food aid gradually transformed from a surplus disposal mechanism to one meant to aid food-deficient populations. The WFP was established in 1962 to that effect (Lowder and Raney, 2005; FAO, 2005). This marked the start of multilateral food aid. Prior to this, most food aid transactions had been on a bilateral basis. The period after this saw a decline in surpluses leading to the adoption of the first Food Aid Convention (FAC) in 1967. This treaty guaranteed a minimum quantity of food aid in cereals each year, creating a predictable flow of food aid, and thus allowing food aid needs to be met without being significantly affected by changes in price or supply (FAO, 2005). The initial total minimum commitment was 4.5 million tonnes of cereals (wheat equivalent), with the US providing 42% of the total, the European Economic Community (EEC) and its six original member states providing 23%, Canada providing 11% and Argentina, Australia, Austria, Denmark, Finland, Japan, Norway, Spain, Sweden, Switzerland and the United Kingdom providing the remaining twenty-four percent (Parotte, 1983). The FAC was renegotiated a number of times in subsequent years, during which changes such as the revision of donors' minimum commitments, an increase in the number of donors and the inclusion of other commodities occurred. The last FAC expired in 1999 and renewal negotiations resulted in the development of the current 2012 Food Assistance Convention. This Convention had two significant changes: first, it allowed new food assistance modalities such as cash, vouchers, inputs and supplementary nutrition, to be counted towards members' annual commitments. Second, member commitments could now be expressed in value or tonnage of wheat equivalence. Although the 2012 Convention is a legal instrument, it is not binding and so

members that do not meet their commitments or observe agreed guidelines do not face any penalties.

Food aid has experienced significant changes in the last two decades. One significant change is the untying of food aid programmes from donor-country procurement. Many donors, for example Canada and the European Union (EU) have untied their food aid donations from domestic procurement. Decreasing food stocks coupled with the proliferation of studies that show that in-kind aid is less serving of recipients' interests and inefficient with respect to costs and timeliness of deliveries (Barrett and Maxwell, 2005; (E. C. Lentz, Passarelli, et al., 2013); Lentz et al, 2013; Lentz and Barrett, 2014, Haggblade and Tschirley, 2007; USGAO, 2009) have contributed to many donors opening up procurement to countries other than their own. Consequently, there has been a decline in direct food aid shipments (Figure 3) and an increase in local and regional food aid purchases (Figure 4). The percentage of total global food aid purchased locally and regionally increased from 17.5% in 2000 to 36.6% in 2012 (Figure 4). Despite this shift toward untying food aid, some donors like the US and Japan, still provide in-kind food aid. The move toward untying has also led to another significant change in food aid: a modification in the types of food aid interventions or modalities. Many donors now provide cash-based food assistance in place of actual food commodities. Additionally, there has also been an increase in the use of voucher programmes (Lentz et al, 2013). These two aid modalities, in addition to local and regional purchases, have been shown to be less costly as opposed to direct transfers, to reduce the time it takes to get food to recipients and to provide recipients with food commodities based on their unique tastes and preferences (Lentz et al, 2013). All these changes have also been accompanied by a shift away from cereal-based food aid. The majority of food aid used to be provided in the form of cereals (mainly wheat). However, attention has shifted from providing

food to mainly satisfy chronic hunger to providing food to address nutrition issues, particularly micronutrient deficiencies or "hidden hunger". Consequently, there has been an increased emphasis on providing fortified foods. The WFP regularly makes use of "specialized nutritious foods" such as fortified blended foods, ready-to-use foods, micronutrient powders and high energy biscuits in its food rations to cater for recipients' vitamin and mineral requirements (WFP, undated (b)).

Although these changes to the food aid landscape have several merits and have renewed focus on recipient-based aid, they are not without limitations, the most significant being that there is insufficient data on the types and quantities of food commodities recipients are receiving. Previously, food aid deliveries were reported in metric tonnes. It is unclear how to convert cash and vouchers as well as the other non-food components of donors' value commitments to quantity form. This may be attributed to the shift from in-kind aid transfers to cash and voucher programmes, the fact that the 2012 FAC allows deliveries such as cash, vouchers, inputs and supplementary nutrition, to be counted towards members' annual commitments, and the fact that members now report their commitments in value. This has led to limited available data on food aid activities in recent years. This is particularly evident on the WFP's INTERFAIS database**,** which has not been updated since 2012.

2.3.1 History and Evolution of Canadian Food Aid

Canada's food aid program took shape when Canada joined the Colombo Plan for Cooperative Economic and Development in South and Southeast Asia in 1951. The Plan was developed to help the South and South-east Asian members of the British Commonwealth in the areas of physical capital, technology and skills development. Canada had surplus wheat at the time and sought to dispose of it. The Plan presented an opportunity for the then government to dispose of

the surplus while garnering support for its foreign policy objectives. Canada's interest in food aid was focused more on foreign policy than on trade promotion (Barrett and Maxwell, 2005). Thus, all of its food aid was procured domestically and given as grants to a handful of countries, particularly Bangladesh, India, Pakistan, and Sri Lanka.

Canada was consistently the second largest food aid donor over the next decade until the late 1960s, when Europe overtook it (Barrett and Maxwell, 2005). It also used to be the largest per capita food aid donor until the late 1980s. Barrett and Maxwell (2005) attribute this decrease in Canadian food aid to an increase in cash assistance.

Canadian food assistance policies have however changed significantly within the past decade, with one major development being the elimination in 2008 of a policy that 'tied' a large portion of Canadian government-funded food aid to domestic procurement (Cardwell, 2012). Up until 2005, the policy required that ninety percent of Canadian government- funded food aid donations be procured domestically. This policy was restrictive since a large portion of funds was spent on wheat from the Canadian Wheat Board (CWB), which only sold wheat and barley (Barrett and Maxwell, 2005). The restrictions were reduced in 2005, allowing procuring agencies to use fifty percent of donated funds to purchase commodities from other places other than Canada, thus taking advantage of lower prices and transportation costs. Tying restrictions were eliminated in 2008. In the absence of formal restrictions on procurement, implementing agencies are now free to procure commodities of their choice in locations of their choice.

Canada's food assistance is now primarily cash-based and is channelled mainly through the WFP and the CFGB (Government of Canada, 2015).

2.4 Tied and Untied Aid

Jepma (1991) identifies three forms of aid tying: "tying to specific development programmes or projects, to specific commodities or services to be procured, and to the country or region where procurement has to take place". The Organization for Economic Cooperation and Development identifies 3 forms of tying status of Overseas Development Assistance (ODA); tied aid, partially untied aid and untied aid. Tied aid is defined as "official or officially supported loans, credits or associated financing packages where procurement of the goods and services involved is limited to the donor country or to a group of countries which does not include substantially all developing countries (of Central and Eastern European Countries (CEECs) or New Independent States (NIS) in transition)" (OECD, 2013(a)). Partially untied aid is defined as "ODA (or official aid) for which the associated goods and services must be procured in the donor country or among a restricted group of other countries (substantially all CEECs and NIS in the case of official aid)" (OECD, 2013(b)). Untied aid is defined as "ODA for which associated gods and services may be fully and freely procured in substantially all countries" (OECD, 2013(c)).

Tied aid has been used by many donors as a tool for domestic farmer/business support, export promotion and the disposal of surplus food commodities. There have however been several arguments against aid tying in favour of aid untying. Opponents of tied aid argue that with tied aid, donors focus mainly on their own interests unlike untied aid, which better serves recipients' interests. Tied aid has been shown to be less timely and cost-effective (by increasing the overall cost of aid) than untied aid (Lentz, Passarelli, and Barrett, 2013; Lentz et al, 2013; Lentz and Barrett, 2014; Haggblade and Tschirley, 2007; USGAO, 2009). Also, untied aid can provide culturally appropriate food/goods unlike tied aid, where recipients are restricted to just a few kinds of foods/goods. In line with the arguments against aid tying, several donors have made the

shift from tied to untied aid, with the notable exception of the US (whose aid is heavily influenced by powerful domestic lobby groups) and Japan.

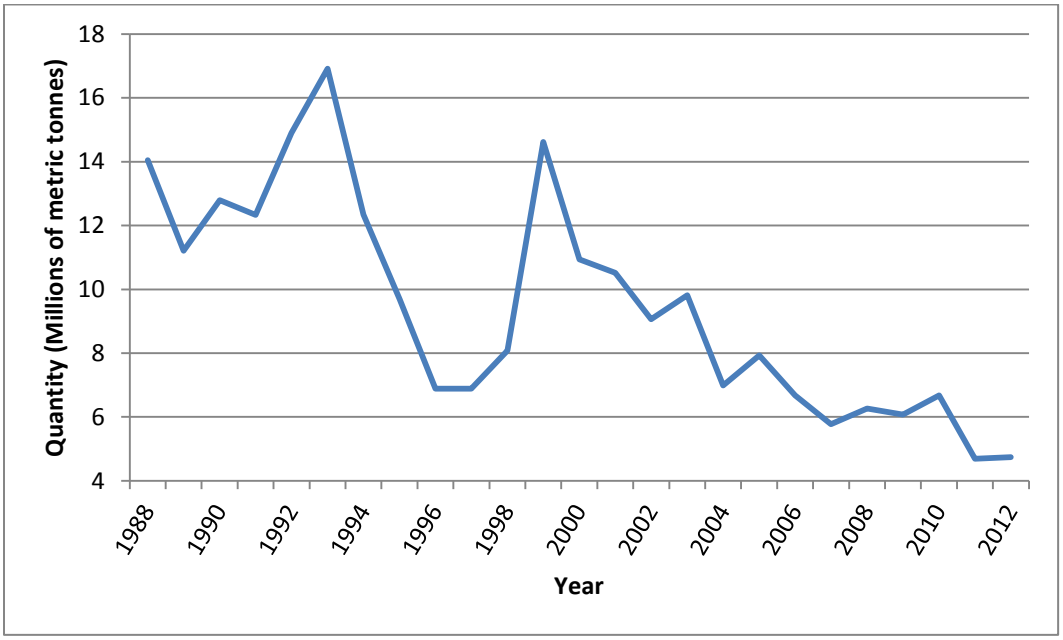
2.5 Trends in Food Aid

This section addresses both global and Canadian food aid trends from 1988 to 2012. The data for this comes from the WFP INTERFAIS database, which has not been updated since 2012. Cardwell (2016) attributes this development to an increase in the share of value-based food aid, particularly cash and vouchers. The proliferation of cash and voucher based programmes has created challenges for the WFP in how these food assistance programmes should reported. Converting these into quantity terms (which the WFP typically reports food assistance activities in) has proved difficult due to uncertainty about how to go about such conversions. Consequently, it is not possible to observe broad trends in food aid beyond 2012.

2.5.1 Global Food Aid Trends from 1988 to 2012

Total global food aid deliveries per year have been steadily declining from 1988 to 2012, despite some fluctuations over the period. They declined from approximately 14 million metric tonnes in 1988 to approximately 4.74 million metric tonnes in 2012. They briefly showed an upward trend from 1988 to 1993. Thereafter, total deliveries declined from 1993 to 2012, with a steep decline from approximately 16.9 million metric tonnes in 1993 to approximately 6.89 million metric tonnes in 1996, and a sharp increase from approximately 6.89 million metric tonnes in 1997 to approximately 14.62 million metric tonnes. The year 1993 had the largest quantity of global food aid deliveries while 2011 had the smallest (approximately 4.69 million metric tonnes). Overall, a total of approximately 237 million metric tonnes of food aid were delivered globally from 1988 to 2012. Figure 1 shows total global food aid flows from 1988 to 2012.

Figure 1. Total Global Food Aid Flows from 1988 to 2012



Source: WFP INTERFAIS

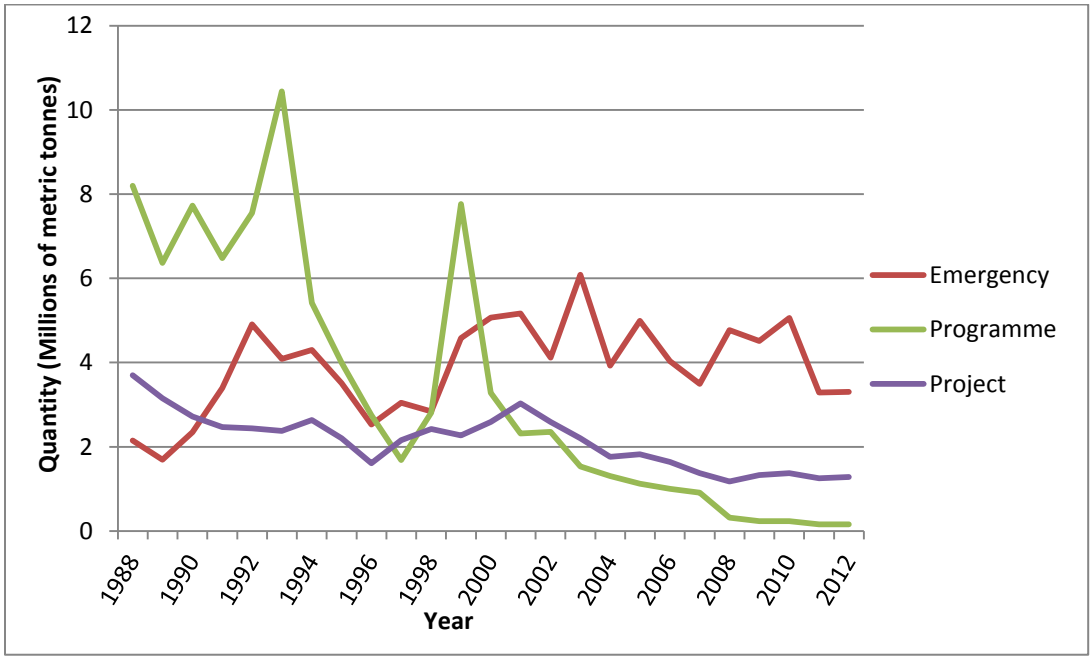
2.5.1.1 Global Food Aid Flows by Type

Global programme and project aid deliveries showed a decreasing trend from 1988 to 2012, though programme aid's decline was steeper than that of project aid. Total global programme aid deliveries per year exceeded both project and emergency aid deliveries from 1988 till 2000, when it was exceeded by emergency aid, and till 2001, when it was exceeded by project aid. In addition, global programme aid exhibited several fluctuations over the period, with a major decrease occurring from 1993 to 1997 (from approximately 10.44 million metric tonnes to approximately 1.69 million metric tonnes), and a major increase from 1997 to 1999 (from to approximately 1.69 million metric tonnes to approximately 7.77 million metric tonnes). The year 1993 had the largest quantity of programme food aid deliveries (approximately 10.44 million metric tonnes) while the year 2012 had the least (154,422 metric tonnes). Project aid deliveries slowly declined from 1988 to 2012, with major fluctuations occurring from 1994 to 1996 (from

approximately 2.63 million metric tonnes to just over 1.6 million metric tonnes) and from 1999 to 2004 (from approximately 2.27 million metric tonnes to approximately 1.76 million metric tonnes). Yearly project aid deliveries, however, did not exceed four million metric tonnes from 1988 to 2012. Yearly global emergency food aid deliveries constantly fluctuated from 1988 to 2013 but exhibited a gradual rise over the period. They, however, did not exceed 6,000,000 metric tonnes or fall below 2,000,000 metric tonnes over the period except in 2003, when such deliveries totalled approximately 6,083,000 metric tonnes, and in 1989, when they totalled approximately 1,689,700 metric tonnes. These years also represent the years with the most and least global emergency aid deliveries respectively. Emergency aid deliveries exceeded both programme and project aid in the year 2000. This remained the case for the remainder of the period (that is, from 2001 to 2012).

Overall, total global emergency aid deliveries exceeded both programme and project aid from 1988 to 2012, with such deliveries totalling approximately 97,196,000 metric tonnes. Project aid followed closely with a total of approximately 86,109,000 metric tonnes from 1988 to 2012. Global programme aid deliveries from 1988 to 2012 were approximately 53,530,000 metric tonnes. Programme aid exhibited the greatest change, falling from approximately 8,201,000 metric tonnes in 1988 to just over 154,000 metric tonnes in 2012, representing a 98% decrease over the period. Figure 2 shows total global food aid flows by type from 1988 to 2012.

Figure 2. Total Global Food Aid Flows by Type from 1988 to 2012



Source: WFP INTERFAIS

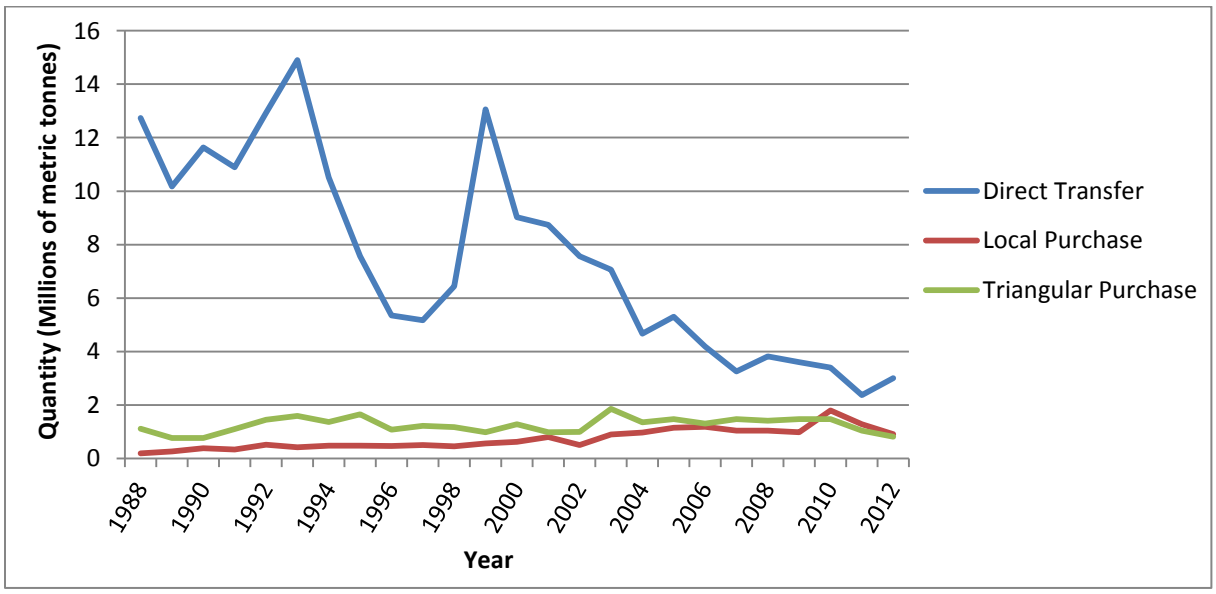
2.5.1.2 Global Food Aid by Delivery Mode

Global direct food transfers declined from approximately 12.7 million metric tonnes in 1988 to 3,007,102 metric tonnes in 2012, representing a 76% decrease over the period. They however dipped sharply from 14,902,850 metric tonnes in 1993 to 5,344,906 metric tonnes in 1996 and rose sharply from 5,166,925 metric tonnes in 1997 to 13,062,893 metric tonnes in 1999. They showed an upward trend from 1988 to 1993 and declined thereafter till 2012 (Figure 4).

Total yearly local and triangular purchases did not exceed two million metric tonnes from 1988 to 2012. Local purchases exhibited an increasing trend from 1988 to 2012, with major fluctuations occurring from 2001 to 2002 (from 799,032 metric tonnes to 504,441 metric tonnes), from 2002 to 2003 (from 504,441 metric tonnes to 9061,600 metric tonnes), from 2009 to 2010 (986,280 metric tonnes to 1,798,709 metric tonnes) and from 2010 to 2012 (1,798,709 metric

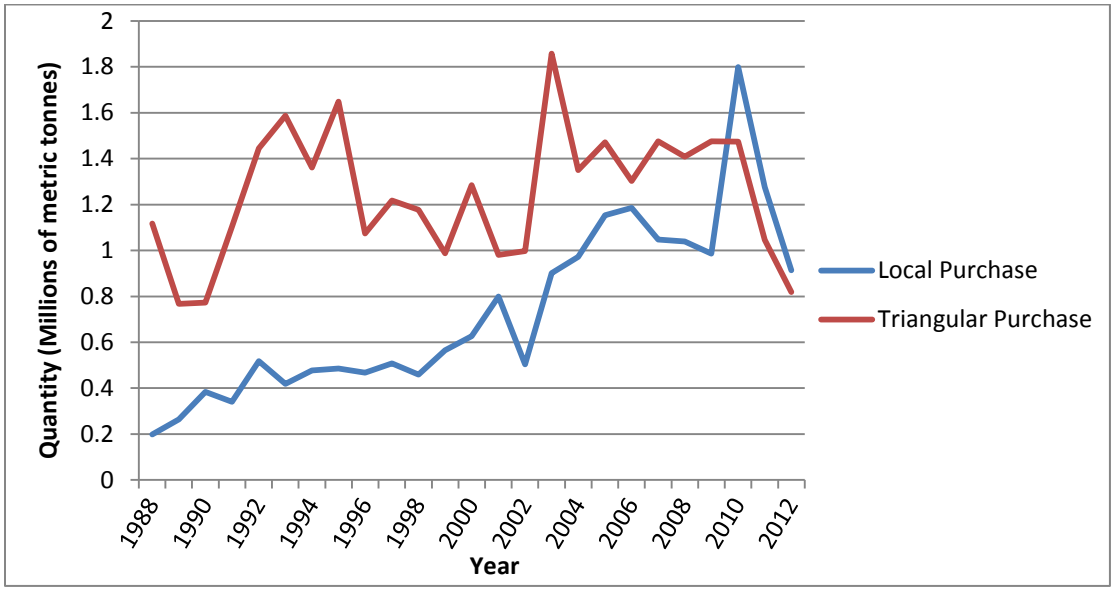
tonnes from to 818,814 metric tonnes).The year 2010 had the highest amount of local purchases while 1988 had the lowest. Total yearly local purchases did not exceed total yearly triangular purchases except from 2010 to 2012. Triangular purchases showed a slight increasing trend from 1988 to 2012, with several fluctuations over the period. Such purchases did not fall below 800,000 metric tonnes each year except in 1989 and 1990. The year 2003 had the largest quantity of food aid purchased triangularly (1,856,600 metric tonnes) while 1989 had the least quantity (767,939 metric tonnes). Overall, more food was delivered via direct transfers from 1988 to 2012, with such transfers totalling approximately 187,345,000 metric tonnes. These are illustrated in Figures 3 and 4 below.

Figure 3. Total Global Food Aid by Delivery Mode from 1988 to 2012



Source: WFP INTERFAIS

Figure 4. Total Global Local and Triangular Purchases from 1988 to 2012



Source: WFP INTERFAIS

2.5.1.3 Global Food Aid Flows by Commodity

Cereals were the largest group of commodities provided as food aid from 1988 to 2012, with a total of 215,109,514 metric tonnes delivered, representing 90.83% of total global food aid over the period. Wheat, maize, and rice were the main cereal commodities provided as food aid over the period. Cereal flours such wheat flour, maize flour, and oat flour were also provided as food aid in some years. In the non-cereal group, pulses were the largest group of commodities provided as food aid from 1988 to 2012, with a total of 10,950,515 metric tonnes delivered, representing 4.62% of total global food aid over the period. Beans, soya beans, lentils, and peas were the main pulse commodities shipped as food aid during the period. In addition to these, fortified foods such as fortified cereal flours, Supplementary Plumpy, Ready-to-Use foods (RUFs), and Fortified Blended Foods (FBFs) were also provided as food aid in some years during the period. Other food items given as food aid include iodized salt, sugar, edible oils,

dairy products such as milk, cheese and butter, eggs, fresh and canned meats, fresh and canned fruits and vegetables fish and fish products. Special food items such as high energy biscuits, rations for infants, therapeutic foods, “likuni phala”, “faffa”, teff, micronutrition powder, “unimix”, and emergency rations were also given in some years during the period.

2.5.1.4 Global Food Aid Donors

The US was largest food aid donor from 1988 to 2012, providing approximately 129,671,000 metric tonnes over the period. The second and third largest food aid donors during that period were the European Community and Canada, with a total of approximately 32,697,500 metric tonnes and 11,721,400 metric tonnes respectively (Table 1). The fourth to tenth largest food aid donors were Japan, Germany, Australia, United Kingdom, China, Republic of Korea, and France. These donors provided a combined 209,404,833 metric tonnes, with the US providing approximately 62% of the total (Table 1).

Table 1. Ten Largest Global Food Aid Donors from 1988 to 2012

Country	Quantity of Food Aid (millions of MT)
US	129.67
European Community	32.7
Canada	11.72
Japan	11.67
Germany	5.22
Australia	4.82
United Kingdom	3.59
China	3.49
Korea	3.34
France	3.18
Total	209.40

Source: WFP INTERFAIS

2.5.1.5 Global Food Aid Recipients

Ethiopia was the largest recipient of food aid deliveries from 1988 to 2012, receiving approximately 22,569,100 metric tonnes over the period (Table 2). The next nine largest recipients of global food aid from 1988 to 2012 were Bangladesh, North Korea, Russia, Sudan, Egypt, Mozambique, Pakistan, India, and Kenya. Overall, these ten recipients received a total of approximately 103,350,600 metric tonnes of food aid over the period.

Table 2. Ten Largest Global Food Aid Recipients from 1988 to 2012

Recipient	Quantity of Food Aid (millions of MT)
Ethiopia	22.57
Bangladesh	14.85
North Korea	12.79
Russia	11.34
Sudan	9.31
Egypt	7.61
Mozambique	7.26
Pakistan	7.09
India	5.76
Kenya	4.76
Total	103.35

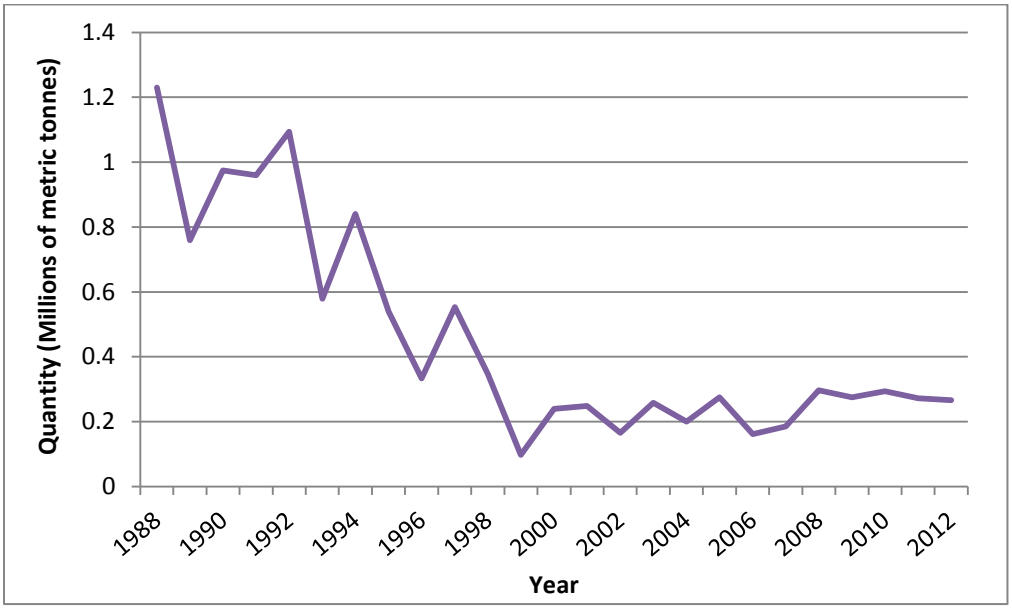
Source: WFP INTERFAIS

Considering geographical region, sub-Saharan Africa was the largest recipient of food aid from 1988 to 2012. This region received over 90.7 million metric tonnes during that period, representing 38.3% of total global food aid (Figure 6). Asia was the second largest recipient region, receiving over 63.2 million metric tonnes (representing 26.7%) of total global food aid.

2.5.2 Canadian Food Aid Trends from 1988 to 2012

Canada's total food aid deliveries showed a general decreasing trend from 1988 to 2012. They declined from approximately 1,230,000 metric tonnes in 1988 to just over 266,000 metric tonnes in 2012, with 1999 being the year with the smallest quantity of deliveries (approximately 98,000 metric tonnes). Over that twenty-four year period, total Canadian food aid flows exhibited fluctuations from year to year, with sharp decreases from 1992 to 1993 (approximately a 516,000 metric tonne decrease), from 1994 to 1996 (approximately a 508,000 metric tonne decrease), and from 1997 to 1999 (approximately a 455,000 metric tonne decrease). Total food aid flows exhibited a decreasing trend from the years 1988 to 1999. Thereafter, they increased at a decreasing rate, from approximately 98,000 metric tonnes in 1999 to 266,000 metric tonnes in 2012. During that period, total food aid flows did not exceed 300,000 metric tonnes. Figure 6 shows total Canadian food aid flows from 1988 to 2012.

Figure 5. Total Canadian Food Aid Flows from 1988 to 2012



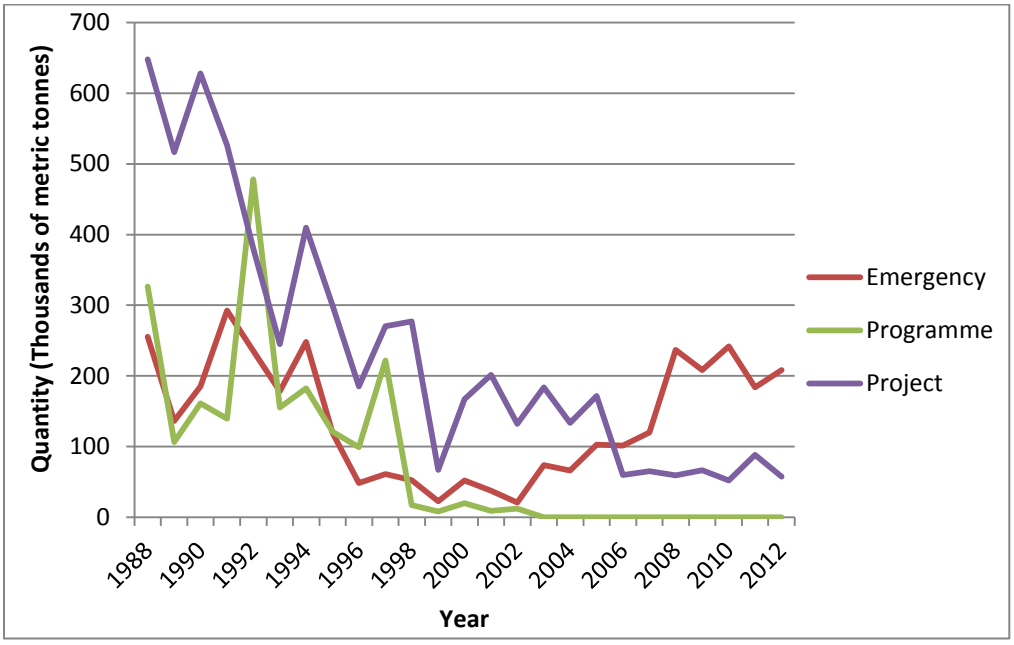
Source: WFP INTERFAIS

2.5.2.1 Canadian Food Aid Flows by Type

Canadian programme and project food aid deliveries both showed a decreasing trend from 1988 to 2012. Programme aid declined from 1988 to 2002, although it exhibited sharp fluctuations during the period. Total programme aid from 1988 to 2012 was just over 2,000,000 metric tonnes, with no such deliveries not occurring after 2002. Project aid flows experienced a steep decline from approximately 648,000 metric tonnes 1988 to 67,045 metric tonnes in 1999. They fluctuated from 1999 to 2005, but did not exceed 200,000 metric tonnes, except in the year 2001, when such deliveries totalled 201,631 metric tonnes. After declining from 2005 to 2006, total project aid deliveries did not exceed 100,000 metric tonnes each year from 2006 to 2012. Emergency aid deliveries showed an initial decrease from approximately 260,000 metric tonnes in 1988 to 22,766 metric tonnes in 1999, but exhibited an increasing trend from 1999 to 2012 (from 22,766 metric tonnes to 208,416 metric tonnes). Despite this, emergency aid deliveries did

not exceed 300,000 metric tonnes each year from 1988 to 2012. Overall, there was more project aid during the period, with such deliveries totalling approximately 5,900,000 metric tonnes. Emergency aid during the period totalled 3,490,607 metric tonnes. Figure 7 below shows total Canadian food aid flows by type from 1988 to 2002.

Figure 6. Total Canadian Food Aid by Type from 1988 to 2012

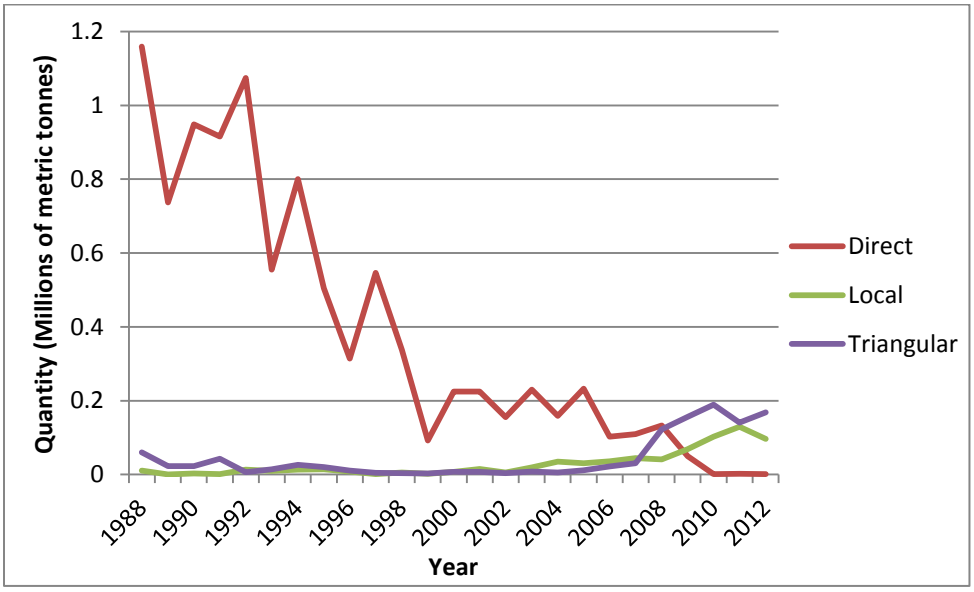


Source: WFP INTERFAIS

2.5.2.2 Canadian Food Aid Flows by Delivery Mode

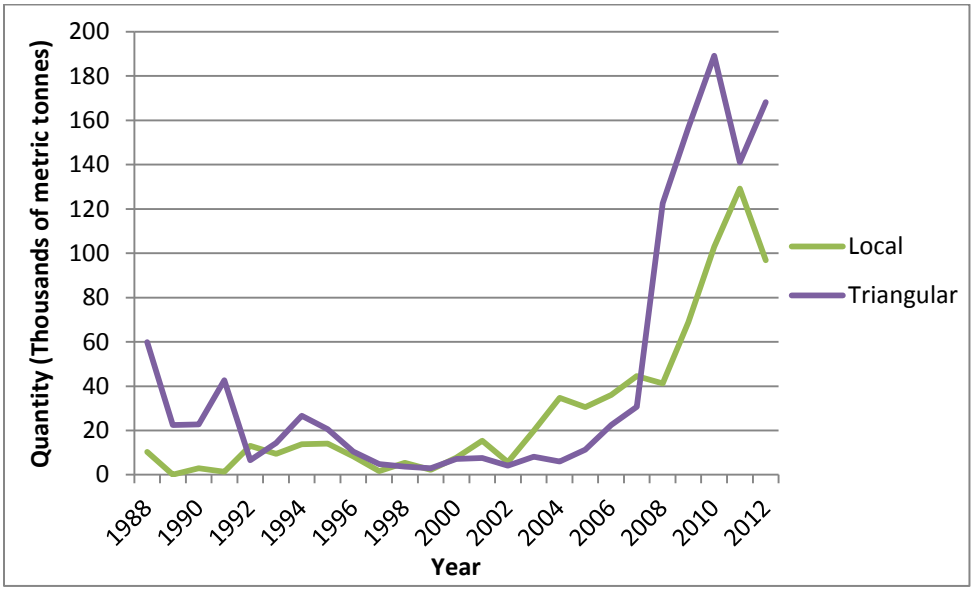
Direct transfers showed a decreasing trend from 1988 to 2012; they declined from 1,159,492 metric tonnes in 1988 to 904 metric tonnes in 2012. These are illustrated in Figures 3 and 4 below.

Figure 7. Total Canadian Food Aid by Delivery Mode from 1988 to 2012



Source: WFP INTERFAIS

Figure 8. Total Canadian Food Aid by Delivery Mode (Local and Triangular Purchases) from 1988 to 2012



Source: WFP INTERFAIS

CHAPTER THREE

METHODOLOGY AND DATA

3.1 Introduction

This chapter presents the model specification, describing the rationale behind it, as well as the variables and equations used in its estimation. The data used in this study and their sources are also described in this chapter. In addition, this chapter discussed the problems encountered with the available data and how those problems are addressed in the estimation of the model. Lastly, diagnostic tests and their results are outlined.

3.2 Model Specification

This study applies a pooled empirical model to data on Canadian government-funded food aid shipments to five recipient regions in order to estimate the effects untying of Canadian food aid on food aid commodity groups, particularly cereals. Specifically, the model estimates price effects for cereal commodities in Canadian cereal food aid baskets.

This study employs a dataset that provides information on where and when specific commodities were purchased, enabling the use of commodity prices that differ across local and regional purchases. This dataset provides monthly data and thus allows the model to pick up variation in prices within each year.

Food aid rations (for example those meant for distribution during a humanitarian crisis) are usually composed of five main components: cereals, pulses, oils, sugar and salt (WFP, undated (c)). Each component provides different forms of nutrition, for example, cereals provide

carbohydrates and pulses provide protein. For this reason, one component cannot be substituted for another (without losing some form of nutrition). When selecting commodities for food aid baskets, donors choose between commodities within each component. Each component can therefore be treated as being a "separable group" of commodities (where "separable" in this context refers to the groups being distinctly separate based on the nutrition they provide, and not to two-stage budgeting in demand theory), with commodities within each group considered substitutable, for example, maize can be substituted for wheat but not for oil.

The empirical model is applied to one of these separable groups of commodities, namely cereals, in order to estimate substitution effects between commodities within this group. This group represents the largest component of a typical WFP food aid basket, with cereals making up just over 72% (400g) and pulses making up almost 11% (60g) (WFP, undated(c)). The model considers three cereal commodities, wheat, maize and rice, which, in totality, account for almost 90% of all cereal food aid and for the majority of all food aid shipments (Barrett and Maxwell, 2005; Nunn and Qian, 2010; Cardwell, 2012).

The general model used in this study is specified as

$$lnQ_{i,t} = \beta_0 + \Sigma_{j=1}^{n}\beta_{ij} lnP_{j,t} + \beta_X lnX_{k,t} + \Sigma_{k}^{r-1}\beta_k D_k + \beta_D D_{2008} + \Sigma_{j=1}^{n}\beta_{ijD} ln\left[P_{j,t}\right]D_{2008} + \beta_{XD} ln\left[X_{k,t}\right]D_{2008} + \varepsilon_{ki,t} \quad (1)$$

From this, three equations are defined; one for each cereal commodity. These are specified as follows:

$$lnQ_{W,t} = \beta_0 + \beta_{WW} lnP_{W,t} + \beta_{MM} lnP_{M,t} + \beta_{RR} lnP_{R,t} + \beta_X lnX_{k,t} + \Sigma_k^{r-1} \beta_k D_k + \beta_D D_{2008} + \beta_{WWD} ln[P_{W,t}] D_{2008} + \beta_{WMD} ln[P_{M,t}] D_{2008} + \beta_{WRD} ln[P_{R,t}] D_{2008} + \beta_{XD} ln[X_{k,t}] D_{2008} + \varepsilon_{kW,t} (2)$$

$$lnQ_{M,t} = \beta_0 + \beta_{WW} lnP_{W,t} + \beta_{MM} lnP_{M,t} + \beta_{RR} lnP_{R,t} + \beta_X lnX_{k,t} + \Sigma_k^{r-1} \beta_k D_k + \beta_D D_{2008} + \beta_{MWD} ln[P_{W,t}] D_{2008} + \beta_{MMD} ln[P_{M,t}] D_{2008} + \beta_{MRD} ln[P_{R,t}] D_{2008} + \beta_{XD} ln[X_{k,t}] D_{2008} + \varepsilon_{kM,t} (3)$$

$$lnQ_{R,t} = \beta_0 + \beta_{WW} lnP_{W,t} + \beta_{MM} P_{M,t} + \beta_{RR} P_{R,t} + \beta_X lnX_{k,t} + \Sigma_k^{r-1} \beta_k D_{k,t} + \beta_D D_{2008} + \beta_{RWD} ln[P_{W,t}] D_{2008} + \beta_{RMD} ln[P_{M,t}] D_{2008} + \beta_{RRD} ln[P_{R,t}] D_{2008} + \beta_{XD} ln[X_{k,t}] D_{2008} + \varepsilon_{kR,t} (4)$$

Where:

i. $Q_{i,t}$ = The quantity of commodity *i* (wheat, maize, or rice) in recipient region *k*'s cereal food aid basket in month *t*, measured in metric tonnes (MT).

ii. $P_{j,t}$ = Real regional prices for commodity *j* (wheat, maize, or rice) in month *t* measured in US dollars per metric tonne (US$/MT).

iii. $X_{k,t}$ = Basket size measured as total quantity of wheat, maize and rice aid shipped to recipient region *k* in month *t*, measured in metric tonnes (MT).

iv. D_k = Recipient region dummy variable.

v. D_{2008} = Dummy variable representing change in food aid tying policy in April 2008. It is defined as 1 from May 2008 to December 2012 and 0 otherwise.

vi. $\varepsilon_{ki,t}$ = The error term.

vii. β_0, β_{ij}, β_k, β_X, β_D, β_{XD} and β_{ijD} = Parameters to be estimated.

viii. n = Number of commodities.

ix. r = Number of recipient regions.

x. *W*, *M*, and *R* represent wheat, maize, and rice respectively.

Estimating the three equations jointly (assuming that their errors are correlated, i.e., that they are seemingly unrelated) would result in more efficient estimators. However, this proves difficult because the number of observations for each commodity is not equal across time. Consequently, the equations are estimated individually using ordinary least squares (OLS) regression.

3.2.1 Variables

The dependent variable in this model is the quantity of commodity *i* (that is, wheat, maize or rice) in recipient region *k*'s cereal aid basket in month *t*, represented by $Q_{ki,t}$. These quantities are conditional on total cereal basket size to each region. The model does not estimate basket size or recipient need because the main focus of this study is the determination of substitution or price effects between wheat, maize and rice. Estimating price effects on basket size is not required to identify substitution effects between commodities. In addition, there are several unobserved factors that affect how much food aid a recipient receives, making the estimation of basket size intractable.

The variables $P_{it}, \dots, P_{jt}$ represent real regional prices of wheat, maize and rice at month *t*.

Variable $X_{k,t}$ represents the total quantity of wheat, maize and rice shipped to recipient country *k* in month *t*, measured in metric tonnes (MT). Data for this variable is from the WFP food aid shipment dataset which is described in detail in Section 3.3.

The process of untying Canadian food aid happened in two stages; it was partially untied in September 2005 and then totally untied in April 2008. Policy dummy variable D_{2008} is used to capture the second stage in which full untying occurred. However, a dummy variable that

captured the partial untying of Canadian food aid in 2005 is not included. This is because there are too few observations of maize and rice in the years prior to partial untying to allow for any meaningful estimation of the model with the inclusion of this variable.

Recipients in different geographical regions may receive certain food aid commodities for reasons other than commodity price, for example, differences in tastes. Recipient region fixed effects are therefore used to control for any unobserved region-specific time-invariant factors, most importantly, differing tastes, for each recipient region. These effects are captured in the variable D_k.

Variables $P_{W,t}D_{2008}$, $P_{M,t}D_{2008}$, $P_{R,t}D_{2008}$, and $X_{k,t}D_{2008}$ represent linear interaction terms of the policy dummy variable with wheat, maize and rice prices and also basket size. These are included in the model to identify the effects of commodity prices and basket size on the dependent variable conditional on when the untying policy was in effect.

Elasticities (specified as e_{ij}) are derived from this model. These are defined as commodity *i*'s price elasticity of quantity with respect to the price of commodity *j*. These elasticities are conditional on the size of the recipient region's cereal aid basket, $X_{k,t}$. Own price and cross price elasticities are expected to be negative and positive, respectively. Thus an increase in the price of maize, for example, should decrease the quantity of maize in a recipient country's cereal basket but increase the quantities of rice and wheat.

The elasticities, e_{ij}, are given as:

$$e_{ij} = \beta_{ij} + \beta_{ijD}D_{2008} \quad (5)$$

Where β_{ijD} is the partial effect of the change in food aid tying policy in 2008 on Canada's response to changes in commodity *j*'s price.

3.2.2 Disaggregated Analysis

A large portion of Canadian food aid in the pre-untying period was programme and project (P&P) aid. These two types of aid were constituted more than 60% of total Canadian food aid each year from 2000 to 2005. However, in 2006, the percentage of total Canadian food aid that was emergency aid rose to 62.48%. This was a year after Canadian food aid was partially untied. In 2008, when it was fully untied, the percentage of emergency food aid in total Canadian food aid rose to 85.49%.

Donor agencies may be less likely to be responsive to changes in commodity prices when procuring food commodities for emergency aid purposes than for P&P aid. This may be because, unlike P&P aid, there is less time to plan for emergencies, especially when there is an urgency to reach recipients, many of whom may not survive without external help. The removal of commodity procurement restrictions for Canadian food aid may have affected donor agencies' decisions to procure commodities for either emergency or P&P aid. This study therefore investigates whether the untying of Canadian food aid in 2008 affected the price sensitivity of donor agencies' decisions to procure wheat, maize, and rice for emergency aid and for P&P aid by estimating all three commodity equations disaggregated by aid type.

3.3 Data

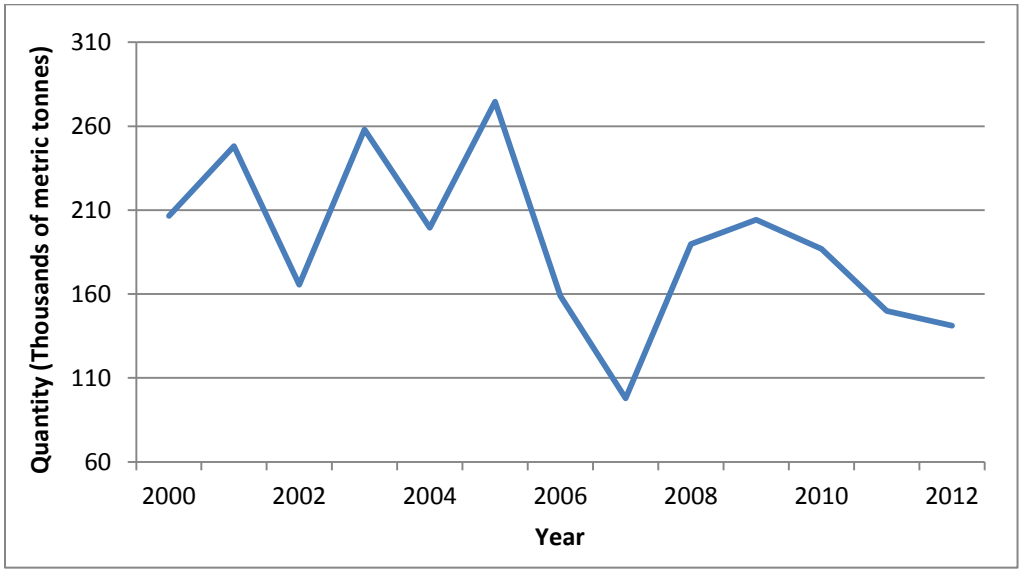
3.3.1 Food Aid Shipment Data

This study employs a transaction level food aid shipment dataset from the WFP spanning a period of 13 years (2000-2012) that is provides information on recipient country, type of aid (programme, project, emergency), commodity, delivery mode (direct, triangular (local/regional purchases)), origin, shipping dates, and arrival dates. This dataset was provided by staff of the WFP and is not publicly available. It is better suited to our purposes than what is publicly

available on WFP's INTERFAIS database because the level of disaggregation in our dataset allows for more thorough analysis. Unlike the annual data available on the INTERFAIS database, the dataset used in this study provides higher frequency data, which records procurement location (that allows for the use of region-specific commodity prices rather than world commodity prices) and the month a shipment is made. This dataset is used with monthly prices to estimate the model, thus allowing any variations in prices within each year to be captured.

From the data, total Canadian cereal aid from 2000 to 2012 exhibited some fluctuations, with several peaks and falls over the period. Overall, the trend of flows depicts a general decrease over the period, from approximately 200,000 metric tonnes to just over 140,000 metric tonnes (Figure 9).

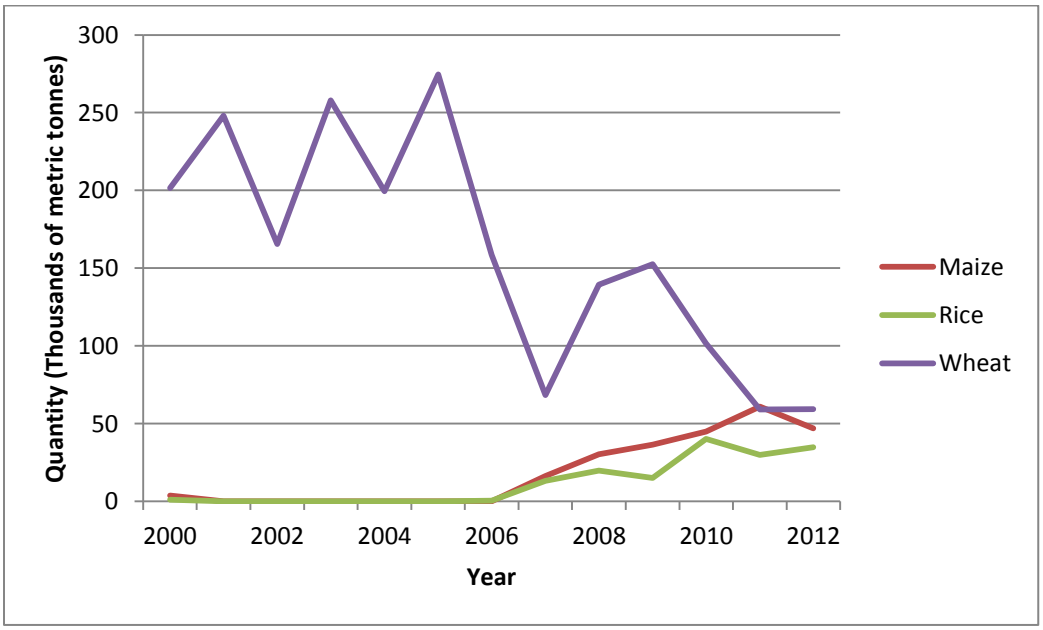
Figure 9. Total Canadian Cereal Aid Flows from 2000 to 2012



Source: WFP (undated, (d))

Considering aid flows by commodity, the data show that total wheat flows decreased over the period, exhibiting a sharp decline from 2005 to 2007. In the year 2000, maize and rice flows were both below 5000 metric tonnes, specifically 3,863 metric tonnes and 1,200 metric tonnes respectively. There were no maize deliveries or rice deliveries from 2001 to 2006 and from 2001 to 2005 respectively. They both exhibit an upward trend, from the years 2007 and 2006 respectively. Total rice deliveries did not exceed 50,000 metric tonnes during the period; with the largest quantity being approximately 40,000 metric tonnes in 2010. Total maize deliveries also stayed under 50,000MT during the period, with the exception of 2011, when it reached approximately 61, 000MT. These are illustrated in Figure 10 below.

Figure 10. Total Canadian Cereal Aid Flows by Commodity from 2000 to 2012

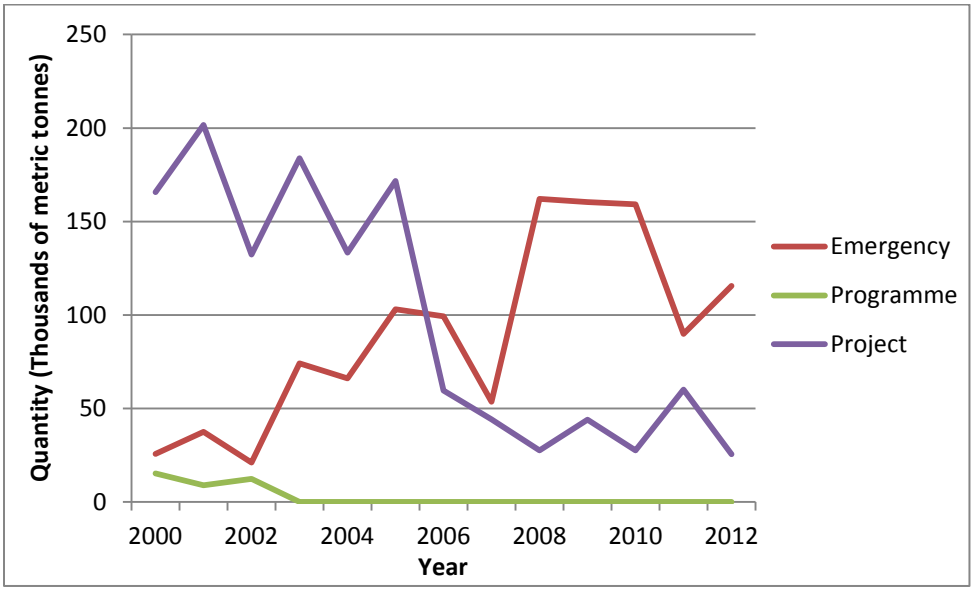


Source: WFP (undated, (d))

Considering aid type, the data show that emergency aid during the period showed an upward trend with a corresponding downward trend in project and programme aid. Overall, there was more project cereal aid during the period, with such deliveries totalling approximately 1.3

million metric tonnes. Emergency aid followed closely at approximately 1.2 million metric tonnes. Programme aid flows, totalling just over 36,000 metric tonnes, only occurred from 2000 to 2002 after which there were none. Figure 11 below depicts total Canadian food aid flows by type over the period.

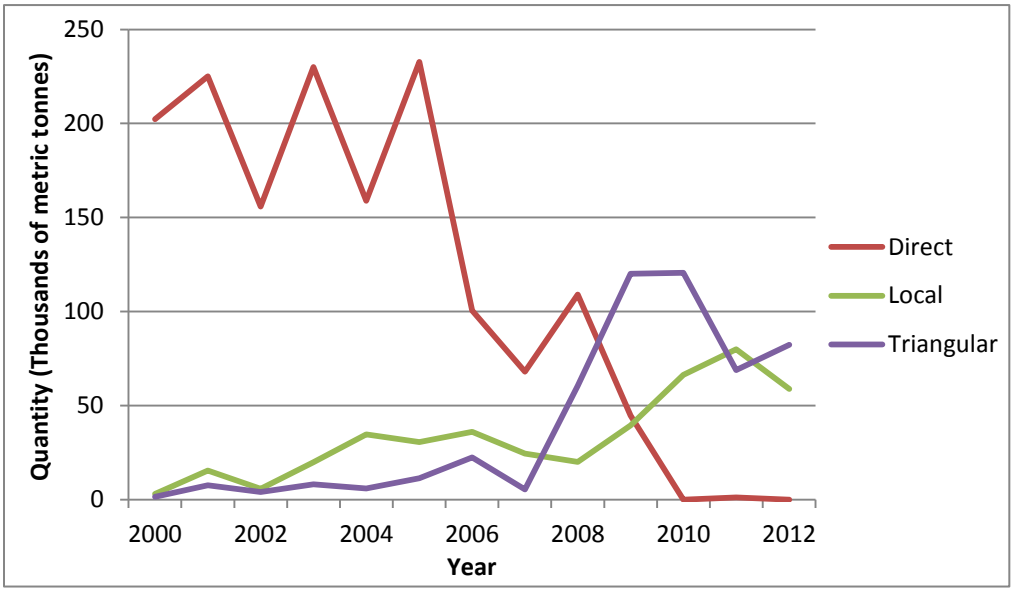
Figure 11. Total Canadian Cereal Aid Flows by Type from 2000 to 2012



Source: WFP (undated, (d))

Considering delivery modes, the data show that both local and triangular purchases exhibited an upward trend while direct or in-kind purchases showed a corresponding downward trend during the period. Both local and triangular purchases exhibited slow growth in aid flows from the year 2000 until 2007, when triangular purchases spiked upwards, and until 2008, when local purchases begun to show an upward trend. Direct transfers fluctuated from the year 2000 until 2005, after which it begun to decline. Despite a slight increase in 2008, it continued to decline until it reached zero in 2010. There were no more direct transfers after 2010. These are illustrated in Figure 12 below.

Figure 12.Total Canadian Cereal Aid Flows by Delivery Mode from 2000 to 2012



Source: WFP (undated, (d))

A total of seventy-nine recipient countries are aggregated into five geographical regions because regional commodity prices are used as proxies (for reasons explained in Section 3.3.2). These regions are Africa, Asia and Pacific, Eastern Europe, Latin America and Caribbean, and the Middle East.

Africa was the largest recipient of Canadian wheat, maize and rice from 2000 to 2012, receiving more than 1.2 million metric tonnes during that period (Table 3). Asia and the Pacific was the second largest recipient, receiving approximately 823,000 metric tonnes during the period. Latin America and the Caribbean and the Middle East received approximately 206,000 metric tonnes and 186,000 metric tonnes respectively over the same period. Eastern Europe received the smallest amount from 2000 to 2012, receiving approximately 19,000 metric tonnes over the period.

Table 3. Canadian Cereal Aid Recipients by Region from 2000 to 2012

Year	Africa	Asia & the Pacific	Eastern Europe	Latin America & the Caribbean	Middle East
2000	58,602	72,272	0	53,560	22,196
2001	37,612	141,134	8,719	40,876	19,741
2002	25,573	117,161	2,487	11,631	8,755
2003	80,028	138,916	2,597	15,821	20,594
2004	83,675	97,860	886	7,772	9,341
2005	173,571	68,676	1,099	17,320	14,004
2006	103,974	33,029	3,042	9,415	9,455
2007	55,560	28,572	0	3,293	10,401
2008	121,075	14,190	0	10,132	44,310
2009	175,967	24,369	0	1,654	2,325
2010	132,953	36,067	0	13,092	4,720
2011	108,70	17,215	0	11,096	13,023
2012	90,128	33,176	0	10,413	7,393
Total	1,247,295	822,642	18,831	206,079	186,263

Source: WFP (undated, (d))

3.3.2 Prices

The WFP food aid dataset provides information on procurement location and so ideally, exact procurement prices for each food aid transaction would be used in order to obtain empirical results which are based on actual prices that donors pay for food aid commodities. Such prices are however publicly unavailable and so proxy prices are used.

For direct food aid transfers, monthly Canadian wheat export prices from the Food and Agriculture Organisation's (FAO) Global Information and Early Warning System on Food and Agriculture (GIEWS) price tool database are used. Canadian maize and rice procurement prices are publicly unavailable and so monthly US maize and rice export prices are employed as proxies. These prices are also used because the US is the largest exporter of those commodities

in North America. Data for these prices are from the USDA Foreign Agricultural Service's Global Agricultural Trade System.

Procurement prices of commodities purchased locally and regionally are not all publicly available for all the locations and dates in the dataset and so monthly region-specific wheat, maize, and rice prices are employed as proxies. All the origin countries (countries from which the food commodities were sourced) are aggregated into six geographical regions: Africa, Asia and Pacific, Eastern Europe, Latin America and Caribbean, Middle East, and North America. The countries from each region with publicly available price data for all the years considered are chosen and their cereal prices are used as regional representative prices. These price data were sourced from the GIEWS price tool database and from the World Bank's Global Economic Monitor (GEM) Database. These regional prices should more accurately reflect the prices paid for food aid obtained through local and regional purchases than would world prices. The drawback however is that the aggregation obscures any variations in prices across countries within regions that would otherwise be observed with the use of country-specific prices.

Summary statistics for the data are presented in Table 4.

Table 4. Summary Statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
$Q_{W,t}$ (MT)	367	5,649.89	10,519.18	5	74,980.74
$Q_{M,t}$ (MT)	121	1,979.80	3,079.86	15.08	20,825
$Q_{kR,t}$ (MT)	187	827.14	1,032.18	3	8,450
$X_{k,t}$ (MT)	675	7,675.41	11,717.41	5	74,980.74
D_{2008}	675	0.49	0.50	0	1
$P_{W,t}$ (US$/metric tonne)	675	261. 89	101.15	74.76	743.62
$P_{M,t}$ (US$/metric tonne)	675	198.04	91.68	60.68	382.50
$P_{R,t}$ (US$/metric tonne)	675	495.95	250.22	142.88	1128

Sources: WFP (undated, (d)), FAO (2014), World Bank (2015), USDA Foreign Agricultural Service(undated)

3.4 Diagnostic Tests

Tests for heteroskedasticity, multicollinearity and influential observations are conducted on the data. These tests and their results are outlined in the following sections.

3.4.1 Heteroskedasticity

The results from the Breusch-Pagan/Cook-Weisberg test for heteroskedasticity show that the null hypothesis is rejected, indicating that heteroskedasticity is present in the data for the wheat and maize equations. Although this does not result in a bias in the parameter estimates, it does result in a bias in the standard errors. To correct this, the wheat and maize equations are run with robust standard errors to obtain unbiased standard errors.

3.4.2 Multicollinearity

Variance inflation factors are computed for each variable in each equation in order to identify the degree of multicollinearity. For each equation, the policy dummy variable and the interaction terms have very high variance inflation factors (Tables 5, 6, and 7) suggesting that there may be a high degree of multicollinearity. This is probably due to the fact that the interaction terms are derived from the policy dummy variable and the price terms. Multicollinearity leads to large standard errors which, in turn, may render some parameter estimates insignificant.

Table 5. Variance Inflation Factors (Wheat Equation)

Variable	VIF
D2008	734.74
$lnX_{k,t}$	1.39
$ln[X_{k,t}]D_{2008}$	39.59
$lnP_{W,t}$	3.76
$ln[P_{W,t}]D_{2008}$	822.21
$lnP_{M,t}$	4.13
$ln[P_{M,t}]D_{2008}$	619.73
$lnP_{R,t}$	2.52
$ln[P_{R,t}]D_{2008}$	772.46
Mean VIF	231.25

Sources: WFP (undated, (d)), FAO (2014), World Bank (2015), USDA Foreign Agricultural Service(undated)

Table 6. Variance Inflation Factors (Maize Equation)

Variable	VIF
D2008	2543.03
$lnX_{k,t}$	4.25
$ln[X_{k,t}]D_{2008}$	29.07
$lnP_{M,t}$	36.32
$ln[P_{M,t}]D_{2008}$	979.04
$lnP_{W,t}$	5.85
$ln[P_{W,t}]D_{2008}$	358.43
$lnP_{R,t}$	41.27
$ln[P_{R,t}]D_{2008}$	5373.62
Mean VIF	852.25

Sources: WFP (undated, (d)), FAO (2014), World Bank (2015), USDA Foreign Agricultural Service(undated)

Table 7.Variance Inflation Factors (Rice Equation)

Variable	VIF
D2008	848.53
$lnX_{k,t}$	9.91
$ln[X_{k,t}]D_{2008}$	40.35
$lnP_{R,t}$	14.05
$ln[P_{R,t}]D_{2008}$	337.40
$lnP_{W,t}$	15.88
$ln[P_{W,t}]D_{2008}$	2039.34
$lnP_{M,t}$	29.80
$ln[P_{M,t}]D_{2008}$	2044.00
Mean VIF	448.79

Sources: WFP (undated, (d)), FAO (2014), World Bank (2015), USDA Foreign Agricultural Service(undated)

In an attempt to minimize this high degree of multicollinearity, a simple form of each equation is estimated, without the policy dummy, price and basket size interaction terms. Results from these regressions are mainly counterintuitive (as is the case of the results from the regressions with the interaction terms; these are addressed in detail in the following chapter). Consequently, the interaction terms are maintained in each of the equations (as depicted in Equations 2, 3, and 4).

3.4.3 Influential Observations

To identify any observations that may have a great influence on the results of the three regression equations, Cook's Distance values are estimated for each observation in the data for each equation. All the observations for each equation had Cook's Distance values that are less than 1. Consequently, there are no influencing observations in the data for each equation.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the estimation of the three commodity equations and a discussion of those results. The results of the disaggregated models (emergency aid and programme and project (P&P) aid) are also presented. Lastly, some data and model limitations are outlined.

4.2 Results of Aggregated Model

In the wheat equation (Table 5), the estimated coefficients on the price terms are positive and significant at 1% for wheat price, negative and significant at 1% for maize price, and negative and significant at 5% for rice price. The estimated coefficients on the price-dummy interaction terms are negative and significant at 5% for wheat price, positive and significant at 1% for maize price, and negative and significant at 1% for rice price. The policy dummy estimate is positive and significant. In both the maize and rice models, estimated coefficients on all terms are insignificant, with the exception of those on basket size.

The coefficient estimates of basket size in all three equations are positive and significant (1% for wheat and maize, 10% for rice). Estimates of the basket size-dummy interaction term are however insignificant in all three models.

Estimated price elasticities for each model are summarized in Table 6. Prior to untying, the signs on the own- and cross-price elasticities in the wheat model are counterintuitive, but all significant (1% for wheat and maize, 5% for rice). After untying, the own-price elasticity is

negative but insignificant, the cross-price elasticity for maize is positive but insignificant and that for rice is negative and significant at 1%. Estimated own- and cross price elasticities in the maize model are all insignificant prior to and after untying. In the rice model, the own- and cross price elasticities are insignificant prior to untying but are significant (5% for rice and maize, 10% for wheat) after untying. The signs on the own-price and maize cross-price elasticities are as expected, while that on the wheat cross-price elasticity is counterintuitive.

Table 8. Summary of Results

Variable	WHEAT	MAIZE	RICE
D_{2008}	13.305*** (4.995)	-3.741 (11.353)	5.325 (8.167)
$ln[X_{k,t}]$	0.842 (.0313)	0.566*** (0.136)	0.361* (0.19)
$ln[P_{W,t}]$	1.279*** (0.272)	-1.125 (0.978)	-1.244 (1.974)
$ln[P_{M,t}]$	-1.196*** (0.294)	1.686 (2.625)	1.437 (2.132)
$ln[P_{R,t}]$	-0.542** (0.264)	-0.069 (3.029)	-0.058 (0.762)
$ln[X_{k,t}]D_{2008}$	0.175 (0.108)	-0.236 (0.189)	0.056 (0.206)
$ln[P_{W,t}]D_{2008}$	-1.636* (0.965)	1.262 (1.090)	-0.082 (2.163)
$ln[P_{M,t}]D_{2008}$	1.803** (0.892)	-1.365 (2.672)	-0.190 (2.227)
$ln[P_{R,t}]D_{2008}$	-2.397*** (0.742)	0.837 (3.085)	-0.697 (0.778)
β_0	2.681* (1.480)	0.146 (10.181)	2.236 (6.546)
N	367	121	187
R^2	0.718	0.293	0.271
F	120.098	41.179	5.397

Legend: * p<0.1; ** p<0.05; *** p<0.01.

Table 9. Wheat, Maize and Rice Price Elasticities Prior to and After Untying

Wheat			Maize			Rice			D_{2008}
E_{ww}	E_{wm}	E_{wr}	E_{mm}	E_{mw}	E_{mr}	E_{rr}	E_{rw}	E_{rm}	
1.279***	-1.196***	-0.542**	1.686	-1.125	-0.069	-0. 058	-1.243	1.437	0
(0.272)	(0.294)	(0.264)	(2.625)	(0.978)	(3.029)	(0.762)	(1.974)	(2.131)	
-0.358	0.607	-2.939***	0.321	0.138	0.768	-0.756**	-1.326*	1.246**	1
(0.924)	(0.837)	(0.702)	(0.447)	(0.530)	(0.668)	(1.261)	(0.794)	(0.612)	

Legend: * p<0.1; ** p<0.05; *** p<0.01.

4.3 Discussion

From the wheat equation, the maize and rice cross-price elasticities prior to untying suggest that increases in maize and rice prices led to decreases in metric tonnes of wheat (11.96% and 5.42% decreases respectively) in the cereal basket, but that wheat quantity was more responsive to changes in maize price than to changes in rice price. These results suggest that maize and rice are complementary to wheat and that donor agencies may not have substituted away from the two commodities when their prices increased. This is counterintuitive because, as previously mentioned, wheat was the main commodity procured during the pre-untying period. It is expected that changes in maize and rice prices would have no effect on donor agencies' decisions concerning wheat quantity during that period.

From the rice equation, the rice own-price elasticity estimate suggests that rice quantity decreased by 7.56% when rice price increased by 10% after untying. This result is intuitive; an increase in rice price caused a fall in metric tonnes of rice in the cereal aid basket. The cross-price elasticity for maize shows that a 10% increase in maize price led to a 12.46% increase in rice quantity after untying. This is also intuitive and suggests that donor agencies may have substituted maize for rice in response to increases in maize price.

The results from the wheat equation show that prior to untying, a 10% increase in wheat price led to a 12.79% increase in the metric tonnes of wheat in the food aid basket (conditional on the size of the basket). This result is highly significant and counterintuitive. It is expected to be insignificant because some tying restrictions were still in place during this period, and so donor agencies' decisions to procure Canadian wheat would not have been affected by changes in wheat price. This suggests that donor agencies may not have substituted away from wheat when wheat price increased.

After untying, the results from the wheat equation suggest that wheat quantity was highly responsive to changes in rice price. Wheat quantity decreased by 29.39% as a result of a 10% increase in rice price post-untying. The results from the rice model show that a 10% increase in wheat price caused a 13.26% decrease in rice quantity. These results together suggest that these two commodities may be complements and that donor agencies may not have substituted wheat for rice and vice versa.

4.4 Results of Disaggregated Analysis

This section presents the results of the model disaggregated by type of aid, specifically emergency aid and P&P aid.

4.4.1 Emergency Aid

From Table 7, in the emergency wheat equation, the estimated coefficients on the price terms are all insignificant, with the exception of that of rice price, which is significant at 10%. The estimated coefficients on the price-dummy interaction terms are negative and significant at 1% for rice price and insignificant for wheat and maize prices. The policy dummy estimate is positive and significant at 10%. In both the maize and rice equations, estimated coefficients on all terms are insignificant, with the exception of those on basket size.

The coefficient estimates of basket size in all three equations are positive and significant (1% for wheat and rice, 5% for maize). The estimate of the basket size-dummy interaction term is positive and significant at 1% in the wheat equation but negative and insignificant in the maize and rice equations.

Estimated price elasticities for each equation are summarized in Table 8. All own- and cross-price elasticity estimates for each model are insignificant prior to untying. After untying, the rice cross-price elasticity in the wheat model is negative and significant at 5%, while the own-price and maize cross-price elasticities are insignificant. In the maize model, the wheat cross-price elasticity is positive and significant at 10%, while the own-price and rice cross-price elasticities are insignificant. All price elasticity estimates in the rice model are insignificant after untying.

Table 10. Summary of Results (Emergency Aid)

Variable	WHEAT	MAIZE	RICE
D_{2008}	9.489* (5.192)	-17.124 (29.012)	0.964 (9.617)
$ln[X_{k,t}]$	0.730*** (0.043)	0.450** (0.188)	0.693*** (0.21)
$ln[P_{W,t}]$	-0.037 (0.419)	1.333 (1.531)	-1.359 (2.027)
$ln[P_{M,t}]$	-0.059 (0.374)	-2.624 (2.752)	0.95 (2.286)
$ln[P_{R,t}]$	0.548* (0.318)	-0.295 (5.753)	-0.01 (0.847)
$ln[X_{k,t}]D_{2008}$	0.405*** (0.121)	-0.159 (0.275)	-0.156 (0.231)
$ln[P_{W,t}]D_{2008}$	0.823 (0.941)	0.563 (1.856)	0.389 (2.284)
$ln[P_{M,t}]D_{2008}$	-0.496 (0.867)	3.359 (2.834)	-0.025 (2.453)
$ln[P_{R,t}]D_{2008}$	-2.389*** (0.861)	-0.259 (6.169)	-0.345 (0.847)
β_0	-1.131 (2.183)	10.375 (26.175)	2.512 (7.265)
N	213	65	117
R^2	0.732	0.449	0.378
F	41.759	3.927	5.278

Legend: * p<0.1; ** p<0.05; *** p<0.01.

Table 11. Emergency Wheat, Maize and Rice Price Elasticities Prior to and After Untying

Wheat			Maize			Rice			D_{2008}
E_{ww}	E_{wm}	E_{wr}	E_{mm}	E_{mw}	E_{mr}	E_{rr}	E_{rw}	E_{rm}	
-0.037 (0.42)	-0.059 (0.374)	0.548 (0.318)	-2.624 (2.752)	1.333 (1.531)	-0.295 (5.753)	-0.010 (0.847)	-1.359 (2.027)	0.950 (2.286)	0
0.787 (0.845)	-0.555 (0.781)	-1.841** (0.812)	0.735 (0.678)	1.896* (1.051)	-0.554 (2.227)	-0.350 (0.272)	-0.970 1.000	0.925 (0.884)	1

Legend: * p<0.1; ** p<0.05; *** p<0.01.

The estimated elasticities are mostly insignificant. This suggests that donor agencies' may not have been responsive to changes in commodity prices when procuring wheat, maize and rice for emergency purposes.

After untying, the results show that emergency wheat tonnage decreased by 18.41% when rice price increased by 10%. This is counterintuitive and suggests that that there was no substitution of emergency rice for emergency wheat and that the two are complements. This result is consistent with the results from the aggregated model. The results also show that a 10% increase in wheat price led to an increase of 18.96% in metric tonnes of emergency maize. This result is intuitive and suggests that emergency wheat was substituted for emergency maize when wheat price increased.

4.4.2 Programme and Project (P&P) Aid

From Table 9, in the wheat equation, the estimated coefficients on the price terms are all insignificant, with the exception of rice price, which is significant at 10%. The estimated coefficients on the price-dummy interaction terms are negative and significant at 10% for wheat price, positive and significant at 5% for maize price, and negative and insignificant for rice price. The policy dummy estimate is positive and insignificant in all three models. In the maize model, estimated coefficients on own-price term and the own price-dummy interaction term are positive and negative, respectively, and are both significant at 10%. Estimated coefficients on all terms in the rice model are insignificant, with the exception of those on the basket size and basket size-dummy interaction terms.

The coefficient estimate of basket size in the wheat model is positive and significant at 1%, negative and significant at 10% in the rice model and positive and insignificant in the maize

model. The estimate of the basket size-dummy interaction term is positive and significant at 10% in the rice wheat model but negative and insignificant in the wheat and maize models.

Estimated price elasticities for each model are summarized in Table 10. Prior to untying, the rice cross-price elasticity in the wheat model is negative and significant at 10%, while the own-price and maize cross-price elasticities are negative and positive respectively, but insignificant. The maize own-price elasticity estimate is positive and significant at 10%, while the wheat and rice cross-price elasticities are negative and insignificant. All elasticity estimates in the rice model are insignificant prior to untying.

After untying, the rice cross-price elasticity in the wheat model is negative and significant at 5%, while the own-price and maize cross-price elasticities are negative and positive respectively, but insignificant. The own and cross-price elasticity estimates in the maize model are negative and positive respectively, but insignificant. In the rice model, the own-price elasticity estimate is negative and significant at 1%, while the wheat and maize cross-price elasticity estimates are positive and negative respectively, but insignificant.

Table 12. Summary of Results (P&P Aid)

Variable	WHEAT	MAIZE	RICE
D_{2008}	4.216 (6.312)	61.420 (90.933)	78.472 (55.399)
$ln[X_{k,t}]$	0.950*** (0.046)	2.093 (2.103)	-1.003* (0.538)
$ln[P_{W,t}]$	-0.112 (0.453)	-1.757 (3.648)	20.684 (14.765)
$ln[P_{M,t}]$	0.107 (0.422)	13.666* (7.328)	-6.101 (5.800)
$ln[P_{R,t}]$	-0.592* (0.315)	-2.342 (10.411)	-1.852 (4.434)
$ln[X_{k,t}]D_{2008}$	-0.034 (0.179)	-1.718 (2.114)	1.059* (0.574)
$ln[P_{W,t}]D_{2008}$	-1.963* (1.021)	1.992 (3.676)	-19.556 (14.758)
$ln[P_{M,t}]D_{2008}$	2.497** (0.983)	-14.112* (7.339)	5.71 (5.900)
$ln[P_{R,t}]D_{2008}$	-1.106 (0.869)	2.574 (10.462)	-0.491 (4.444)
β_0	3.149 (2.490)	-58.404 (90.257)	-62.505 (55.206)
N	148	60	67
R^2	0.823	0.289	0.307
F	52.236	1.991	2.212

Legend: * p<0.1; ** p<0.05; *** p<0.01.

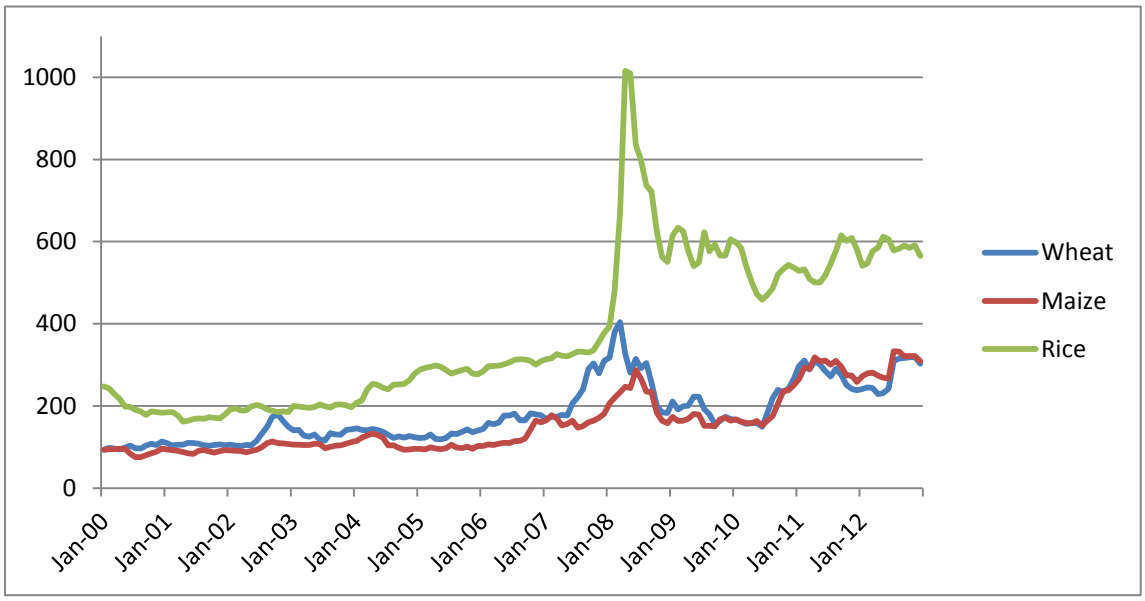
Table 13. P&P Wheat, Maize and Rice Price Elasticities Prior to and After Untying

Wheat			Maize			Rice			D_{2008}
E_{ww}	E_{wm}	E_{wr}	E_{mm}	E_{mw}	E_{mr}	E_{rr}	E_{rw}	E_{rm}	
-0.112 (0.453)	0.107 (0.422)	-0.592* (0.315)	13.666* 7.328	-1.757 (3.648)	-2.342 (10.411)	-1.852 (4.434)	20.684 (14.765)	-6.101 (5.800)	0
-2.075 (0.912)	2.604 (0.884)	-1.699** (0.826)	-0.446 (0.510)	0.235 0.791	0.232 (1.096)	-2.343*** (0.626)	1.127 (1.416)	-0.3911 (0.890)	1

Legend: * p<0.1; ** p<0.05; *** p<0.01.

The results show that prior to untying, a 10% increase in rice price caused a 5.92% decrease in metric tonnes of P&P wheat. This is counterintuitive but consistent with the results from the aggregated model. The results also show that a 10% increase in the maize price caused a 136.66% increase in metric tonnes of P&P maize prior to untying. This suggests that donor agencies did not substitute away from P&P maize when maize price increased. This is counterintuitive; it is expected to be insignificant because some tying restrictions still existed and so maize price would have no effect on donor agencies' decision to procure P&P maize. However, maize prices have remained relatively lower than wheat and rice prices (Figure 13) over the years. Increases in maize price have generally been smaller than those of wheat and rice prices, making maize relatively cheaper than the other two commodities. Considering this, coupled with the reduction in procurement restrictions brought about by the partial untying of Canadian food aid in 2005, it is possible that donor agencies may have still procured P&P maize even when its price increased.

Figure 13. Wheat, Maize and Rice Prices (US$/MT) from January 2000 to December 2012



Source: International Monetary Fund eLibrary Data (undated).

After untying, the results show that a 10% increase in rice price led to a 16.99% decrease in metric tonnes of P&P wheat. This is counterintuitive and suggests that donor agencies did not substitute P&P rice for P&P wheat when rice price increased. This result is however consistent with the results from the aggregated wheat model.

The results also show that a 10% increase in rice price led to a 23.43% decrease in metric tonnes of P&P rice. This is intuitive and suggests that donor agencies may have substituted away from P&P rice when rice price increased.

The results from both the aggregated and disaggregated models are mainly counterintuitive and difficult to explain. It is likely that a number of model and data limitations may have affected the results. These limitations are outlined in the next section.

4.5 Study Limitations

The first major limitation is the aggregation of individual recipient country shipments into regional shipments, and the aggregation of the origin countries into regions to enable the use of regional commodity prices in place of country-specific origin prices (which were unavailable for most origin countries). These aggregations may have obscured country-level price variability that may have been picked up in the model had country-specific origin prices been used. This means that the variability in prices between recipient countries cannot be observed in the parameter estimates.

Another major limitation of this study has to do with the model specification used. This study employs a regional fixed effects model to determine the price effects caused by the untying of Canadian food aid in 2008. It is likely that there may still be unobserved effects in the model despite the inclusion of the dummy variable to account for regional tastes and preferences. Also, the model used in this study is *ad hoc* and not based on economic theory. Consequently, it is

possible that the model does not adequately depict donor agencies' behaviour with respect to commodity procurement. In addition, this model assumes that all countries in the same region are homogeneous, that is, they have the same tastes and preferences. In the case where countries in a particular region have different tastes, this assumption may result in incorrect or biased estimates.

The third limitation has to do with the data. As previously mentioned, Canadian food aid was first partially untied in 2005 and then fully untied in 2008. Ideally, the model must account for both stages. However, there are too few observations of maize and rice shipments in the years prior to partial untying to allow for the inclusion of a dummy variable in the model to account for the partial untying policy. It is likely that the partial untying policy may have had a separate effect on donor agencies' decisions to procure wheat, maize or rice for Canadian food aid, but this theory cannot be tested by the model because of this data limitation. In addition, the limited number of observations of maize and rice in the period prior to partial untying makes drawing definite, realistic conclusions from the parameter estimates, particularly those in the period prior to complete untying in 2008.

Another data limitation involves the types of commodities considered in this study. The model only considers three cereal commodities (wheat, maize and rice). In reality, cereal food aid baskets are composed of several different cereals, many of which are less popular, like sorghum and millet. Ideally, these should have been accounted for in the model in order to give a more accurate picture. However, price data for many of these cereals are not available for many of the origin countries. Their exclusion from the model does not affect the parameter estimates mainly because they do not account for majority of cereal food aid. It however means that substitution effects cannot be estimated for these cereals. Also, the model only considers quantities of wheat,

maize, and rice in their unprocessed forms (whole grains) and excludes cereal flours and other processed forms of the three commodities. This implies that the parameter estimated do not capture the full picture of substitution effects for the three commodities.

Another limitation of this study is the fact that it only considers food aid data from the years 2000 to 2012, even though there is data available on food aid shipments in the years prior to 2000, as far back as 1988. Ideally, the model should consider all the data for these years in order to have an accurate/more realistic picture of Canadian food aid over time. However, due to the unavailability of complete price data for food aid commodities in the years prior to 2000, this time period is not considered in the model.

Given the econometric model used (regional fixed effects), the dataset and the OLS estimation procedure, the results from the study indicate that there is no statistical evidence that untying Canadian food aid in 2008 made donor agencies more sensitive to price changes of wheat, maize or rice when procuring these commodities for food aid purposes.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Summary and Conclusion

This study aims to determine whether the untying of Canadian food aid in 2008 affected the price sensitivity of commodity procurement decisions. The ability of donor agencies to respond to changes in commodity prices by substituting between food aid commodities could allow more food per dollar to be provided and thus reach more beneficiaries. However, food aid commodity procurement decisions may exhibit small price responses for two probable reasons: the first being donor efforts to provide culturally appropriate food to recipients, regardless of price and the second being tied aid policies that require specific commodities to be procured in donor countries Cardwell (2012). This study focuses on the second reason and aims to identify the effects of untying Canadian food aid commodity procurement on the price sensitivity of donor agencies' commodity procurement decisions.

This study estimates substitution effects between wheat, maize and rice in Canadian cereal food aid baskets by applying a pooled empirical model to regional price data and data on Canadian government-funded food aid shipments to five recipient regions. Regional fixed effects are used to control for regional differences in tastes as well as any other unobserved region-specific time-invariant factors. A policy dummy variable is also used to account for the policy that completely untied Canadian food aid in 2008. This study also investigates the effects of untying Canadian food aid on the price sensitivity of donor agencies' decisions to procure different types of food aid. Thus, the model is disaggregated by emergency aid and P&P aid.

Both the aggregated and disaggregated equations produced mixed results. Many of the estimated elasticities are insignificant. The results from both analyses suggest that some substitution may have occurred. Donor agencies may have substituted away from rice when rice price increased and substituted maize for rice when maize price increased. They may also have substituted emergency wheat for emergency maize and substituted away from P&P rice when rice price increased. The results also suggest that, on the whole, donor's decisions to procure wheat, maize and rice for emergency purposes are not significantly affected by price changes of the three commodities.

Despite this, both analyses produced significant elasticity estimates that are mainly counterintuitive. For example, the results from the aggregated model show that the donor agencies' did not substitute between wheat and rice (both prior to and after complete untying) when their respective prices increased, suggesting that the two commodities are complements. These results are also replicated in the disaggregated model; there was no substitution of emergency rice for emergency wheat after untying and no substitution of P&P rice for P&P wheat prior to and after untying.

These mainly counterintuitive results may as a result of some limitations of the model and the data. These include the aggregation of individual recipient country shipments into regional shipments, the use of regional fixed effects, the use of regional commodity prices in place of country-specific origin prices, and the inability to account for the partial untying of Canadian food aid in 2005.

Given the multiple data issues, model limitations and the mainly counterintuitive results of the model, this study does not provide empirical evidence of cereal commodity substitution after the

untying of Canadian food aid in 2008. Despite this, there is still reason to believe that donor agencies indeed substitute between cereal commodities, especially after the untying of Canadian food aid in 2008. Further research is however needed to generate empirical evidence for this.

5.2 Recommendations for Future Research

As previously mentioned, the nature of food assistance has changed, particularly within the last two decades. There has been a major shift from the physical transfers of food commodities as aid to cash-based food assistance. One may argue that the research question addressed in this study is no longer relevant given this shift. However, this question still has some relevance given that the US, which is the largest global donor of food aid, still gives tied in-kind aid. It can contribute to the discourse on the very broad and complex subject that is food aid.

In view of this, future research may consider using a different model specification as well as country-specific commodity prices as proxies for commodity procurement prices so as to avoid aggregation and the complications that accompany it. Future research may also consider a wider cereal basket which includes commodities like cereal flours and lesser known cereals like sorghum and millet. In addition, future research may consider analysing substitution effects for pulse commodities like lentils, beans and peas. This is because the extent of substitutability for pulses is likely to differ from that of cereals probably because of donors' willingness to modify the pulse component of food aid baskets since commodities within this group have similar preparation methods and are likely non-staple foods of recipients (Cardwell, 2012).

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APPENDIX A

Table 14. Recipient Country Aggregations

Africa	Asia & Pacific	Eastern Europe	Latin America & Caribbean
Algeria	Bangladesh	Albania	Bolivia
Angola	Cambodia	Armenia	Colombia
Benin	China	Georgia	Cuba
Burkina Faso	East Timor	Russia	Ecuador
Burundi	India	Serbia & Montenegro	El Salvador
Cameroon	Indonesia		Guatemala
Central African Republic	North Korea		Haiti
Chad	Laos		Honduras
Republic of Congo	Myanmar	**Middle East**	Nicaragua
Cote d'Ivoire	Nepal	Afghanistan	Peru
Djibouti	Philippines	Azerbaijan	
Egypt	Sri Lanka	Gaza/West Bank	
Eritrea	Thailand	Iran	
Ethiopia		Iraq	
Gambia		Jordan	
Ghana		Palestinian Territories	
Guinea		Pakistan	
Guinea-Bissau		Syria	
Kenya		Tajikistan	
Lesotho		Yemen	
Liberia			
Libya			
Madagascar			
Malawi			
Mali			
Mauritania			
Morocco			
Mozambique			
Niger			
Rwanda			
Senegal			
Sierra Leone			
Somalia			
Sudan			
Swaziland			
Tanzania			
Uganda			
Zambia			
Zimbabwe			