IMPLEMENTATION OF TARIFF RATE QUOTAS IN THE PHILIPPINES

by

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B.S., University of the Philippines at Los Baños, Philippines, 1984
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Abstract

Tariff rate quotas (TRQs) are one of the most widely used trade policy instruments in agricultural trade. The issue of whether TRQs are efficient trade policy instruments for improving market access has been widely debated. Some believe that TRQs impose an extra barrier to trade, circumvent the reforms sought under the General Agreement on Tariffs and Trade (GATT) and World Trade Organization (WTO) and may not be as attractive as initially envisioned. Others believe that the TRQs are useful and facilitate trade and liberalization. Any expansion in quota, or decrease in tariffs, or combinations of the two, has the potential to liberalize trade in a specific industry. There is strong clamor for continued reforms in the conduct of agricultural trade – including the implementation of TRQs. The purpose of this study is to increase the understanding of TRQs, and determine the impact of their implementation on the Philippine corn market. Specifically, the study will estimate the quantities of supply, demand, imports, domestic equilibrium prices, and border prices under different TRQ liberalization regimes.

In this study, an existing TRQ model was utilized to determine how effective TRQs are as a trade policy instrument for trade liberalization and increasing market access. The results reveal that the Philippine corn market was restricted by the out-quota tariff. *De facto* liberalization of the TRQ at the level of the out-quota rate (50%) or even at 35% (in-quota rate), does not completely liberalize the corn market. Progressively reducing both tariffs liberalizes the market and leads to increases in surpluses. The lower tariffs, however, lead to less government revenues. The smaller the gap between the in-quota and out-quota, the smaller the quota rents become. Increasing the quotas has no significant impact in liberalizing the corn market, and the increase in imports decrease producer surplus in all cases.

The TRQ model of the Philippine corn sector reveals that changing the components of the TRQ would lead to different impacts on supply, demand, consumer, producer and net surplus, and government revenues. Knowledge of the regime in which the country is trading can determine which individual policy instrument of the TRQ, the in-quota and out-quota tariff and the quota, should be used to increase market access or address the concerns of stakeholders in the

corn sector. It is thus important for policy makers to find a workable tariff level that would serve the interest of all stakeholders in the sector.

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Dedication

This paper is dedicated to my family – Connie, Carlos and Charles.

CHAPTER 1 - Introduction

Tariff rate quotas (TRQs) are one of the most widely used trade policy instruments in agricultural trade. They are used in 45 World Trade Organization (WTO) member countries and implemented in well over 1,400 individual tariff lines (WTO, 2006a). TRQs were institutionalized in the Uruguay Round Agreement on Agriculture (URAA) as a trade instrument to provide market access for sensitive commodities. One overriding reason for this was that World Trade Organization (WTO) member countries were worried that the tariffication exercise, i.e., the conversion of non-tariff barriers (NTBs) into their tariff equivalents, would lead to extremely high tariffs and defeat its intended purpose of maintaining or improving market access (Abbott and Morse, 2001 and 2004; Mönnich, 2003a; Moschini).

Skully (1999a and 1999b) describes a tariff rate quota (TRQ) as a two-tiered tariff system. There are three main components of a TRQ: 1) the lower first-tier tariff or the in-quota tariff; 2) the higher second-tier tariff or the out-of-quota tariff; and 3) the quota that sets the limit up to which quantity the lower in-quota tariff is applied. During a given period, the lower in-quota tariff is applied to imports up to the last unit of the quota and then the higher out-of-quota tariff is applied to all subsequent imports. A fourth component – TRQ administration, is concerned with how the quotas are allocated and who gets the economic rents (Meilke, *et al.*, 2001). More detailed discussions on the workings of the TRQ are available from Rae; Abbott; de Gorter and Sheldon, Mönnich (2003b), Skully (1999a and 2001a), and the World Trade Organization Secretariat (WTO, 2002a and 2002b).

The issue of whether TRQs are efficient trade policy instruments for improving market access has been discussed at length by many authors. The widely-held opinion is that the administration of tariff rate quotas imposes an extra barrier to trade (de Gorter and Sheldon; Mönnich, 2003b). High transaction and administrative costs prevent the actual liberalization of agricultural markets and carry on the practice of rent seeking in trade (Abbott and Paarlberg). They further argued that the use of TRQs circumvented the reforms sought under the General Agreement on Tariffs and Trade (GATT) and the conversion of NTBs into TRQs during the Uruguay Round may not be as attractive as initially envisioned. Tariffication is the process of converting non-tariff barriers (NTBs) such as quotas, absolute bans, and prohibitions into their

bound tariff equivalents. Bound tariffs essentially meant that once these tariffs are set, they cannot be raised, and are subject to reductions over time as agreed to in the URAA. The unintended effect of tariffication was that nations were allowed to effectively re-impose a quota if it maintains a very high out-of-quota tariff. Transparency was not improved and quota rents may remain.

However, some authors (Tsigas and Ingco; Pearce and Sharma; Bureau and Tangermann; Matthews and Dupraz; and Barichello), believe that the tariffication package included something more than simply converting the quotas into tariffs. The tariffication process ensured that the quantities that were imported before the UR agreement took effect could continue to be imported and guaranteed that quantities that were considered 'new access' were charged non-prohibitive tariff rates. As tariff rate quotas are continuously applied, any expansion in quota, a decrease in out-of-quota tariffs, or the combination of the two, has the potential to liberalize trade in a specific industry.

With agricultural trade firmly in place within the multilateral trading system, many WTO-member countries demanded continued reforms in the conduct of agricultural trade at the WTO Doha Round negotiations in 2001. Among the reform areas include the presently administered system of TRQs (WTO, 2004). Several years later, countless proposals, drafts, and deadlines have come and passed, but positions remained wide apart and there has been little consensus on the proposed drafts or on how to modify it (WTO, 2004).

The purpose of this study is to analyze the impact of potential changes in TRQ implementation and liberalization in the Philippines. The Philippines currently has 14 agricultural products under a TRQ system. This study will look specifically at the impact of TRQ implementation on the corn market. The ongoing discussion on the efficiency of TRQs as a means to enhance market access will serve as the backdrop. The general objectives for this research are to increase the understanding of tariff-rate quotas, determine the impact of tariff rate quota implementation on corn, an important food and feed ingredient in Philippine agriculture, and to estimate the dollar (and peso) value of the impacts. The analysis of the TRQ regime will be developed using a simple trade model for the Philippines under a small importing country assumption. The specific objectives of this study are to estimate the supply – demand situation, imports, domestic equilibrium prices, and border prices under different TRQ liberalization regimes. The per-unit quota rents will be computed, as well as consumer, producer, and net

surplus and total government revenue under the different TRQ regimes. The hypothesis is that the TRQ has an impact on the market and welfare for the corn sector. Several key issues that also need to be answered as a result of the implementation of TRQs in corn trade in the Philippines: (a) is the TRQ an appropriate transition mechanism to liberalize the corn market? (b) What is the dominant trade policy component in the present TRQ system? (c) To what magnitude is the TRQ liberalizing corn trade? (d) What are the effects of the TRQ on welfare?

Quite a number of papers have been written about tariff-rate quotas, with a majority of these qualitative, or descriptive, in nature. Some empirical studies on TRQs that provide evidence of the effects and costs of this trade policy instrument are made on large or aggregate economies on either very specific or on aggregated agricultural commodities. A brief discussion of these studies is in the review of literature section of this paper. The economic contribution of this study is that it presents the effects of TRQs on a small net-importing agricultural country such as the Philippines. The study by Abbott and Paarlberg was closely followed and their model serves as the basis for the model described in this study. Abbott and Paarlberg present one of the few empirical studies made on small developing countries. Their study offers specific quantitative results for a small net-importing agricultural country, and provides an application of the theory behind TRQ implementation.

This paper is made up of six chapters: (1) the introduction; (2) agricultural and trade policy in the Philippines; (3) review of literature; (4) the conceptual model; (5) results and discussion, and (6) the conclusion and recommendations.

CHAPTER 2 - Agricultural and Trade Policy in the Philippines

The Philippine economy and its agricultural sector have undergone many upheavals as well as reforms over the last four decades. The purpose of this chapter is to provide the readers with an idea of the importance and performance of the corn sector to the Philippine economy. The general trade policy and agricultural trade policy reforms, and the Philippines' TRQ implementation are also discussed at some length in the following sections.

Importance of the Corn Sector to the Philippine Economy

Corn, or maize, was chosen for this study because of its importance to the Philippine's agriculture and economy. Next to rice, corn is the second most important staple and feed crop in the Philippines. About a third of all farmers grow corn, and about a quarter of the population consumes corn as food. The corn sub-sector contributes about 7% to total agricultural gross value added (GVA). As a major feed ingredient, the corn sub-sector has strong linkages with the livestock and poultry sectors, both high growth areas for Philippine agriculture (de Dios). The Philippines has been self-sufficient in white corn for food but not in yellow corn for use as feed. Some 60% of total corn production is used as feed for the livestock and poultry industry.

Production of corn has been increasing overall over the period 1995 – 2005 at an annual growth rate of close to 2.4% per year. There are, however, years where declines have been noted, particularly during the El Niño years of 1997 and 2002. Area planted, on the other hand, has been declining by an average of 1% per year as farmers move in and out of corn production, depending on the levels of profitability among crops (e.g. between corn, sugarcane, tobacco and root crops). Marked improvements in yields have been noted with growth rates at over 3% per year over the last ten years (Table 2.1).

The demand for corn has been increasing largely due to population growth and increased demand for feed from the livestock and poultry sectors. About 60% of total corn supply (production and imports) goes into feeds, some 23% goes directly into food and another 12% goes into industrial/food processing (Table 2.2). Per capita consumption of corn over the period 1995 – 2005 has hovered close to 15 kilograms per year, down from over 17 kilograms per year in the period 1985 – 1994. Imports, on average, have accounted for about 5% of total supply, but

there have been record years when imports account for as high as 8% to 10% in years when production was down.

Government intervention has also been substantial in the corn sub-sector. Most of the policies up to the early 1990s have consisted mostly of: (a) trade measures – import licensing and a 20% import tariff; (b) grains stabilization program through regulations on entry and domestic operations; and (c) corn and livestock production programs (de Dios). The National Food Authority (NFA), directly intervenes in the domestic grains market to stabilize supply and demand for rice and corn. The NFA undertakes this through its mandate of buying paddy (or unhusked) rice and corn when the domestic price was lower than a support price in order to help farmers recover their production costs (WTO, 2002a).

The Philippines historically banned the imports of corn to protect producers from outlying islands which face huge cost disadvantages in inter-island shipping (Gonzales and Perez). Before the mid-1980s the NFA was the sole importer of corn and after some policy changes in the NFA's operations, any entity with an import permit was allowed to import. In 1994, prior to the Philippines ratification of the GATT Agreement, this licensing function was given to the Philippine Department of Agriculture. When the Philippines ratified the GATT agreement in 1994 to become part of the WTO, it laid down the framework for implementing its commitments to the world body by the following year. The implementation of TRQs starting in 1995 has allowed imports to enter at levels comparable to those from earlier periods. The NFA also participates as an importer of corn to shore up its buffer stock and to cater to the needs of small livestock and poultry producers. Abbott and Morse (2004) noted that this is an example in which the TRQ instrument permits a country to pursue a post-Uruguay Round regime similar to earlier regimes while also allowing some rise in imports.

Philippine Trade Policy and Agricultural Trade Reforms

The Philippines, like many other developing countries, pursued protectionist policies from the 1950s to the 1970s. Trade policy reforms began in the 1960s and continue up to this time. There have been several attempts at liberalizing trade in the 1960s and 1970s. However, it was only in the early 1980s that a serious effort at liberalization was initiated. A detailed discussion of these events can be found in Cororaton and Cuenca, Manasan and Querubin, and de Dios. The 1980's trade liberalization package included (a) a Tariff Reform Program (TRP)

that entailed compression of the tariff rate structure from a 0 – 100% range to a 10% – 50%
range from 1981 to 1985, and (b) an Import Liberalization Program (ILP) that was aimed at
lifting quantitative restrictions on imports. The ILP, however, was abandoned in 1983 due to a
balance-of-payment crisis coupled with economic instability and political unrest. It was resumed
in 1986 when the Aquino government assumed power where it achieved far more success (Hasan
and Chen).

In the 1990s, there were three major developments in the area of foreign trade in the
Philippines: (1) a series of unilateral trade reform programs of the government; (2) the ASEAN
Free Trade Area (AFTA); and (3) the GATT-UR/WTO in 1995 (Cororaton and Cuenca). The
following sections provide a short discussion of these developments.

Tariff Reform Program in the 1990s

Despite the strong overall trade liberalization efforts in the late 1980s, most major
importable agricultural commodities with any significant domestic production remain subjected
to quantitative trade restrictions (QRs), particularly those protected by laws passed by Congress
(David, 1997 and 2002). In 1991, the government enacted a second tariff reform program (TRP
II) whereby tariff rates would be further compressed to a 10% – 30% range. However, there were
a number of exceptions granted so that about 10 percent of commodity lines in 1995 were still
subject to tariff rates between 0-5% and 30% and 50%. In 1992, quantitative restrictions were
converted into tariff equivalents for a variety of agricultural and manufactured goods. In a
number of cases, the tariff rates on these liberalized goods were set fairly high, some by as much
as 100% of their pre-liberalization levels, albeit with a built-in 5-year phase-down of these tariff
rates. The process of tariffication also entailed some reversal in 1993 with the re-imposition of
quantitative restrictions through legislation on various items, mainly concentrated among
agricultural goods.[1] The result was that while only 164 commodities were subject to quantitative
restriction by the end of 1992, the number had increased to 257 by 1993 (Hasan and Chen,

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[1] Efforts to remove QRs were pre-empted by the passage of the Magna Cam of the Small Farmers (or
Republic Act 7607) in 1991 which provided, among other things, blanket authority for restricting agricultural
imports competing with domestic production. The implementing guidelines and list of covered commodities were
issued in 1993. RA 7607 also made the process of implementing quantitative trade restrictions more cumbersome by
requiring government consultations with farmers and other affected sectors.

Manasan and Querubin, Cororaton and Cuenca). Table 2.3 provides a summary of the tariff reform programs of the Philippines from 1981 – 2000.

Substantial reforms were implemented under the third tariff reform program (TRP III) in 1994 - 1997. Measures under the TRP included a reduction of tariff rates on a number of manufactured items including capital equipment and machinery, textiles, garments, and chemical inputs among others (Philippine Tariff Commission). There was also some reduction of tariffs on "non-sensitive" agricultural goods. In general, the TRP III focused on developing a four-tier tariff schedule: 3% or 10% for raw materials and capital equipment depending on whether these were available locally or not; 20% for intermediate goods; and 30% for finished goods. There was also a liberalization of all import restrictions as a result of the need to comply with WTO commitments; some products were however allowed to have tariff rates above the ceiling of 30%.

The fourth tariff reform program (TRP IV) was implemented from 1998 – 2000, with the objective of enhancing the country's global competitiveness. TRP IV basically provided for a more flexible 3%-5%-7%-10%-15%-20%-25%-30% structure replacing the 3%-10%-20%-30% tariff structure. The outcome was that average nominal tariff declined from 13% to 8% over that period (Philippine Tariff Commission).

ASEAN Free Trade Area

The Philippines is a founding member of the Association of Southeast Asian Nations (ASEAN), along with Brunei, Indonesia, Malaysia, Thailand and Singapore. The ASEAN Free Trade Area (AFTA) was initiated by the ASEAN at the Fourth ASEAN Leaders Summit held in Singapore in January 1992 (ASEAN Secretariat). The AFTA laid out a comprehensive program of regional tariff reduction, to be carried out in phases through the year 2008. However, this deadline was subsequently moved forward in 1994 to 2003 after the GATT-UR/WTO were ratified in order to maintain its relevance and importance. Over the course of the last several years, the program of tariff reductions was broadened and accelerated, and a host of "AFTA Plus" activities were initiated, including efforts to eliminate non-tariff barriers and quantitative restrictions, and harmonize customs nomenclature, valuation, and procedures, and develop common product certification standards. The ASEAN later on signed a series of framework agreements for the intra-regional liberalization of trade in services, and for regional IPR

cooperation. An industrial complementation scheme designed to encourage intra-regional investment was approved, and discussions were held on creating a free investment area within the region (ASEAN Secretariat).

The Common Effective Preferential Tariff or CEPT is the mechanism by which tariffs on goods traded within the ASEAN region that meet a 40% ASEAN content requirement, were reduced to 0-5% by the year 2002/2003 for the six original ASEAN member countries (2006 for Vietnam, 2008 for Laos and Myanmar, and 2010 for Cambodia). The tariff reductions move forward in two tracks – the "fast" and "normal" tracks. Tariffs on goods in the fast track were mostly reduced to the 0-5% range by 2000. Tariffs on goods in the normal track were reduced to this level by 2002, or 2003 for a small number of products. Currently, about 81% of ASEAN's tariff lines are covered by either the fast or normal track (ASEAN Secretariat).

ASEAN members have the option of excluding products from the CEPT in three cases: 1) temporary exclusions; 2) sensitive agricultural products; and 3) general exceptions. Products in the temporary exclusions list refer to commodities for which tariffs will ultimately be lowered to 0-5%, but which are being protected temporarily by a delay in tariff reductions. This is permissible under the AFTA agreement, and is spelled out under a Protocol Regarding the Implementation of the CEPT Scheme Temporary Exclusion List. For a small number of sensitive agricultural products whose integration into the CEPT scheme was extended, 2010 serves as a deadline. The CEPT scheme will cover nearly 98 percent of all tariff lines in ASEAN by the year 2003; by then, the only products not included in the CEPT Scheme will be those in the General Exceptions category and sensitive agricultural products.

The Philippine GATT-UR/WTO Commitments

The Philippines is a founding member of the WTO. In 1995, after its Senate ratified the Marrakesh Agreement Establishing the World Trade Organization. As a member of the WTO, the Philippines participate in the pursuit of several policy reform areas in agriculture. Among these are in increasing or enhancing market access, abolition of domestic support and export subsidies (WTO, 2002a, 2006b; David, 1997).

Specifically, the Philippines was committed to the following under market access: 1) Removal of Quantitative Restrictions (QRs) and conversion of QRs into their tariff equivalents – also known as tarrification; 2) Reduction of tariffs on agricultural products. As a developing

country, the Philippines committed to reduce average tariffs by 24% with a minimum 10% cut per tariff lines from 1995 to 2004; 3) Implement a tariff-rate quota (TRQ) system or on several agricultural products locally referred to as the Minimum Access Volume (MAV) system. A more detailed discussion of the Philippine TRQ is in the next section; 4) Tariff bindings – the Philippines agreed to bind almost all of her tariff lines in agriculture to specified rates at levels beyond which no further increases will be imposed; 5) Prohibition of additional non-tariff measures. The Philippines committed itself to the principle that no new non-tariff measures, such as import licensing, variable import levies, import quotas, and import bans may be imposed (WTO, 2002a, 2006b). The Philippines was also granted an exemption from the removal of quotas on rice imports in 1995 under Annex 5 of the WTO agreement. This exemption was to expire in mid 2005, but an extension was negotiated for a new deadline of 2012.

In the area of abolishing domestic support, the Philippines agreed to the reduction of production subsidies. For developing countries, this calls for a reduction of trade-distorting domestic subsidies by 13% from 1995 to 2004. The Philippines, however, falls under the "de minimis" principle of the agreement, which refers to the situation where no reductions are required because its level of domestic support is not more than 10%. The Philippines also agreed to a reduction of export subsidies. However, it does not provide such support to its exporters. The Philippines as a signatory to the WTO agreed to put in place as system for plant variety registration and protection under a patent or the '*sui generis*' system or both.[2]

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[2] This section is covered by the WTO Agreement on *Trade-Related Aspects of Intellectual Property Rights* (TRIPS). Under the TRIPS Agreement, member states are not obliged to provide for patent protection for plants and animals. However, they do have to implement some form of intellectual property protection for plant varieties (Seiler). Member states can either provide patent protection for plant varieties, or by implementing a *sui generis* system (a system of its own kind), or by any combination thereof. In general, developing countries can choose among the following policy options: a) To make provisions for the patent protection of plant varieties; b) To join the *International Union for the Protection of new Varieties of Plants* (UPOV) in either of both variants (UPOV 78 or 91); c) To provide for comparable *plant variety protection* (PVP) without formally joining the UPOV Convention; or d) To devise a *sui generis* system which is better designed to suit national interests and to take into account the protection demands of informal and local communities.

Current Directions of Philippine Agricultural Trade Policy

Intense reforms of the Philippines tariff structure were observed over the period 2000 – 2005. The original tariff schedule for 2001 – 2004 required a tariff band of 0 to 5%, with exemptions for some agricultural commodities by 2004. However, in 2002 the implementation of these proposed tariff rates was put on hold by the Philippine government because of fiscal concerns. By 2003, the government policy was to slow down the pace of tariff reform committed to the ASEAN Free Trade Area (AFTA) and World Trade Organization (WTO) to the minimum and the country was taking full advantage of all allowed windows of exception. The effort to decelerate the pace of reforms was very apparent from 2003 onwards. The simple average of the tariff rates started to rise from this period such that by 2005, the average tariff rate (7.5 per cent) is only about 0.5 percentage point lower than the overall average for 2000 (Rodriguez and Cabalu). The government also provided for higher tariffs on selected agricultural commodities.

TRQ Implementation in the Philippines

The Philippines is one of many developing countries with significant implementation of TRQs (Elbehri, et. al., 2004). By implementing the Uruguay Round results, the Philippines converted all quantitative restrictions on agricultural products, except on rice, into tariffs. The Philippines currently implements a system of TRQs or more commonly referred to as minimum access volumes (or MAV) for a number of agricultural products that include live animals (HS headings 01.01, 01.03-01.05) except live bovine animals (HS 01.020), pork (HS02.03), sheep or goat meat (HS02.04), poultry meat (HS02.07), potatoes (HS07.01), coffee (HS09.01), corn or maize (HS10.05), and sugar (HS17.01).[3] The size of the quotas for agricultural products covered under the TRQ mechanism is based on the Philippine's commitments made during the Uruguay Round. Table 2.4 provides a complete list of products, tariffs and quantities under tariff rate quotas for the Philippines as submitted to the WTO Secretariat. The Philippines invoked special

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[3] The HS or the Harmonized Commodity Description and Coding System (HS) of tariff nomenclature is an internationally standardized system of names and numbers for classifying traded products developed and maintained by the World Customs Organization (WCO). Almost 200 countries and economic or customs unions, representing about 98% of world trade, use the HS as a basis for customs tariffs and extension of preferences, collection of taxes and statistics, monitoring of controlled goods, trade negotiations (*i.e.*, in the WTO, regional free trade areas) and rules of origin, among others (WCO).

safeguard provisions for rice (HS10.06) under Annex 5 of the UR Agreement on Agriculture that delayed the lifting of quantitative restriction until a later date.[4] The National Food Authority (NFA), a state trading enterprise (STE), is tapped to manage imports of the staple. Until the end of 1997, the Philippines also maintained tariff quotas for live bovine animals and meat of bovine animals (HS 0201, 0202) (WTO, 2002a).

The Philippines is also one of a few countries that use lower in-quota tariff rates in addition to its MFN rates (Abbott and Morse, 2004). The system for administering tariff quotas still remains complex, and this may deter imports. A substantial number of tariff quotas are regularly unfilled (WTO, 2005b); more recently there have been no imports of live goats (HS 0104) and beef (HS 0201), and utilization for live poultry (HS 0105), pork (HS 0203), goat meat (HS 0204), poultry (HS 0207) has been less than three quarters. Fill rates for rice and sugar have been 100%, while that for corn have been high for most years. Abbott and Morse (2004) noted TRQ underfill is common for meat products although substantial volumes of out-of-quota imports exist. Except for goats, imports of most commodities under the TRQ system have increased. Table 2.5 presents the TRQ fill rate of products for the Philippines from 1995 – 2003.

When the Philippines first informed the WTO about its TRQ implementation, it reported that it was going to use direct licensing and state trading enterprises (STEs) in the implementation of its commitments. A few months later, in a change of heart, policy makers revised the TRQ importation guidelines into a system using historical importers for most products. As a result, the Philippines has received a substantial amount of criticism for its use of producer groups to implement TRQs for certain commodities, as these groups have not always imported committed quantities. The Philippine government has continually updated procedures to ensure that the quotas are filled up. Abbott and Morse (2004) noted that it is apparent that the Philippines' objective in the implementation of its TRQ seeks to ensure that rents from TRQs accrue to domestic agents and that this is also why a country may find it difficult to ensure that both quotas are filled and rents accrue to domestic agents. However, they noted that as Philippine

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[4] The Special Treatment for rice technically expired last June 30, 2005. The Philippine government formally filed its Notification for the Extension of Special Treatment for Rice Under Annex 5 in 29 March 2004 through the Philippine's Permanent Mission in Geneva, Switzerland. However, approval on the Philippine's bid to extend the Special Treatment for rice is subject to negotiations. During the negotiations, other countries (Argentina, Australia, Canada, China, Egypt, India, Pakistan, Thailand, and the USA) requested for concessions in exchange for the Philippines' Request for Extension of the Special Treatment for Rice.

MFN tariff rates are reduced from base to bound levels and approach the lower in-quota tariff rate levels, the rents become less of an issue and growing demand in the Philippines would likely boost imports of these TRQ commodities.

The following paragraphs describe the TRQ procedure as it has evolved after the initial submission of the Philippines on its TRQ implementation to the WTO Secretariat. The detailed and official submissions of the Philippines on this matter with the WTO Secretariat were used as basis for this part of the report (WTO, 1995, 1996a 2002a)

The Philippine TRQ system or MAV system was first introduced in July 1996 covering the agricultural products committed by the Philippines during the Uruguay Round, and included catching-up provisions concerning Philippine tariff quota commitments for 1995. The current rules and regulations for the administration of the MAV are contained in Department of Agriculture Administrative Order (A.O.) 8 of 1997 as amended by A.O. 1 of 1998. An MAV Management Committee (MMC), chaired by the Secretary of Agriculture, implements the MAV system and issues MAV licences to importers. The MMC is advised by the MAV Advisory Council, composed of private sector representatives appointed by the MMC.

Application procedures and eligibility for quota licences differ between the first year of implementation of the MAV system and subsequent years. In the first year of implementation for each MAV applicable product, the product was defined and classified as either Type 'A' or Type 'B' depending on the imported amount in the three years immediately preceding the first year of implementation. Type 'A' products are those considered to have been imported regularly and in substantial volumes; Type 'B' products are those irregularly or scarcely imported during the period. Frozen meat of bovine animals, corn (maize), rice, and cane or beet sugar and chemically pure sucrose were defined as regularly imported products; all other MAV products were defined as irregularly imported (Section I.E.1.a of the A.O. 8.).

Allocation of licences for regularly imported products is based on the import shares of applicants and for irregularly imported products allocation is based on the local output share of applicants. Potential importers eligible for MAV licences for a Type 'A' product are those that have imported the product during the representative period. Those entities eligible for MAV licences for a Type 'B' product are users or sellers of the product during the period. Subsequent entrants are accepted on the basis of past imports.

For subsequent years, the allocations from the previous year are carried over, in addition to incremental volumes arising from annual quota increases, recalls, and cancellations, through a systematic distribution procedure (SDP). A typical tariff-rate quota year runs from February to January of the following year. Tariff quotas are allocated twice during the quota year – in February and again in July; this is an effort by the Philippine government to increase the likelihood of filling up the quota. In February, the incremental quota for the quota year, the allocation of the prior quota year, which has been recalled, and any portion of the quota not taken up during the prior quota year are put together in a Beginning Year Pool (BYP), and these are apportioned to license holders and new entrants. In July, the allocations surrendered or relinquished by licensees by end-May are put together in a Mid-Year Pool (MYP), and these are reallocated to other qualified applicants. The BYP and MYP are allocated as follows: (a) priority access is given to licensees who have not surrendered any of their previous year quota, and have utilized at least 80% of their allocation (for BYP) and 30% by the last working day of May (for MYP), and qualified entrants; and (b) any volume remaining in the BYP and MYP is distributed to interested applicants on a first-come-first-served-basis.

If the incremental volumes are less than the sum of all the volume requests made by licensees qualified to apply for the incremental volumes, the incremental volumes are allocated first to the MAV eligible applicants[5] and that they have imported the minimum import volume, defined in the Annex II of A.O. 8, for the product at any time during the immediately preceding twelve months. If the incremental volumes exceed the sum of the requested volume, the remaining quota is allocated on a first-come-first-served basis to other legal entities that have neither operated a business involving a MAV product nor imported the minimum volume of the product.

The rules of the Philippine MAV system articulated that the MAV Management Committee may permanently cancel a licence on the grounds of misrepresentation of vital information, submission of spurious or falsified documents, commission of technical smuggling or other act of deceit by the applicant. A licensee that decides not use its licence may voluntarily surrender the licence as provided in the A.O. 8. Licensees that surrender or underutilize quotas may be penalized; for example, licensees utilizing less than 80% of their net allocations, regular

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[5] MAV eligible applicants are any legal entities that have operated a business involving the product concerned as of the start of the prior year.

and additional allocations minus surrendered volumes accepted, may have part of such allocations recalled for purposes of determining allocations in the following year (details of penalties are found in Section I.H of A.O. 8).

The list of licensees and their corresponding allocations must be published in two local newspapers of national circulation. The time allowed for submitting applications for licences is usually up to the end of the authorized period. The authorities estimate that an application for a licence, if complete in all respects can normally be granted within two weeks.

Table 2.1. Philippines: Corn Production, Area Planted and Yield, 1985 – 2005.

Year	Production (000 MT)	Area Planted (000 Ha)	Yield (MT/Ha)
1985	3,862.8	3,510.9	1.10
1986	4,090.7	3,595.0	1.14
1987	4,278.1	3,682.6	1.16
1988	4,428.0	3,745.1	1.18
1989	4,522.2	3,689.2	1.23
1990	4,853.9	3,819.6	1.27
1991	4,655.0	3,589.5	1.30
1992	4,618.9	3,331.4	1.39
1993	4,798.0	3,149.3	1.52
1994	4,519.2	3,005.8	1.50
1995	4,128.5	2,692.3	1.53
1996	4,151.3	2,735.7	1.52
1997	4,332.4	2,725.9	1.59
1998	3,823.2	2,354.2	1.62
1999	4,584.6	2,642.2	1.74
2000	4,511.1	2,510.3	1.80
2001	4,525.0	2,486.6	1.82
2002	4,319.0	2,395.5	1.80
2003	4,616.0	2,409.8	1.92
2004	5,413.0	2,527.1	2.14
2005	5,253.0	2,441.8	2.15
Growth Rates 1985 – 1994 (in %)	1.76	-1.71	3.50
Growth Rates 1995 – 2000 (in %)	1.79	-1.39	3.30
Growth Rates 1995 – 2005 (in %)	2.44	-0.97	3.47

Source: Bureau of Agricultural Statistics, Philippines.

Table 2.2. Philippines – Corn supply and utilization, 1995 – 2005.

Year	Beg. Stocks	Pro- duction	Imports	Gross Supply	Exports	Seeds	Feeds/ Waste	Pro- cessing	Food Use	Ending Stocks
1985	182.00	3863.00	281.00	4326.00	0.27	70.00	2631.00	194.00	999.73	431.00
1986	431.00	4091.00	0.20	4522.20	0.14	72.00	3036.00	205.00	968.06	241.00
1987	241.00	4278.00	56.00	4575.00	0.24	74.00	3039.00	214.00	1017.76	230.00
1988	230.00	4428.00	25.00	4683.00	0.07	75.00	3067.00	221.00	1026.93	293.00
1989	293.00	4522.00	173.00	4988.00	0.08	74.00	3195.00	231.00	1349.92	138.00
1990	138.00	4854.00	345.50	5337.50	0.09	76.00	3434.00	244.00	981.61	601.80
1991	601.80	4655.00	0.32	5256.82	20.70	71.79	3365.00	247.12	1090.49	461.72
1992	461.72	4618.00	0.62	5080.34	0.04	66.63	3002.25	616.00	1161.59	233.83
1993	233.83	4797.90	0.65	5033.65	0.02	62.99	3118.70	640.04	1004.31	207.59
1994	207.59	4519.30	0.89	4727.89	0.04	60.12	2937.55	602.87	910.01	217.30
1995	217.30	4128.52	208.02	4553.84	0.07	53.85	2683.54	550.74	1076.15	189.49
1996	189.49	4151.30	405.44	4746.23	0.02	55.48	2698.35	553.78	1180.08	258.52
1997	258.52	4332.42	307.59	4898.53	0.02	54.52	2816.07	577.94	1130.95	319.03
1998	319.03	3823.18	462.12	4604.33	0.17	47.08	2485.07	510.01	1079.77	482.23
1999	482.23	4584.59	149.46	5216.28	0.08	52.84	2978.98	611.58	1334.66	238.14
2000	238.14	4511.10	446.43	5195.67	0.25	50.21	2932.22	601.78	1421.00	190.21
2001	190.21	4525.00	172.00	4887.21	0.04	50.00	2941.00	604.00	1115.00	177.17
2002	177.17	4319.00	278.00	4774.17	0.07	48.00	2807.00	576.00	1107.00	236.10
2003	236.10	4616.00	100.00	4952.10	0.09	48.00	3000.00	616.00	1077.00	211.01
2004	211.01	5413.39	23.00	5647.40	0.17	51.00	3518.00	722.00	1165.00	191.24
2005	191.24	5253.15	71.00	5515.39	0.12	49.00	3414.00	701.00	1147.00	204.26

Source: Bureau of Agricultural Statistics, Philippines.

Table 2.3. Philippine Tariff Reform Programs, 1981 – 2000.

TRP-I	Period: 1981-1985 Objective: Export promotion Action: Tariff band narrowed from 10%-100% to 10%-50%; Outcome: Average nominal tariff fell from 42% in 1981 to 28% at the end of TRP-I; Reduction and evening out of effective protection rates (EPRs) with primary and agricultural industries receiving a low EPR of 3% and manufacturing industries declining from 66% to 36%.
TRP-II	Period: 1991-1995 Objective: Global competitiveness Action: Final tariff rates cluster around four levels – 3% (for raw materials and capital equipment not locally available), 10% (for raw materials and capital equipment locally available), 20% (for intermediate goods), 30% (for finished goods); Outcome: Average nominal tariff fell from 28% to 20%; Average EPR level fell from 25% to 19%
TRP-III	Period: 1994-1997 Objective: Global competitiveness Action: Continued with the basic 3%-10%-20%-30% tariff structure with more than 95% of total tariff lines dutiable at any of these four tariff levels; Outcome: Average nominal tariff declined from 20% to 13%
TRP-IV	Period: 1998-2000 Objective: Global competitiveness Action: Provided for a more flexible 3%-5%-7%-10%-15%-20%-25%-30% structure replacing the 3%-10%-20%-30% structure; Outcome: Average nominal tariff declined from 13% to 8%

Source: Philippine Tariff Commission.

Table 2.4. Philippine schedule of tariff-rate quotas.

Products (Units)	Tariff Item Numbers	Initial Quota		Final Quota		Implementation Period	Other Terms and Conditions
		Quantity	Tariff Rate (%)	Quantity	Tariff Rate (%)		
Horses (Heads)	0101	57.00	30	57.00	40		
Cattle (000 Heads)	0102	12.20	30	20.34	40		
Live Swine (Heads)	0103	2,570.00	30	2,570.00	40		
Live Goats (000 Heads)	0104	49.37	30	82.29	40		
Live Poultry (000 Heads)	0105	5,708.12	40	9,513.54	40		
Beef (000MT)	0201	4.00	30	5.57	30		
Pork (000MT)	0203	32.50	30	54.21	30		
Goat Meat (000MT)	0204	0.67	30	1.12	40		
Poultry Meat (000MT)	0207	14.09	50	23.49	40		
Potatoes (MT)	0701	930.00	50	1,550.00	40		
Coffee (MT)	0901	5.90	50	5.90	40		
Corn or Maize (000MT)	1005	130.16	35	216.94	35		
Rice (000MT)	1006	59.73	50	119.46	50	1995-1999	NFA*
Rice (000MT)	1006	119.46	50	238.94	50	2000-2004	NFA*
Sugar (000MT)	1701	38.43	50	64.05	50	1995-2004	

*The National Food Authority (NFA) has the first right to import these TRQs in accordance with food security policies of the Philippines.
Source: Schedule LXXV, WTO (1994)

Table 2.5. Philippines TRQ Fill-rates (in Percent), 1995 – 2003.

Commodity	1995	1996	1997	1998	1999	2000	2001	2002	2003
Horses	100	100	100	11	100	100	93	100	100
Cattle	100	100	100	100	100	100	100	100	100
Live Swine	95	89	0	39	100	49	84	53	7
Live Goats	0	0	0	0	0	27	0	0	0
Live Poultry	36	29	0	14	25	23	28	30	20
Beef	1	52	9	100	100	0	0	33	0
Pork	3	8	21	16	44	45	19	18	19
Goat Meat	0	0	0	0	0	0	0	48	42
Poultry Meat	10	6	10	16	91	63	60	82	93
Potatoes	15	100	2	7	38	82	95	100	100
Coffee	100	21	100	100	100	100	100	100	100
Corn (Maize)	100	100	99	100	99	99	73	100	48
Rice	100	100	100	100	100	100	100	100	100
Sugar	100	100	100	100	100	100	100	100	100
Average	54	58	45	50	71	63	61	69	59

Source: WTO, 2005b.

CHAPTER 3 - Literature Review

This literature review is subdivided into four major sections. The first sub-section is a brief background on the WTO and TRQs. In this section, a brief history of how TRQs came about within the framework of the WTO is discussed. The second section dwells on the administration of TRQs. The third section focuses on TRQ implementation. The fourth section provides a discussion about TRQ liberalization.

A Brief Background on the WTO and TRQs

Before the Uruguay Round (UR) of the General Agreement on Tariffs and Trade (GATT), agriculture was for the most part exempted from most of the disciplines set forth in the trade agreement. The GATT rules were ineffective in providing discipline in the key aspects of agricultural trade (WTO, 2004). The original GATT agreement allowed countries to use a number of trade-restricting measures whose use were subject to some conditions (e.g. use of import quotas only when it was necessary to enforce measures to effectively limit domestic production), exceptions and specific-country derogations like grandfather clauses, waivers and protocols. Many of these non-tariff border restrictions were applied without merit and any apparent justification such that the result was a proliferation of impediments to agricultural trade (WTO, 2006b). Among these measures were import bans, minimum import quotas, variable import levies, and use of state trading enterprises (STEs).

In the negotiations leading up to the Uruguay Round, it became evident that there was a need to instigate reforms in the measures that affect world agricultural trade – market access, domestic support, export subsidies, and use of sanitary and phyto-sanitary regulations. The UR negotiations on agriculture were considered difficult because of its scope and political sensitivity (WTO, 2006b). In fact, it took the UR several years (1986-1994) to be completed as considerable time was required to reach compromises on the new rules and additional technical work was needed in order to establish modalities to formalize commitments in key policy areas.

When member countries ratified the GATT 1994 Agreement protocol in Marrakesh, they established the World Trade Organization, which came into being on January 1, 1995 (Bowen, Hollander and Viaene). The General Agreement on Tariffs and Trade 1994 protocol was

supplemented with several other agreements – agriculture, textiles and clothing, rules of origin, safeguards, and on such issues as trade in services, sanitary and plant health measures, trade-related aspects of intellectual property, and technical barriers to trade. It also established a new, more efficient and legally binding means of dispute resolution (WTO, 2006c).

The UR Agreement on Agriculture (URAA) set off a wave of reforms in major trade-related measures aimed at more liberalized agricultural trade that included among other things the lifting of import bans and the removal of quotas on agricultural imports under the so-called pillar of market access. The reforms under market access required that members convert their non-tariff measures to equivalent bound tariffs or "tariffication" plus reduction commitments on these bound tariffs. There are other reform measures covered by Market Access aside from "tariffication." It was agreed that tariffs on agricultural products were to be reduced by an average of 36 per cent in the case of developed countries and 24 per cent in the case of developing countries. Minimum reductions for each tariff line of 10 percent were also required. The reductions were to be undertaken over six years in the case of developed countries and over ten years in the case of developing countries. Least-developed countries were not required to reduce their tariffs (WTO, 2006c).

The URAA, however, did not require the conversion of the bans and quotas into tariffs overnight as the Agreement allowed these to be converted into tariff-rate quotas or TRQs (Skully, 2001a). Negotiators at the Uruguay Round essentially agreed to implement a 2-tier tariff-rate import quota or tariff-rate quota (TRQ) scheme as an interim transition tool to more liberalized agricultural trade, to increase market access, and at the same time provide protection to agricultural markets (Boughner and de Gorter; de Gorter; Li). Some authors were also of the opinion that the TRQs were institutionalized in the Uruguay Round (UR) as a compromise solution to the threat of closing some markets due to high most favored nation (MFN) tariffs resulting from the tariffication process (de Gorter and Sheldon; Matthews and Dupraz).

The tariffication process was based on 1986-1988 prices when world agricultural prices were low such that member countries had considerable discretion over the conversion of non-tariff barriers into their tariff equivalents (de Gorter and Sheldon). High levels of protection were perpetuated by "putting water in tariffs" and in so doing, only some tariff-rate quotas increased market access for imports compared to earlier levels (Mönnich, 2003a). Many of the TRQs that were instituted merely preserved pre-WTO agreement levels of protection (OECD). It was also

noted that requirements for the allocation of minimum access commitments were not specified in the Modalities Agreement of the GATT, and so the allocation and administration of TRQs has become a contentious issue (Meilke, *et al.*, 2001).

Some authors believe that the functioning of this trade instrument is not properly understood and that it requires a closer look at the available literature. A starting point is to look at the three major facets of TRQs: administration, implementation, and liberalization. The following sections provide some views on the topics and provides basis for moving forward in the paper.

TRQ Administration

There are a number of administrative methods for TRQs that are permitted by the WTO. Among these are applied tariffs, licenses on demand, first-come first-served, auctioning, historical importers, state trading, producer groups and other miscellaneous categories (WTO, 2002a and 2002b; de Gorter and Sheldon; Skully, 2001a).

In the *applied tariffs* regime, no quota shares are allocated to importers and unlimited imports are allowed into the importing country's territory at the in-quota tariff or lower. For *licenses on demand*, the importer's shares are generally allocated, or licenses issued, in relation to quantities demanded. This is often done prior to the start of the import period before the physical arrival of the imports. Licenses may, however, be issued on a first-come first-serve basis; and in cases where the quantities demanded are higher than the quota, the allocation is pro-rated based on the actual quota (Boughner; de Gorter and Sheldon; WTO, 2002a and 2002b). Under *first-come first-served*, no shares are allocated to importers. Imports coming in at the in-quota tariff rate are permitted up to the quota; then the higher out-quota tariff rate is applied. The physical arrival of the importation determines the order and application of the appropriate tariff rate. In *auctioning*, import shares are determined through competitive bids. *Historical importers* – here importers' shares are allocated in relation to past imports of the concerned product. Imports covered by *state trading* are allocated mainly to a state trading entity which imports or have direct control of imports undertaken by the importing WTO-member country. *Producer groups* import shares are allocated entirely or mainly to a producer group or association which imports the product concerned. Imports falling under the *other miscellaneous categories* do not fall in any of the aforementioned regimes.

The administrative method used by the importing country government determines to a large extent the level of transparency, efficiency and distribution of trade (Skully, 2001a; Mönnich, 2003a). There are three broad objectives of TRQ administration that are deemed important – 1) full utilization of the TRQ, meaning the aggregate TRQ should be fully allocated to willing importers and that these importers should fully use their allocation as well; 2) allocation of TRQs to the most efficient firms, this is to ensure that those importers receiving the quota are the most efficient producers in terms of net profit; and 3) an efficient TRQ operating system, one that is simple to operate, with clear rules for entry or participation, and one that minimizes uncertainty (de Gorter and Sheldon). Skully (1999a), on the other hand, elaborated on the rules governing TRQ administration in the GATT/WTO and argued that GATT Article XIII evaluates TRQ administration by two criteria: non-discrimination and quota fill. The above issues have been the subject reforms of the ongoing negotiations on market access and some of these would be discussed in the section on TRQ Liberalization.

Mönnich (2003a) used a censored regression technique to answer the question of which factors determine the fill rates of TRQs. Her results showed that the coefficients for qualitative variables for the principal methods of quota administration were significant and had sizeable partial effects. Therefore, in the European Union (EU), administration matters and affects TRQ fill rates. Although this result was not surprising, it did not follow theoretical expectations – for instance, historical allocations, while it tends to limit competition, and export certification were found not to cause quota under fill. Of all the administration methods employed by the EU, the poorest performance was turned in by licenses-on-demand. It was suggested that the resulting reduction of uncertainty and the ability to establish stable business relationships are dominant for overall effect.

Another interesting finding from Mönnich (2003a) was that the in-quota tariff and the wedge between domestic and import prices does not have a significant impact on TRQ fill rates while the out-quota and the quota limits do. It was noted that in the EU, TRQs are used primarily to supplement varying domestic supply, leading to varying import demand that faces an upward sloping supply curve. The analysis also shows the interaction of two areas where the WTO rules apply – *i.e.,* domestic support and market access.

Barichello looked at TRQ administration in Canada, where a total of 21 TRQs were administered for agricultural commodities. Most Canadian TRQs were allocated to private firms,

and its administration imposes minimal burden on importers. Canada allocates import quotas mostly on the basis of licenses granted to importing firms which have imported the products historically, while provisions are made for new entrants. Although allocating quotas to firms with historical market share may not be the most efficient method, Barichello noted that Canada has started to make progress towards transferability of quotas on a permanent basis, with quotas now being traded in many categories. Overall, Barichello took notice that Canada's TRQ regime has been successful in maintaining transparency, and minimizing costs to importers. Additional gains may be made through further simplification of quota administration, and trading or renting of quotas within a particular year in all product categories.

Li looked into agricultural TRQs and their impacts on market access for the period 1995 – 2000 covering 28 WTO member countries. The findings suggest that agricultural TRQs were underutilized by a significant margin and no significant improvement in market access over the study period was observed. The econometric results of the study showed that reducing the in-quota tariffs significantly improve market access, while the effect of reductions on the out-quota tariff were marginal. The results also showed that alternative administrative methods reduce market access in varying degrees. Such is the case when the applied tariffs method is used – this has the least negative impact on market access and it is determined primarily by the size of the tariff, the domestic demand, and the world price. This method generated the highest quota fill rate, emphasized the need for increased transparency in administration and implied that in order to increase market access in agriculture, TRQs should be converted to their tariff equivalents.

TRQ Implementation

In this section, some studies on how TRQs were implemented are presented. It should be noted that quite a number of papers were more of the qualitative nature that spans a myriad of agricultural products in a number of countries.

There are currently over 1,400 individual tariff-rate quotas that have been specified in the schedules of some 45 WTO member countries (WTO, 2006a). Although these individual TRQs account for only a small portion of total individual tariff lines, they play an important role in agricultural trade protection (Burfisher; Skully, 2001c; Gibson, *et. al.*, 2001).

Bureau and Tangermann examined how the European Union (EU) implemented its TRQ system on 87 agricultural products. They found that about 60 percent of the TRQs related to minimum access, while the remainder related to current access. The TRQ usually provides continued access on a bilateral basis for exporters who in the past have enjoyed preferential access to the EU. The authors noted that the EU chose to administer its TRQs in a way that neither discouraged imports nor improved economic efficiency. The most common methods of TRQ administration were licenses on demand, historical allocation, and first-come first-served basis. It was noted that fill rates have been quite high for most TRQs, and there was no evidence that the EU managed TRQs in such a way as to discourage market access. The TRQ system accounted for most of the increased access to the EU market after the URAA. Bureau and Tangermann concluded that in terms of further trade liberalization, increasing quota volumes in the EU would likely result in more gains than reductions in tariffs.

In the U.S. there are some 57 TRQs covering 7 product categories that have been notified to the WTO. These TRQs include beef (1), canesugar (1) and sugar containing products (11), tobacco (1), peanuts (2) and peanut butter (1), green olives (4) and satsumas in airtight containers, cotton (7), and dairy products (25). Skully (2001b) investigated the TRQs covering sugar, peanuts, and cotton, while Coleman and Boughner examined TRQs for dairy products. The TRQs for these products originated from quotas that were designed to maintain U.S. domestic price support programs. Most of these TRQs were allocated based on the basis of historical market share, and once allocated, were unlikely to be redistributed in accordance with changing comparative advantage. Coleman and Boughner noted that the U.S. dairy TRQ regime was highly effective in limiting imports of dairy products during the period of 1995 – 1999. In general, this was due to prohibitive out-of quota tariff rates, coupled with complicated and costly TRQ administration procedures that made it virtually impossible for 'new' trade to occur on either side of the market. The administration of U.S. dairy TRQs has proven to be extremely complicated, burdensome, and non-transparent.

Abbott and Morse (2001 and 2004) assessed the implementation of tariff rate quotas in 14 developing countries. Their assessment was based on their examination of GATT offers and required reports to WTO by those 14 developing countries. Those reports on implementation mechanisms and quota fulfillment were compared to trends in actual imports – revealing only a

few cases where this instrument acts like a binding quota and generates rents. Where institutions exist to allocate rents, they generally seek to distribute those rents to domestic agents.

GATT tariff bindings and applied tariffs were also compared in light of declared implementation mechanisms for TRQs. Abbott and Morse (2001 and 2004) observed that applied tariffs are often low, and in many cases most favored nation (MFN) applied tariffs were below commitments for in-quota tariffs. This evidence reveals that in many cases, the concept of dirty tariffication is relevant to understanding market outcomes, and that it is pursued for policy flexibility of governments and not for increased protection of their agricultural sectors. Dirty tariffication works in a number of ways – it could possibly moderate the effects of TRQs on trade liberalization when the 2nd tier tariff is redundant or it can be used on the tariffs of less sensitive commodities in meeting tariff reduction commitments. Boughner and de Gorter defined dirty tariffication as the "purposeful manipulation of domestic consumption calculations in setting the CA and MAC." The computation of current access or CA and minimum access or MAC is covered by the Modalities Agreement in the GATT-UR but there are some ambiguities in some areas such that countries were given wide latitude for implementation.

Trade data for the developing countries that report using TRQs suggest substantial liberalization of trade and in many instances acceleration of imports beyond historical trends were noted. However, the Abbott and Morse (2001 and 2004) cautioned that it would be a mistake to credit this expansion of trade solely on the TRQ mechanism since in most cases where imports were growing the TRQ was operating more like a pure tariff than a true TRQ. In other cases, government commitments to meet GATT obligations have led to increased imports.

Fill rates for market access commitments of developing countries were low in some cases, but not because complex institutions have emerged to maintain protection. Low demand elasticities for these commodities and high transportation costs to what may be unattractive markets means under-fill of the TRQ was more likely even when formerly closed trade regimes were substantially reformed. Overfill was as common as under-fill as well and reflects the extent of liberalization achieved.

Abbott and Morse (2001 and 2004) noted that serious problems can arise when developing countries face a TRQ system for their exports. Implementation mechanisms have the effect of limiting export potential, discouraging investment for export expansion, necessitating the expansion of state trading enterprises to negotiate with importing country agents, and

encouraging complex domestic agricultural policy to share rents among stakeholders and interest groups. It can also turn a country into an exporter of a commodity for which it has no comparative advantage when a preferential trade arrangement is in force.

The potential problems most often identified with TRQs – high transactions and administrative costs that prevent the actual liberalization of agricultural markets and the regime of rent seeking in trade policy – were expected to increase in the future unless the next Trade Round reforms (or better still eliminates) this market access instrument. Abbott and Morse (2001 and 2004) concluded that the reduction of MFN tariffs and the elimination of non-tariff barriers to trade would be a far more effective way to liberalize markets than through the expansion of minimum access commitments or reductions of in-quota tariffs for a few privileged exporters.

Choi and Sumner reviewed the implementation of TRQs in Korea and Japan and suggested that TRQs for all agricultural imports were established following the URAA, specifically on 67 tariff lines for Korea and 19 tariff lines in the case of Japan. Korea administers its TRQ through licenses on demand, first-come first-served, auctioning, and through STEs, while Japan uses both licenses and STEs. The state trading enterprises in these two countries have the highest fill rates. Choi and Sumner noted that access for some commodities, such as rice, were less open than would have been the case if quota amounts were made available on a commercial basis. As a result, they conclude that consumer benefits were reduced, and allocation across import suppliers has been affected.

TRQ Liberalization

Tariffs and import quotas have the effect of raising the domestic price of a product to the consumer and form a wedge between the domestic price and the world price. Tariffs generally raise revenues for the importing country's government while an import quota generates quota rents for the importer and/or the exporter (Grimwade). Countries apply tariffs primarily to protect domestic industries by imposing a cost on all products that cross a border, thus raising prices within the country that imposes the tariff. Higher prices in turn affect supplies as farmers respond by increasing output and this eventually affect demand as consumers buy less due to higher prices (Gibson, *et.al.*, 2001).

There are several combinations of tariffs and import quotas that can arise, and based upon their attributes, the policy instrument can be classified as either effective or redundant. A policy

instrument can be considered effective when it directly determines the level of the domestic and world prices and is redundant when the domestic market price is determined by one of the other two instruments. Only one policy instrument, the import quota or one of the two tariffs can be effective at a time, rendering the other two as redundant. TRQs have inherent characteristics of both quantitative restrictions (QRs) and tariffs, either one of which can prevail depending on the particular market setting (Herrmann, Kramb, and Mönnich). Tariff rate quotas, or TRQs, were intended to serve two purposes – first, to ensure that there is no deterioration of market access or that pre-existing market access opportunities are preserved and second, to create new, minimum market access (Abbott and Paarlberg; de Gorter and Sheldon; Hathaway).

Boughner looked into the implications of implementing the TRQ on the United States dairy industry. A trade policy model of the US dairy industry was developed in this study to analyze the economics of a TRQ scheme. The effects of the quota and each tariff line were isolated to show the implications of each policy instrument under different trade policy liberalization schemes. The empirical results of the study showed that reducing the second tier (or out-quota) tariff had a greater impact on increasing market access than increases in the quota levels.

Mielke, *et. al.,* (2001) and Abbott noted that the liberalization of a TRQ can involve changes in any combination of the three components: the amount of the quota, in-quota tariff and/or out-quota tariff. Any change in market access depends on which of the three elements is currently constraining imports and how much each is changed. Abbott noted that the only liberalization approach with any hope in achieving the long run goals of tariffication is the outright reduction of the MFN tariffs over time. Not only would the process determine the marginal suppliers, but the liberalization effects would be felt more widely in the economy and it has the potential to lead to more open markets in the long run.

Elbehri, *et. al.,* (2000) examined the consequences of liberalizing the sugar TRQ import regime using an applied general equilibrium model that explicitly accounted for the mechanisms of the TRQ. A striking feature of the model used was the bilateral treatment of the TRQs and the readjustment of the quota rents between importers and exporters. The latter feature is critical because in the sugar sector, many quota-holding exporters also benefit from preferential access to the US market and they capture the associated economic rents that result from the much higher domestic prices compared to domestic prices. They considered three sets of policy experiments –

1) US sugar TRQ liberalization only; 2) EU sugar liberalization only; and 3) multilateral sugar trade liberalization with or without the TRQ regime. The US TRQ sugar liberalization was analyzed for three cases: a) out-quota tariff reduction of one-third; b) TRQ quota expansion by one-third; and c) a combination of both. The same cases were also used for the EU TRQ sugar liberalization.

The results showed that reducing the US out-quota tariff by one-third would result in net welfare gain for the US, but a net income loss for exporting countries because of the erosion of quota rents become larger than the gains from expanded exports. The analysis showed that in the case of sugar TRQs, the welfare implications of partial trade liberalization are determined by the interplay of economic rents and the changes in the volume of trade. If the US expands its quotas by one-third, net welfare gains would be realized by the quota-holding exporters while the US shows a net income loss from reduced tariff revenues. The results of the combined reduction in out-quota tariffs and quota expansion resulted in welfare gains for both the US and exporting countries. The same results were noted for the EU unilateral sugar liberalization exercise. However, since the EU is the biggest player in world sugar trade and it is a significant producer as well, the impact on world sugar trade and regional welfare was larger when compared with liberalization of the US sugar sector itself. The authors noted that their results highlight the complexity of the TRQ mechanism and that the modalities in reforming the TRQs can be critical in determining the distribution of gains from trade liberalization between exporters and importers.

Gao, Fox and Li investigated the effects of liberalizing the Japanese rice market by increasing the quota level and decreasing the out-quota tariffs. Results from the study shows that even a small decrease in the out-quota tariff (i.e. 0.33%) or a small increase in the quota level will make the other policy instrument ineffective and have the effect of opening up Japan's rice market. Since Japanese and world rice supply are inelastic, the liberalization of Japan's rice market will have substantial impact on the world rice market. A 10% change in Japan's rice import quota or in the out-quota tariff will cause a 30% increase in world rice prices and a decrease in tariff of more than 0.33% will have more impact than any increase in quota. Liberalization would benefit Japanese consumers and rice exporters to Japan, with lower domestic prices and higher world rice prices. Full liberalization (free trade conditions) would increase the net welfare of Japanese economy by 120.8 billion yen or $0.97 billion. Most of the

rent and revenues are collected by the Japanese food agency and these may be used to compensate rice farmers affected by liberalization.

The WTO Secretariat provided a compilation of the different proposals from WTO-member countries for reforming the TRQ system (WTO, 2004). Most of these papers contained the objectives and proposals of each, also the concerns of the Member countries. The United States, for example, proposed that all tariff-rate quotas should be subjected to "substantial increases through progressive implementation of annual commitments over a fixed period" and that "disciplines to improve the functioning of TRQs, including specific mechanisms that trigger when tariff rate quota fill remains below a fixed level" should be established (WTO, 2000b). The ASEAN proposal called for a clarification of the continuation of TRQs, and if this is so, non-discriminatory allocation and administration of tariff quotas must be ensured (WTO, 2000c). The Cairns Group proposal was of a similar nature with the US and they called for "substantial tariff quota volume expansion consistent with the levels which would have been required if the Uruguay Round reform process had continued at the same pace" (WTO, 2000d). The European Community has proposed that a set of rules and disciplines should be defined to increase the transparency, the reliability and the security of the management of TRQs such that the concessions granted result in real trade opportunities (WTO, 2000e). A group of 12 developing countries jointly called upon developed countries to enhance market access, simplify the administration of their TRQs, and promote greater transparency and equitability (WTO, 2000f).

Mönnich (2003a) provided some approaches to liberalizing TRQs that would result in greater market access or eventual trade liberalization in agriculture. It was emphasized that reforming the present TRQ system is high on the WTO agenda and that there are numerous proposals on how to do it. The reforms in the TRQ system can be achieved by instituting changes in the components of a TRQ: 1) reductions in the out-quota tariffs; 2) increases in the quota levels and country-specific allocations; and 3) reductions in the in-quota tariffs. The other areas include: 4) the eventual phase-out of TRQs; and 5) TRQ administration – more transparency, predictability and abstention from rules that restrict market access. While there are merits associated with reform in each one, Mönnich provided some ideas by which to proceed – e.g. the choice of the right instrument, quota administration, transparency, eventual phase out, and the impact of these on developing countries.

The following chapter provides a detailed discussion of the conceptual model used in this study, the data used and the simulations or policy experiments that were carried out.

CHAPTER 4 - The Conceptual Model

In this chapter, the conceptual model of a TRQ is defined and developed. A graphical description of a TRQ is also developed. Recall from above that there are three main components of a TRQ: 1) the lower first-tier or the in-quota tariff; 2) the higher second-tier or the out-of-quota tariff; and 3) the quota that sets the limit up to which quantity the lower in-quota is applied. During a given period, the lower in-quota tariff is applied to imports up to the last unit of the quota and then the higher out-of-quota tariff is applied to all subsequent imports. These three characteristics alter the export supply function and determine, together with the import demand function, whether the quota is binding, i.e., whether the main economic effect of the TRQ is that of a quantitative restriction or QR (Herrmann, Kramb, and Mönnich).

A Graphical Description of a TRQ

Figure 4.1 panel (a) represents the domestic market of an importing country. In this representation, the domestic supply $S(p^d)$ and demand $D(p^d)$ are shown, where p_e^d is the equilibrium domestic price. An autarky price p^a determines the vertical intercept of the importing country's excess demand curve (ED) which we find in panel (b) represented by the world market. The excess demand curve ED is defined as $\{D(p^d) - S(p^d)\}$.

The effect of a tariff rate quota on the excess supply curve faced by a small importing country is illustrated in panel (b).[6] A series of excess supply curves are shown in panel (b), where ES_o^f is the relevant excess supply curve if no tariff were applied by the importing country (free trade condition), ES^{ti} is the excess supply curve with the in-quota tariff (t^i), and ES^{to} is the excess supply curve with the out-quota tariff (t^o). Both tariffs (t^i and t^o) are considered to be *ad valorem*. The result of the two-tiered tariff imposed by the importing country is a discontinuity or a kink between ES^{ti} and ES^{to}, in the excess supply curve at the quantity Q_{min}. The height of this segment is determined by the difference between the in-quota (t^i) and out-quota tariffs (t^o) at a

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[6] In a large country case, an upward sloping supply function can be assumed. In the small open-economy case, the supply is assumed to be totally elastic since the demand of a small country is small compared to world supply, hence the step-up shape of the supply curve (Monnich, 2003a).

given level of market access (Morath and Sheldon; Monnich, 2003a). Altogether, the effective excess supply curve with a TRQ is the bold broken line in panel (b) – the combination of ES^{ti} for import levels below the minimum access quantity Q_{min}, and by ES^{to} for import levels above the minimum access levels.

Economics of Tariff Rate Quotas

As discussed above and earlier, TRQs have three main components – the in-quota (or first-tier) tariff (t^i), the quota (or minimum access quantity) Q_{min}, and the out-quota (or second-tier) tariff (t^o). Depending on how these three parameters behave in relation to import demand and supply, three fundamentally different outcomes are likely to transpire (Monnich, 2003a). Either one of the following would be binding – the in-quota tariff or the quota or the out-quota tariff. In simple terms, either one of these parameters would determine the market equilibrium while the other two becomes redundant. The alternative tariff rate quota equilibrium conditions are discussed in the following section and are shown in Figure 4.2.

When the Quota is Binding

When the observed Q_{min} lies between the minimum and maximum level of imports, it is assumed that the TRQs have fill rates of 100 percent, and the common conclusion is that the quota is binding (Monnich, 2003a). As illustrated in Figure 4.2, shown with the excess demand curve ED_1, it intersects the excess supply curve in the inelastic (or discontinuous) portion of the kinked supply curve. Under these conditions, the out-quota tariff is deemed prohibitive to allow imports, with quantity at the level of the minimum access Q_{min} (at this point, let $Q_{min}=q_1$), identical to a pure quota (Hermann, Kramb and Monnich). The economic conditions in the importing country can cause the excess demand curve to shift up or down over the entire range of the vertical segment of the excess supply curve, depending on the size of the over-quota tariff without affecting imports or the world price (Meilke and Lariviere). It follows that the domestic price p_1^d would adjust to a level between $p_2^d = p^w*(1+t^i)$ and $p_3^d = p^w*(1+t^o)$ (Morath and Sheldon).

When the In-quota Tariff is Binding

In the case when the in-quota tariff is binding, ED_2 intersects ES^{ti} which is below the minimum access level Q_{min}, so that there is a partial fill of the TRQ at q_2. The equilibrium domestic price, inclusive of the tariff t^i is p_2^d, i.e. $p_2^d = p^w*(1+t^i)$, such that the in-quota tariff rate is binding. In some situations where the in-quota tariff is zero, the domestic price is equal to the world price, $p_2^d = p^w$. Under this scenario the tariff rate quota is not trade distorting (Meilke and Lariviere).

When the Out-quota Tariff is Binding

When the out-quota tariff is binding, the excess demand curve ED_3 intersects ES^{to}, and the quantity imported, q_3 is larger than Q_{min} (or q_1) – i.e., there are out-quota imports and the equilibrium price, inclusive of the out-quota tariff t^o is p_3^d, i.e. $p_3^d = p^w*(1+t^o)$.

A fourth condition discussed by Morath and Sheldon is the case where the excess demand curve, say ED_4, does not intersect the excess supply at all. The price at autarky $p^a = p_4^d$ is lower than the border price inclusive of the in-quota tariff. There are no imports in this case and hence, there is zero fill of the TRQ.

The Theoretical Model

The TRQ regime can be analyzed using the basic excess supply-demand curves under different market conditions. We use a simple trade model for a small importing country adapted from Abbott and Paarlberg and Skully (2001c). Recall from earlier that a tariff rate quota regime has three components: First, there is the quota (Q_{min}), which is the minimum access commitment in the URAA. There is the "low" (in-quota) tariff (t^i) that the country levies on import quantities below that quota, and there is the above quota "higher" (out-quota) tariff (t^o) that apply to quantities imported above the minimum access commitment (Q_{min}) or the quota.[7] Both tariffs are treated as *ad valorem* tariffs, and depending on supply and demand in the domestic market, imports may be at, above or below Q_{min}.

The mathematical model to analyze the economic impacts of this trade regime is set up using linear supply (S) and demand (D) functions:

(1.1) $\quad S = S_0 + [E_{sp}*S_0/P_{d0}(P_d - P_{d0})] + G_sS_0T$

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[7] In the Philippines, this is called the minimum access volume (MAV).

(1.2) $D = D_0(1+G_n)^T*[1- E_{dp}*(P_d - P_{d0})/P_{d0} + E_{dy}*(1+G_y)^T-1]$

where P_d is the domestic price, E_{sp} and E_{dp} are the domestic supply and demand elasticities. Dynamic forces are introduced in Equations (1.1) and (1.2) and these include growth rate in supply (G_s), growth rate in population (G_n), growth rate in per capita income (G_y), and a time index (T). It is necessary to establish a benchmark for this model by estimating the initial equilibrium $(S_0, D_0 \text{ and } P_{d0})$ for equations (1.1) and (1.2).

Imports (M) are the difference between the demand and supply at the market equilibrium price:

(2.1) $M = D - S$

From (2.1) a net import demand function may be specified:

(2.2) $M(P_d) = D(P_d) - S(P_d)$

The border price (P_b) is calculated based on a fixed world price (P_w), the exchange rate (ε), and any tariff (t):

(3.0) $P_b = \varepsilon * P_w(1 + t)$

The Philippines is a "small nation" in most agricultural markets in the world – that is, it is unable to affect the prices of goods in world markets, hence world prices can be assumed as exogenous. We assume that initial total quantity demanded and supplied are equal and prices are set competitively with zero transactions costs among markets.

Depending on the policy regime in place, we can solve for market equilibrium prices. In the case of a policy of quantitative restriction, imports equal the quota level (Q_{min}), and the domestic price is equal to domestic supply plus imports.

(4.0) $M = Q_{min} = D(P_d) - S(P_d)$

Equation (4.0) occurs when net import demand intersects excess supply at Q_{min}. The equilibrium domestic price, P_d, adjusts to a price level determined between one that is subject to the lower in-quota tariff (i.e., $p_2^d = \varepsilon*p^w*(1+t^i)$) and one subject to the higher out-quota tariff (i.e., $p_3^d = \varepsilon * p^w*(1+t^o)$). A quota rent (R), shown in equation (5.0) below, accrues if the quota is binding and as long as the domestic price is higher than the border price:

(5.0) $R = P_d - P_b = P_d - \varepsilon * P_w(1 + t); P_d > P_b$

In a quota regime, the rent is computed as the difference between the domestic and border price. In a mixed policy regime, such as the TRQ, part of the potential rent is captured as tariff revenue by the government of the importing country. It is assumed that the quota rent accrue to

importing trading companies or exporting country firms. Skully (1999a) noted that in practice, who gets the rents depends on the quota allocation mechanism in place. As long as a rent is generated under a TRQ, some allocation mechanism will exist (either implicitly or explicitly).

Static impacts

In this section, the static impacts of tariff-rate quotas are discussed under the three different cases under the TRQ regime (Figure 4.3) The first case is when imports are equal to the minimum access commitment, the TRQ behaves like a pure quota and a per unit quota rent (R) is earned:

(6.0) $TRQ = D(P_d) - S(P_d); R = P_d - P_b$

The government of the importing country collects a tariff revenue, $t^i r = t^i \times Q_{min}$ that in effect reduces the rent (Figure 4.3 (a)). A rent is derived if $P_b = \varepsilon * P_w(1+t^i) < P_d$ for imports at the QR. The TRQ is similar to the case where a tariff is levied in addition to a quota and it allows the government of the importing country to appropriate some of the rent through the administration of the TRQ itself.

The second case occurs when imports are less than the minimum access commitment the, in-quota tariff (t^i) is the effective policy instrument:

(7.0) $P_d = P_b = \varepsilon * P_w(1 + t^i); M = D(P_d) - S(P_d) < Q_{min}$

Equation (7.0) applies when the excess demand intersects the excess supply curve to the left (the quota or total imports are less than the minimum access). In this case, the TRQ mechanism allocates all of the rents to the importing country's government as tariff revenue and the TRQ acts like a pure tariff (Figure 4.3 (b)).

In the third case, imports exceed the minimum access (Q_{min}) level, the higher out-quota tariff (t^o) is applied and it occurs when ED intersects the excess supply function (Figure 4.3 (c)). The rent in this case is the difference between the equilibrium domestic price and the price with in-quota tariffs (*i.e.* world price plus the lower in-quota tariff (t^i)). The rent is only earned on below quota imports:

(8.0) $P_d = \varepsilon * P_w(1 + t^o); M = D(P_d) - S(P_d); R = P_d - \varepsilon * P_w(1 + t^i)$

The importing country government earns tariff revenues on quantities below the quota ($t^i \times QR$) and from import quantities above the quota ($t^o \times (M - QR)$). Therefore total rent paid $R \times Q_{min} = (P_d - \varepsilon * P_w(1 + t^i)) \times QR$, since the rent only accrues to the below-quota imports (or to

whomever has the rights to bring in the minimum access commitment). The equilibrium domestic market price associated with the above quota imports is $P_d = \varepsilon * P_w(1 + t^o)$. Abbott and Paarlberg observed that the TRQ allows for larger imports than does a pure quota, but there is a rent to firms because the tariff revenue does not obtain the full value of the rent arising from the intervention. In rapidly growing markets, this rent can become quite small, but will not disappear, requiring whatever institution which allocates that rent to remain (Abbott and Paarlberg).

Skully (1999a) noted further that if a particular TRQ is in fact a quota, rents would typically accrue, and since the underlying cause of these rents is from supply rationing, the problem that arises is how the resulting excess demand is to be administered.

Consumer, Producer and Net Surpluses

Government-imposed policies have a way of affecting prices such that the quantities supplied by producers and demanded consumers or firms change. In general, producers would not be willing to supply as much of a good at lower prices and consumers or firms would want to buy more goods at lower prices. By understanding how, and in what direction, government interventions such as trade policy (tariff protection) make different domestic agents better off or worse off, we are able to appreciate the motives for different groups to favor or oppose such interventions. For us to be able to answer these questions, we need a way to measure the gains and losses from government interventions and the changes in market prices and quantities that such intervention causes.

The method that we use is to calculate the changes in consumer and producer surplus that result from the government intervention. Consumer surplus measures the welfare that consumers derive from their consumption of goods and services, or the benefits that they derive from the exchange of goods in a competitive market (Pindyck and Rubinfeld). Consumer surplus is the difference between what consumers are willing to pay for a good or service (as indicated by the position of the demand curve) and what they actually pay (the market price). In graphical terms, the level of consumer surplus is shown by the area under the demand curve and above the ruling market price. Producer surplus is the net benefit or difference between the amount that producers actually receive and the minimum amount that they would have to receive in order to supply the given level of output (Pindyck and Rubinfeld). On a graph, producer surplus can be shown as the

area above the supply curve and below the prevailing market price. Panel (a) of Figure 4.4 illustrates the domestic market with the corresponding areas for consumer and producer surplus.

Figure 4.4 illustrates some of the important effects of trade policy on production, consumption and price. In panel (a), under autarky or absence of trade, the price of say corn in the Philippines is at P_a while in the rest of the world, the price is P_w, and quantity supplied is equal to q_e. The price difference provides an incentive for trade to proceed, such that when it does occur, demand and supply between each country or region interact to determine the world price of corn and the quantities produced, consumed, and traded. In this illustration, the world price of corn would be traded at P_w, m_f would be exported from the rest of the world (see panel (b)), and $d_f - q_f$ quantities of corn would be imported by the Philippines. Using these parameters, the domestic supply, demand and export supply for the rest of the world can be estimated and from there consumer, producer and net surpluses can be computed under different trade policy scenarios.

Starting from a condition of no trade (autarky), consumer surplus is equal to that of area 'c', and producer surplus is represented by areas 'a' + 'e'. Under free trade, consumers in the Philippines generate surpluses equal to the areas 'a' + 'b' + 'c' + 'd' (for a net gain of 'a' + 'b' + 'd'), while producer surplus decline to that of area labeled as 'e' (or a loss of 'a'). As a whole (producers and consumers combined) under no trade the surplus is equal to area 'a' + 'c' + 'e', with trade the surplus is 'a' + 'b' + 'c' + 'd' + 'e', and the net effect is equal to 'b' + 'd' (Figure 4.4). To operationalize the computation of these surpluses, we consider the assumptions discussed in the next paragraphs.

It is reasonable to assume linear relationships between supply- demand quantities and prices at the equilibrium point. Alston, Norton and Pardey noted that using linear supply-and-demand curves make it simpler and easier to calculate the geometric areas of surplus using linear algebra. These authors have pointed out flaws in the use of linear curves (*e.g.*, when the function is inelastic at the supply-demand equilibrium, if one were to extrapolate back to the origin, the intercept at the price axis would be negative and thus imply that positive quantities would be supplied even at negative prices). They also pointed out that other types of functional forms (*e.g.*, supply and demand curves of constant elasticity and the constant elasticity form with positive intercept) have issues as well. The implications of choosing a linear form versus the other forms

depend on the approximating formula being used. Accordingly, what is important is that the functional form chosen is an adequate approximation for the purpose.

In this study, we consider that the domestic demand Y_d, domestic supply Y_s, for corn in the Philippines and world excess supply Y_{es} are linear functions of domestic price P_d and world price P_w in the form:

(9.0) Domestic Demand $\qquad Y_d = a + b*P_d$

(10.0) Domestic Supply $\qquad Y_s = c + d*P_d$

(11.0) World Excess Supply: $\qquad Y_{es} = e + f*P_w$

Given that the price elasticities of these functions are η_d, ε_s, and ε_{es}, respectively, the parameters in the domestic demand, domestic supply and world excess supply functions can be solved as:

$$b = \eta_d * \frac{\overline{Y_d}}{\overline{P_d}}, \ a = \overline{Y_d} - b * \overline{P_d},$$ where $\overline{Y_d}$ is domestic demand and $\overline{P_d}$ is domestic

price;

$$d = \varepsilon_s * \frac{\overline{Y_s}}{\overline{P_d}}, \ c = \overline{Y_s} - d * \overline{P_d},$$ where is $\overline{Y_s}$ is domestic supply (or production) and

$\overline{P_d}$ is domestic price;

$$f = \varepsilon_{es} * \frac{\overline{Y_{im}}}{\overline{P_w}}, \ e = \overline{Y_{im}} - f * \overline{P_w},$$ where is $\overline{Y_{im}}$ is the volume of Philippine corn

imports and $\overline{P_w}$ is the world price; and

$Y_{im} = (a + c) + (b - d) * P_d$ is the Philippine corn excess demand function (the difference between domestic demand and supply).

From these equations, using algebra, we can solve for the domestic price and market clearing quantities necessary for computing changes in the consumer and producer surplus. Net surplus is computed as the sum of the changes in the consumer and producer surplus. A positive net surplus implies that the change is welfare enhancing and a negative net surplus means that society's welfare has declined.

Data Requirements

The basic data requirements for the models used in the study are presented in Table 4.1. The data used in this study are distinguished between real data and simulated data. The real data

come from official or published sources and the simulated data are those that have undergone calculations using the real data and the equations found in the detailed model structure. Most of the information needed is readily available over the internet.

The real data used in the study are the base year supply, use, and price data are for the years 1994 and 2003 – the year before the TRQs were institutionalized and two years before the final implementation of the URAA, respectively. Most of the real data were collected from the Food and Agriculture Organization of the United Nation's FAOSTAT website. FAOSTAT website provides time series and cross sectional data relating to food and agriculture for 200 countries and more than 200 primary products and inputs. Information on the volume and value of traded goods were collected from the United Nations AMAD – Agricultural Market Access Database. The AMAD is the result of a cooperative effort by Agriculture and AgriFood Canada, EU Commission - Agriculture Directorate-General, Food and Agriculture Organization of the United Nations (FAO), Organization for Economic Cooperation and Development (OECD), The World Bank (WB), United Nations Conference on Trade and Development (UNCTAD), United States Department of Agriculture - Economic Research Service (USDA-ERS). Additional data on prices, supply-demand, imports and consumption were collected from the Philippine Bureau of Agricultural Statistics (BAS).

Information on tariffs and quotas were taken from the Philippines GATT offer – *i.e.,* Schedule LXXV of the GATT 1994 (WTO, 1994) and from the reports on the Philippine's Trade Policy Review made by the WTO Secretariat (WTO, 2002a). The annual quota volumes used in the simulation model came from the various notification reports of the Philippines to the WTO Secretariat (WTO, 1996b, 1997, 1998, 2000a, 2002d, 2005a, and 2006d).

A number of income and demand elasticities that may be used in the domestic demand equations were collected from several studies on food demand in the Philippines (Quisumbing 1986a and 1986b; Ingco, 1991; David, 1993; Bouis, 1982 and 1991). A summary of the reported demand elasticities from the cited studies can be found in Table 4.2. Ingco (1991) evaluated food demand in the Philippines from 1965-1990 using the almost ideal demand system (AIDS) model. The demand system consisted of rice, corn, wheat, fish, meat, fruits and vegetables and the income elasticities of demand, and the individual demand and cross-price elasticities for each commodity were computed in the paper.

Bouis (1982 and 1991) provided some estimates of elasticities for income and demand in two studies, one looking at cereals and the other looking at corn in relation to food and livestock demand in urban and rural areas at different income quartiles. The study by Quisumbing (1986b) looked at food demand in relation to nutrition and government intervention. Demand and income elasticities in Quisumbing (1986b) were computed for different income quartiles as well for several food items aside from corn.

The choice of which demand elasticity to use in the model depends on two factors: first whether the sign (positive or negative) conforms to economic theory, and second, whether the elasticity is relatively elastic or inelastic. The correct sign is important because it is expected that for a normal good, the own-price elasticity of demand would be negative – *i.e.*, as we increase the price, the demand for the good declines. It is assumed that corn is a normal good and the expected own-price demand elasticity is negative. In general, the expected elasticity for a staple or food item is that it is relatively inelastic ($0 < \eta < 1$), this is because people need food so that for even relatively large changes in its price, the quantity demanded will not significantly change. It is also worth noting that in most economics literature the minus sign is often omitted and the elasticity is given as an absolute value or positive value (Case and Fair; McEachern).

There was no readily available up-to-date supply price elasticity for corn in the Philippines. A supply price elasticity of 0.2 was used in the model. The supply price elasticity can be computed using a simple log-linear regression of domestic price and supply using recent data from FAOSTAT, but the results show it to be negative. Askari and Cummings conducted a survey of agricultural supply response and they reported a supply price elasticity of negative to 0.6 for corn in the Philippines from a study by Mangahas, Recto and Ruttan. Shonkwiler and Maddala reported a supply elasticity of 0.392 for the US corn market..

Most of the Philippine's imports of corn are supplied from the United States and we use its own-price supply elasticity as a proxy for export supply price elasticity. Westcott (1998) investigated how the US corn sector responded to shocks with changes in the policy setting for supply management/planting flexibility and stock policies. The demand adjustments in the study were made on the basis of assumed elasticities of -0.30 for feed demand, -0.40 for exports, -0.10 for food, seed, and industrial use and the supply response was based on an assumed elasticity of 0.20. In another study cited by Westcott (1997) the estimated corn supply elasticity for the US North Central region ranged from a lower bound of 0.27 and an upper bound of 0.47. Westcott

also cited Adams' estimate of the supply elasticity for the same region of 0.37 for the period 1986-1990. The estimates made by Adams placed the full US corn sector's supply elasticity increased from 0.21 to 0.41 for the period 1986 – 1990. Assuming that changes in regional supply elasticities apply at the national level, these increments imply that total US corn supply elasticity start from 0.20 to a range of 0.30 to 0.40 (Westcott, 1998).

The exchange rate – *i.e.*, Philippine pesos per US dollar were collected from the Central Bank of the Philippines website (BSP). Information on population growth rate and growth in per capita income were also collected from that website. Other sources of social and economic statistics for the Philippines are the National Statistics Coordination Board (NSCB) and the Philippine Institute for Development Studies (PIDS). The population data came from the PIDS and the per capita income data came from the NSCB.

It is important to keep in mind that there are some simulated data that are used in the study to compute for some parameters. These simulated data are the supply, demand, imports, and prices generated by the model from 2003 – 2010. These are used in computing for the consumer, producer, and net surpluses in the study.

Description of the Simulation Models

In what follows, a number of scenarios will be analyzed on the implementation of TRQs in the Philippines. The initial procedure was to establish benchmark or baseline figures that can be used to compare results from the different policy experiments that would be conducted in the study. Several simulations or policy experiments are then conducted wherein the three components of the TRQ are altered, individually or in combination, to mimic TRQ liberalization scenarios. These are performed to look at the impact of these components on government revenues, consumer, producer and net surplus, and quota rents. The models are discussed in detail in the following paragraphs.

The base model of the TRQ

A 'base run model' of the present TRQ was specified to simulate the impact of TRQ implementation for the years 1995 - 2004. The purpose of running the 'base run model' was to see if the model can capture or would mimic actual events that happened during the period. It was carried out using 1994 – 2004 data of the actual quota, in-quota and out-quota tariffs and the growth rates in population, and income. The specific data used in the model are presented in

Table 4.1. The 'base run model' computed for the supply, demand, imports and domestic prices for a ten-year period representing the years 1995-2004.

For the 'base run model' of the TRQ – imports are allowed, and tariffs – both the in-quota and out-quota tariffs are applied. Year by year changes in the out-quota and in-quota tariffs and in the quota volumes were simulated by changing the pertinent parameter to recreate the regime for a TRQ in a particular year. For example, in the first year, the 'base run model' is provided with the initial TRQ volume, and in-quota and out-quota tariff rates; these are changed for each year of simulation to include the changes in the quota and in the out-quota tariffs. Under the present TRQ system, the in-quota tariff rate was fixed at 35%. The model is basically driven by the demand and income elasticities, and the growth rates established for supply, income and population. The model can also be modified to see the impact of movements in world prices and supply. These can be simulated through the standard deviation on world prices and supply, and introduced as stochastic terms in the supply – demand equations.

Equations (1.0) to (8.0) make up the simulation model used in this study. The simultaneous equation model was set up in GAMS (General Algebraic Modeling System) to determine domestic prices, supply and demand, and imports over a period of ten years (1995-2004) corresponding to the period wherein the TRQs were implemented. The model computes for the domestic supply and demand, the market equilibrium price, border price, and the per quota unit rent (*i.e.,* market equilibrium price minus the border price) for each year. Each year is simulated by changing the year index of the model in Equations (1.1) and (1.2). The level of imports is determined using Equation (2.0) and the border price is computed with Equation (3.0) based on the small importing country assumption. The corresponding domestic equilibrium price is computed depending upon the regime in effect. Recall that there are three cases to consider in a TRQ – when imports equal the quota (the quota is binding) use Equation (6); when imports are less than the quota (the in-quota tariff is binding) use Equation (7); and when imports are greater than the quota (the out-quota tariff is binding) use Equation (8).

The Simulation/Policy Experiment Models

After the 'base run model' was established, the model was re-calibrated to look at the impact of changes in the TRQ's components for the years 2005 – 2010 which from here on we shall call the 'baseline model.' The TRQ 'baseline model' goes under the assumption of "what if

the present TRQ system as carried out until 2010." The 'baseline model' results will be used as benchmarks for comparison with other simulations that reflect liberalization of the different TRQ components.

In this part of the study, the 'baseline model' TRQ model is modified to look at other liberalization scenarios and perform policy experiments by modifying the different components of the TRQ model. Various policy experiments are conducted to determine the effects of using the TRQ as a policy instrument in liberalizing the corn market in the Philippines. A combination of changes in the TRQ components can bring about the four trade policy scenarios: 1) an absolute quota – the in-quota and out-quota tariffs are removed; 2) outright liberalization – removal of the quota and merging of the in-quota and out-quota tariffs into one *ad valorem* tariff rate – either at the level of the out-quota rate or at the level of the in-quota rate; 3) changes in the in-quota and out-quota tariffs while the quota is fixed; and 4) a change in the quota while the in-quota and the out-quota tariffs are fixed. Table 4.3 provides a summary of the policy experiments and summary of the model parameters for the corn TRQ model for years 2005 through 2010.

The policy experiments (#1) – (#3) are designed to isolate the effects of each policy instrument or component to show the impact that each instrument has on the overall corn market. To do this, two of the three policy instruments will be eliminated at a time. In (#1) the in-quota and out-quota tariffs were eliminated such that an absolute quota exists. The results of this simulation are then compared to the benchmark to determine if, and how much, the introduction of the TRQ has liberalized the corn market. Eliminating the tariffs will show how the quota portion of the TRQ affects the market when it is the sole instrument used to determine domestic prices. In policy experiments (#2) and (#3), the effects of liberalizing the market at either the level of the out-quota or the in-quota tariffs are analyzed, respectively. In these two experiments, the 'other' tariff and the quota are eliminated resulting in a de facto or outright tariffication. The results would show the changes that would occur from the baseline at the edges of the TRQ system. The results of the simulations give us an appreciation of the effects attributable to the in-quota tariff, the out-quota tariff and the quota itself.

The next set of policy experiments are combinations of tariffs and quotas and they are tiered in such a way that they build upon one another. In experiments (#4) to (#8) the out-quota tariffs were reduced in increments of 10 percentage points from their 2005 levels while the in-quota rates are set to 5%. In (#9) – (#25) the in-quota tariffs are reduced by increments of 5

percentage points from their 2005 levels while the out-quota tariffs are kept fixed at different levels.

In policy experiments (#26) – (#37) the effects of increasing the quota are analyzed while the in-quota and out-quota tariffs are adjusted downwards. The quota levels are increased to three levels: a) by 100,000 MT (simulations (#26) through (#29)); b) raised to 5% of base consumption levels (434,000 MT) in simulations (#30) to (#33); and c) raised to 10% of base consumption level (651,000 MT) in simulations (#34) to (#37). The last simulation (#38) provides results if free market policy is in effect.

The number of quota to out-quota and in-quota tariff combinations that can be analyzed is quite large, but the combinations that are presented in this study provide a good representation of possible scenarios that may be considered by policy makers. Table 4.4 provides a summary of the policy experiments and summary of the model parameters for the corn TRQ model for years 2005 through 2010. The results of the different experiments and how they compare to the baseline are discussed in the next chapter.

Table 4.1. Philippines: Corn TRQ Model Data.

Parameters (Sources of data)	Base model	Baseline Model	Scenarios/ Experiments
Supply-Use			
Supply – Production (in '000 MT) (FAOSTAT)	4519	4129	4129
Demand – Consumption (in '000 MT) (FAOSTAT)	4519	4129	4129
Imports	0	0	0
Import Quota	0	0	0
Prices			
Domestic Price (Pesos/Kg) (FAOSTAT, BAS)	5.73	8.56	8.56
World Price ($/Kg) (FAOSTAT – US #2 Corn)	0.133	0.11	0.11
Exchange Rate (Pesos/US$) (Bangko Sentral ng Pilipinas)	25.00	54.20	54.20
Tariffs			
Base Tariff, before TRQ (%)	30	30	30
Initial TRQ Quota (in 000 MT) (WTO, 1994)	130.16	217.00	217.00 – 651.00
Final TRQ Quota (in 000 MT) (WTO, 1994)	216.94	217.00	217.00 – 651.00
In-Quota Tariff (%) (WTO, 1994)	35	35	35-5
Out-Quota Tariff (%) (WTO, 1994)	100	50	100-10
Elasticities			
Supply Price Elasticity (assumed)	0.2	0.2	0.2
Demand Price Elasticity (Bouis, 1982)	-0.27	-0.27	-0.27
Demand Income Elasticity (from Ingco, 1991)	-0.2124	-0.2124	-0.2124
Growth Rates			
Supply (%) (computed)	0.01973	0.0229	0.0229
Population growth per annum (%) (computed from PIDS data)	2.0 - 2.2	2.0	2.0
Income per capita (%) (computed from NSCB data)	3.0 - 3.8	3.0	3.0

Table 4.2. Philippines: Selected Income and Demand Elasticities for Corn.

Source/Study	Income		Price Demand	
Ingco (1991)				
At the sample means	-0.2124		-0.0686	
Average (1987-1990)	-0.4545		-0.1142	
Quisumbing (1986b)				
I	1.90		-2.10	
II	1.42		-1.57	
III	0.22		1.51	
IV	0.05		-2.09	
Bouis (1982)	-1.34		-0.27	
Bouis (1991)	Urban	Rural	Urban	Rural
I	-0.30	-0.40	-1.6	-1.5
II	-0.80	-0.40	-1.5	-1.2
III	-0.60	-0.90	-1.2	-1.1
IV	-0.02	-0.80	-0.9	-1.1

Table 4.3. Summary of TRQ model simulations.

Simulation Number	Parameters
#1	Absolute quota – no in-quota and out-quota tariffs
#2	*De facto* tariffication at the out-quota level (50%); no quota and in-quota tariffs
#3	*De facto* tariffication at the in-quota level (35%); no quota and out-quota tariffs
#4	Quota from 205 KMT – 217 KMT; Out-quota: 50%; In-quota: 5%
#5	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 5%
#6	Quota from 205 KMT – 217 KMT; Out-quota: 30%; In-quota: 5%
#7	Quota from 205 KMT – 217 KMT; Out-quota: 20%; In-quota: 5%
#8	Quota from 205 KMT – 217 KMT; Out-quota: 10%; In-quota: 5%
#9	Quota from 205 KMT – 217 KMT; Out-quota: 50%; In-quota: 30%
#10	Quota from 205 KMT – 217 KMT; Out-quota: 50%; In-quota: 25%
#11	Quota from 205 KMT – 217 KMT; Out-quota: 50%; In-quota: 20%
#12	Quota from 205 KMT – 217 KMT; Out-quota: 50%; In-quota: 15%
#13	Quota from 205 KMT – 217 KMT; Out-quota: 50%; In-quota: 10%
#14	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 35%
#15	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 30%
#16	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 25%
#17	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 20%
#18	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 15%
#19	Quota from 205 KMT – 217 KMT; Out-quota: 40%; In-quota: 10%
#20	Quota from 205 KMT – 217 KMT; Out-quota: 30%; In-quota: 25%
#21	Quota from 205 KMT – 217 KMT; Out-quota: 30%; In-quota: 20%
#22	Quota from 205 KMT – 217 KMT; Out-quota: 30%; In-quota: 15%
#23	Quota from 205 KMT – 217 KMT; Out-quota: 30%; In-quota: 10%

Table 4.4. Summary of TRQ model simulations, continued.

Simulation Number	Parameters
#24	Quota from 205 KMT – 217 KMT; Out-quota: 20%; In-quota: 15%
#25	Quota from 205 KMT – 217 KMT; Out-quota: 20%; In-quota: 10%
#26	Quota increased from 217 KMT – 317 KMT; Out-quota: 50%; In-quota: 35%
#27	Quota increased from 217 KMT – 317 KMT; Out-quota: 40%; In-quota: 30%
#28	Quota increased from 217 KMT – 317 KMT; Out-quota: 30%; In-quota: 20%
#29	Quota increased from 217 KMT – 317 KMT; Out-quota: 20%; In-quota: 10%
#30	Quota increased from 217 KMT – 434 KMT; Out-quota: 50%; In-quota: 35%
#31	Quota increased from 217 KMT – 434 KMT; Out-quota: 40%; In-quota: 30%
#32	Quota increased from 217 KMT – 434 KMT; Out-quota: 30%; In-quota: 20%
#33	Quota increased from 217 KMT – 434 KMT; Out-quota: 20%; In-quota: 10%
#34	Quota increased from 217 KMT – 651 KMT; Out-quota: 50%; In-quota: 35%
#35	Quota increased from 217 KMT – 651 KMT; Out-quota: 40%; In-quota: 30%
#36	Quota increased from 217 KMT – 651 KMT; Out-quota: 30%; In-quota: 20%
#37	Quota increased from 217 KMT – 651 KMT; Out-quota: 20%; In-quota: 10%
#38	Free Market

Figure 4.1. Effects of a tariff-rate quota.

(a) Domestic Market

(b) World Market
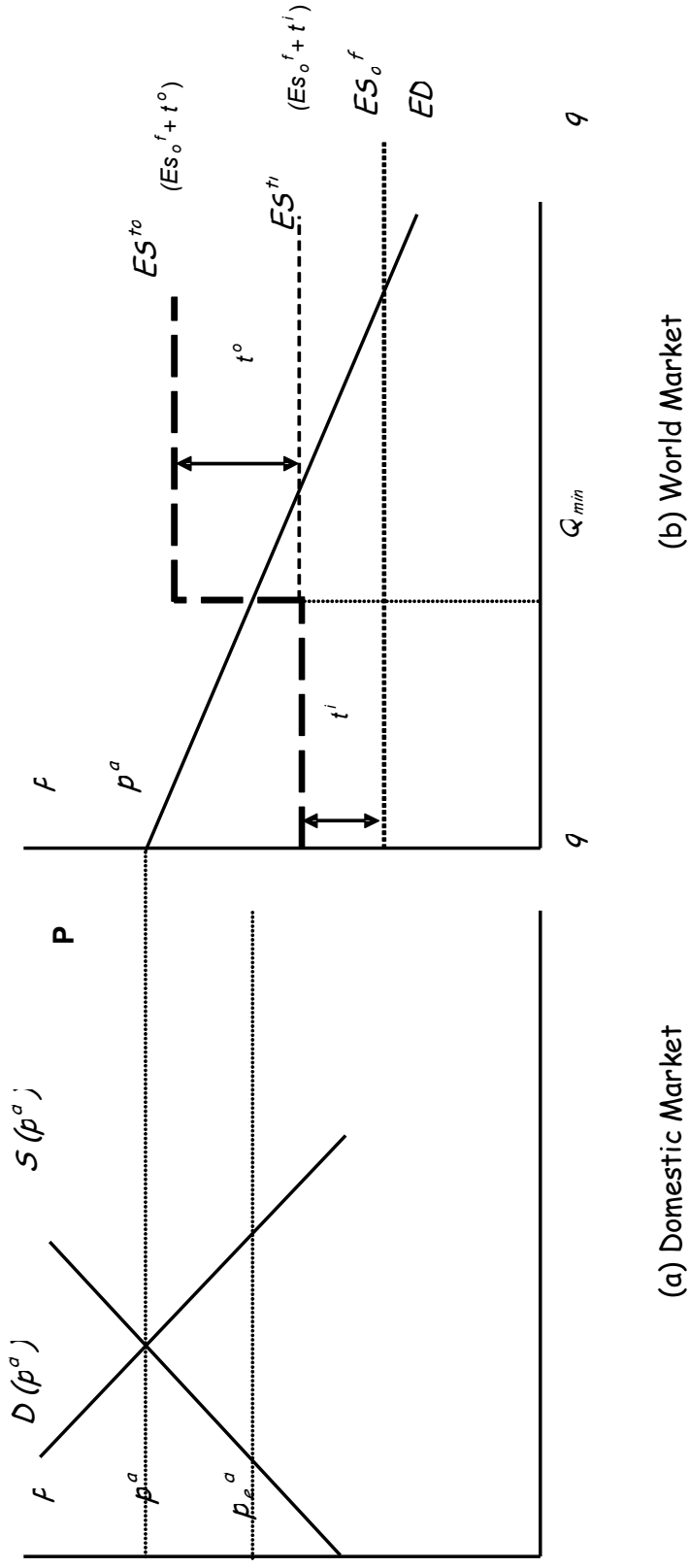
Sources: Adapted from Morath and Sheldon; Abbott and Paarlberg; Monnich.

Figure 4.2. Alternative tariff-rate quota equilibria.

P

$p_3^d = p^{w*}(1+\ell)$

$p_2^d = p^{w*}(1+t)$

F

Es^{to}

Es^{ti}

Es^{f}

ED_3

ED_1

ED_2

ED_4

p_3^d

p_1^d

p_2^d

p_4^d

q_2 $Q_{min}=q_1$ q_3 q_w q

50
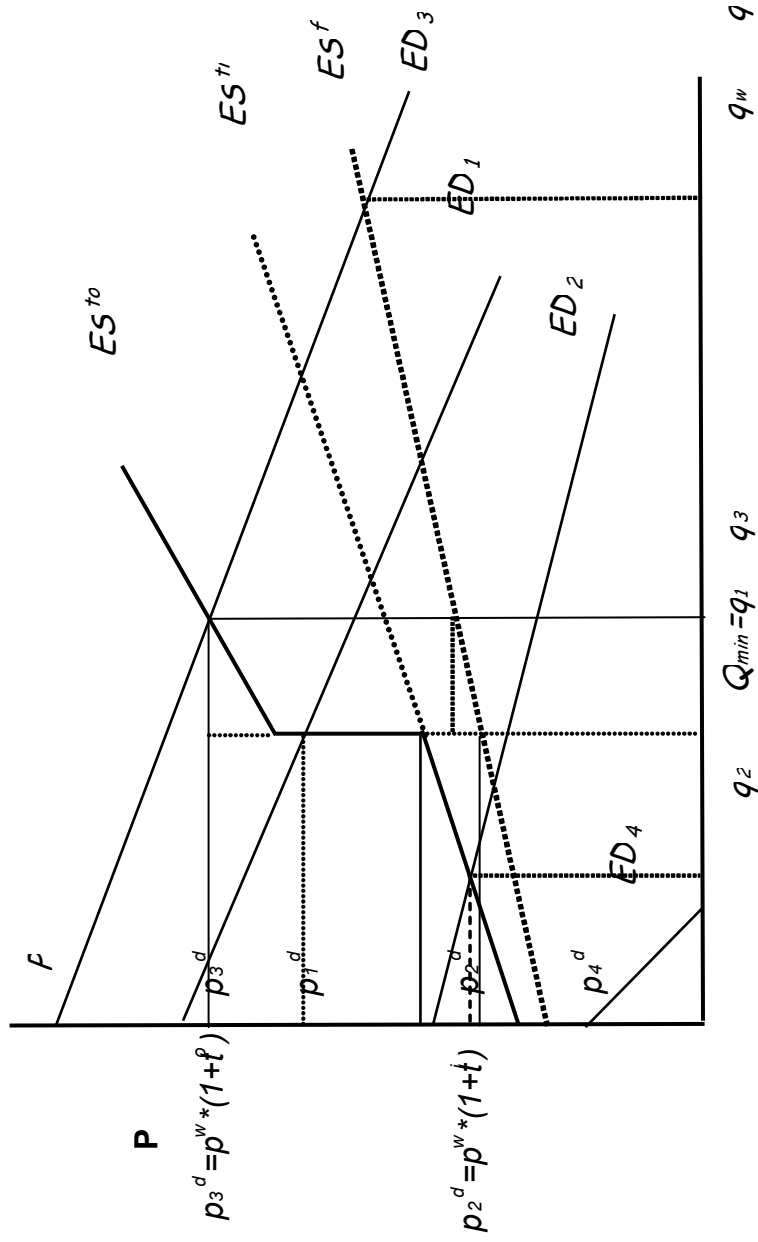
Figure 4.3. Static impacts under alternative tariff-rate quota equilibria.

(a)

P

$p_b = e^*p^{w*}(1+t^o)$

p_d

R

$p_b = e^*p^{w*}(1+t^i)$

t^o

t^i

$t^i r$

p_w

ED_1

$Q_{min} = QR$ *Imports* q

(b)

P

p^a

$p_b = e^*p^{w*}(1+t^o)$

$p_d = e^*p^{w*}(1+t^i)$

$t^i r$

p_w

ED_2

M Q_{min} *Imports* q

(c)

P

p^a

$p_d = e^*p^{w*}(1+t^o)$

R

$t^o r$

ED_3

$p_b = e^*p^{w*}(1+t^i)$

$t^i r$

p_w

Q_{min} M *Imports* q
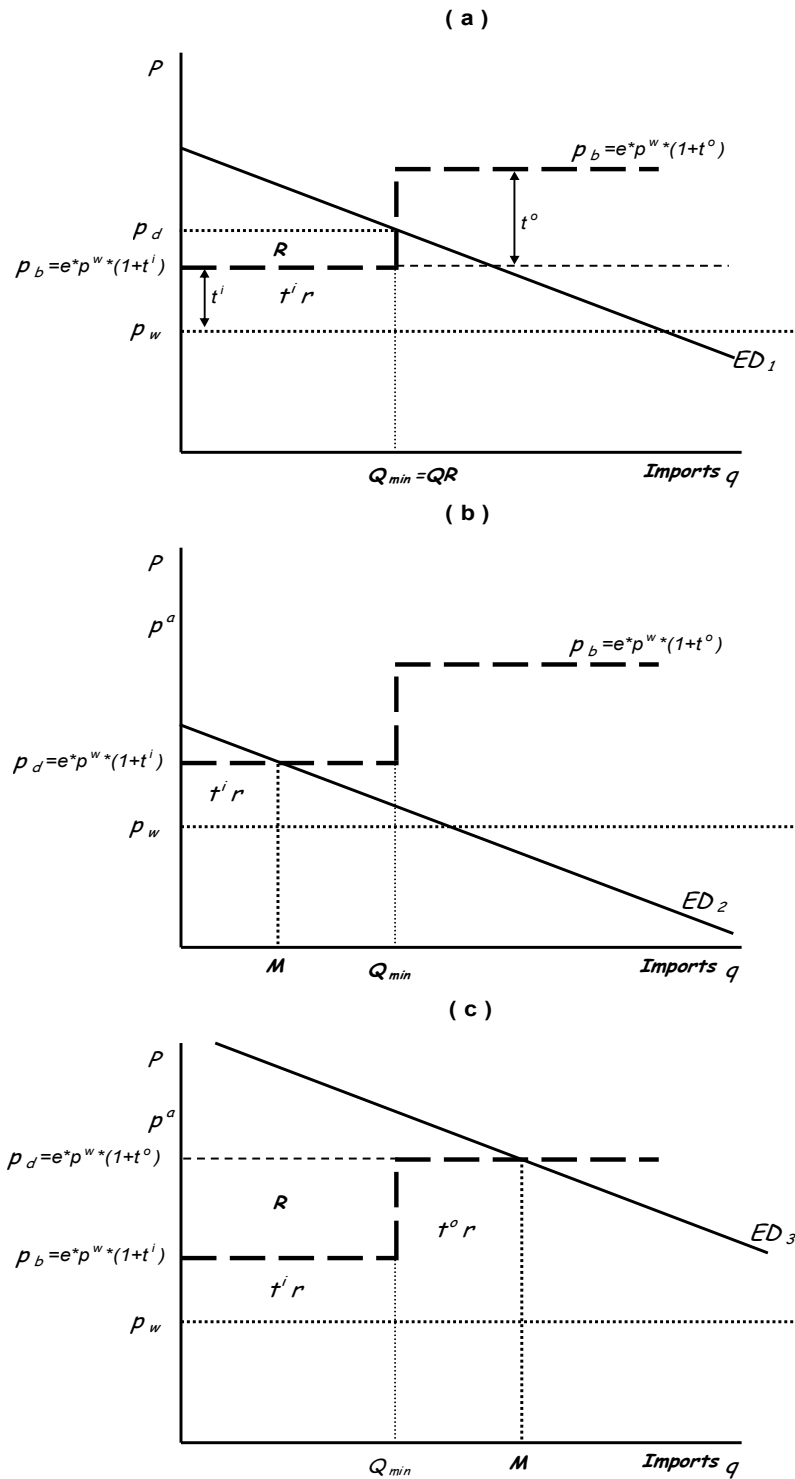
Source: Abbott and Paarlberg.

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Figure 4.4. The effects of trade on welfare – small country.

(a) Domestic Market

(b) Import Market
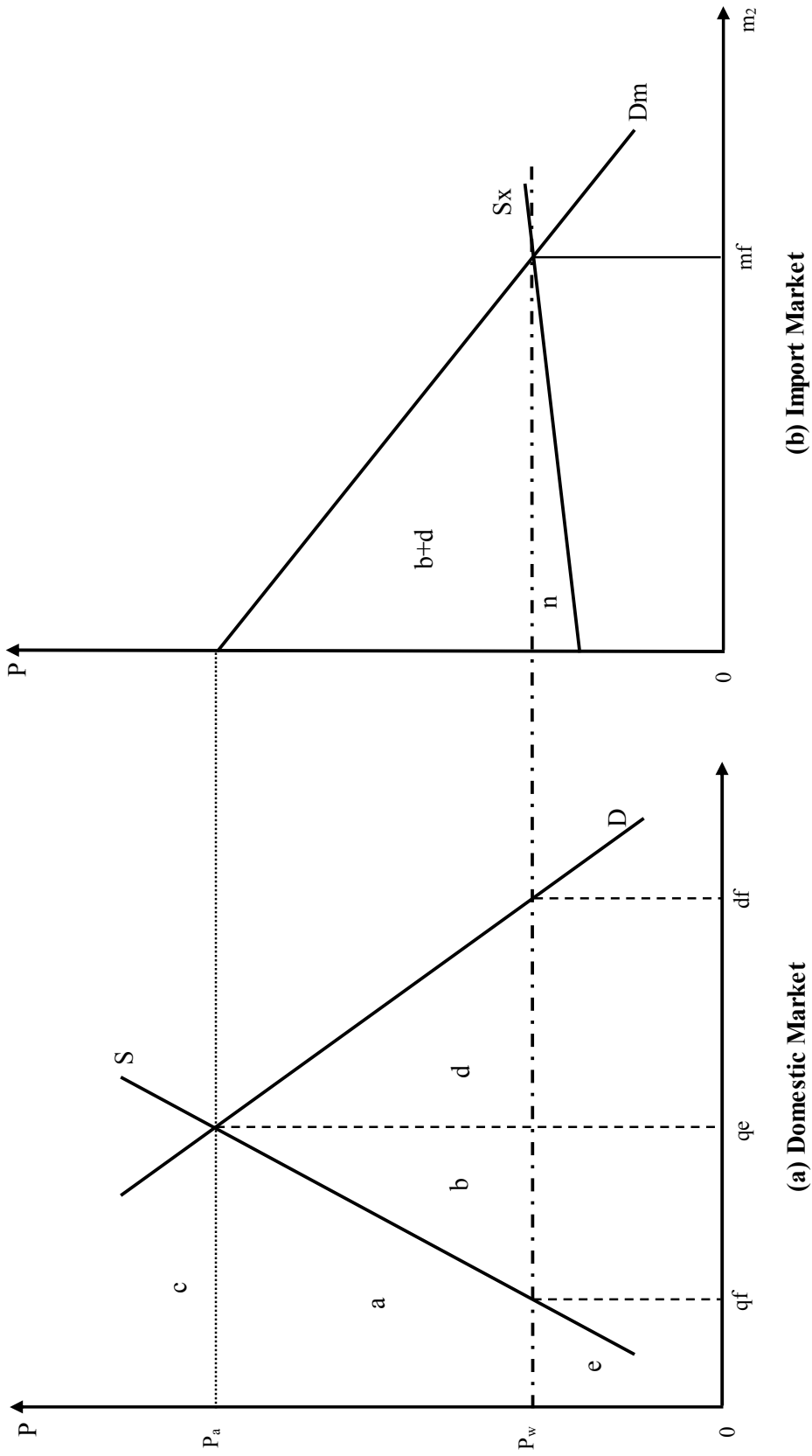
Source: Bowen, Hollander and Viaene; Pindyck and Rubinfeld.

CHAPTER 5 - Results and Discussion

The initial task was to conduct preliminary runs of an existing TRQ model to determine its applicability on the corn market of the Philippines. These preliminary runs served as the basis for developing a simulation of the TRQ system in the Philippine's corn market. A 'base run model' – under the assumption of "what if the present tariff-rate quota system was still in place" was conducted to establish the benchmark for computing the quota rents of the model under different policy scenarios. The base run of the model TRQ was carried out using data for 1994 – 2004 of the actual quotas, in-quota and out-quota tariffs. The results were used to see if the model capture or would mimic actual events that happened during the period. The base run model computed for the supply, demand, imports and prices for a ten-year period representing the years 1995-2004 using the growth rates in population, income, and the demand and supply elasticities for corn as defined in Chapter 4.

After the base run model was established, the model was re-calibrated to look at the impact of changes in the TRQ's components for the years 2005 – 2010. The simulation scenarios or policy scenarios that were discussed in Chapter 4 serve as the basis for the policy experiments that were conducted to look at the effects of changing quotas and tariff rates over the experiment period, 2005 – 2010. In this chapter, the results of the policy experiments are discussed and analyzed and comparisons across different scenarios were carried out.

The 1994 – 2005 base run model results

The starting point in understanding the workings of the TRQ model is through the base model. How the base run model works is described in Chapter 4, and considering that it is primarily driven by the elasticities of supply and demand, the model results track the actual supply and demand data fairly well. Graphs of the model results of supply/production and demand against actual production and demand are presented in Figures 5.1 and 5.2. The supply side equation of the model can be calibrated, or fine tuned, to emulate actual production and this can be done by changing the year index (T) in the equation (1.1). The range of possible choices for (T) is quite large – from negative to positive continuous numbers. Negative numbers can be use to emulate years where declines in production were observed such as in 1998 and 2002,

considered as drought years due to the El Niño weather phenomenon. The same procedure can be applied for the demand equation (1.2).

The basic parameters of the base run model TRQ are: quota volumes start from 130,000 MT (or 3% of consumption in 1986–1988) in the first year increasing to 217,000 MT by the tenth year of the model TRQ; the in-quota tariff rate is fixed at 35% throughout the ten years; and the out-quota tariff starts at 100% in the first two years and then goes down to 50% by the last year. The out-quota tariff for corn was bound at 100% when the URAA was ratified in 1994 and it is subject to reduction commitments by the Philippines to 50% by 2005. The in-quota tariffs however are not subject to reduction commitments but it serves as useful part of the overall TRQ mechanism.

The base run model the simulations indicate a trend where the demand for corn exceeds supply, and imports increase as a consequence. The model projected that the quantity of supply, or production, of corn will increase by 1.6% over the ten year period, while demand, on the other hand was projected to grow by 3.7% over the same period. The base run model solutions of the present under TRQ system of supply and demand volumes, net imports, market price, below quota price, and per unit quota rent (in Philippine peso and US $ terms per kilogram) are presented in Table 5.1.

The simulations show that in the first three years (1995-1997), total imports would be equal to the quota volumes allowed under the TRQ, and in this case, the TRQ acts like a quota. In the first two years of the TRQ implementation, the out-quota tariff is 100% (its highest level), and in the third year (1997), the out-quota tariff was adjusted down to 80%. At these tariff levels, it would imply that it is not profitable to import and this may explain why the imports are equal to the TRQ quota volume. The operable market equilibrium price here is determined by the model and it shows that the domestic price P_d would adjust to a level between $P_d^i = \varepsilon * P^w * (1+t^i)$ and $P_d^o = \varepsilon * P^w * (1+t^o)$, respectively. The domestic price ranged from Ph5.52 to Ph5.87 per kilogram of corn and these lie between the prices with the in-quota tariff (Ph4.49) and the price with the out-quota tariff (Ph6.65).

In the next two years (from year 4 (1998) to year 5 (1999)), the out-quota tariffs were maintained at 80% and the model results show that imports would increase beyond the TRQ quota. The pronounced difference in growth between demand and supply makes imports profitable despite the fact that tariffs are still relatively higher and this is confirmed by the

presence of higher per unit quota rents (Ph1.50 per Kg or $0.06 per Kg). The model simulated that the equilibrium market price is equal to $P_d = \varepsilon * P_w(1 + t^o)$ since imports are now more than the quota. This is the case where the out-quota tariff is binding and prices hold steady ay P5.98 ($0.239) per kilo of corn. The per unit quota rent is determined by $R = P_d - \varepsilon * P_w(1 + t^i)$ from equation (5.0) or the domestic price less the price with the in-quota tariff. Figure 5.3 illustrates what happens as the out-quota tariff is reduced over time. Note the changes in the size of the rent, the revenues from the in-quota tariff and the out-quota tariff that goes to the government. The further apart the in-quota and out-quota tariffs, the greater the amount of rents created and thus the greater the incentives to seek these rents (Boughner and de Gorter). As the out-quota tariffs are reduced, the rents decline; the in-quota tariff revenue remains relatively the same and the revenues from the out-quota tariff declines.

For years 6 and 7 (1999 – 2000), and 8 to 10 (2001 – 2004), the out-quota tariff rates were again decreased to 65% and 50%, respectively to simulate the reduction of the out-quota tariffs over time. The situation here is almost similar to the previous period, where the only difference was that the out-quota tariffs were lower. It should be noted that the effect of the decline in the out-quota tariff is that market equilibrium prices declined from Ph 5.98 ($0.239) to P5.49 ($0.220) and 4.99 ($0.200) per kilogram, respectively. The per unit quota rents declines further from Ph1.49 ($0.059) in year 5 (1999) to Ph0.50 ($0.020) in year 10 (2004). The simulation shows that in year 10, the level of imports would be sufficiently large (1.17 million MT) and the domestic equilibrium price is close to the in-quota price, $P_d = \varepsilon P_w(1 + t^i)$. This can be explained by fact that in some cases, over time, the difference between the in-quota tariff and the out-quota tariff rates may become very small or is very negligible, in this case down to 15 percentage points. The out-quota tariff rate is subject to reduction commitments under the URAA. It is also worth noting that the out-quota tariff is binding from the fourth to the tenth year of corn TRQ model.

Abbot and Paarlberg observed a similar scenario in their study of the Philippine's pork market. They noted that albeit the TRQ allows a small increase in imports via the minimum access, the demand growth relative to domestic supply makes imports profitable even at the higher tariff and imports expand greatly over time. In their simulation of the Philippine's pork market, they noticed a leveling off and subsequent decline of the domestic price of pork once the import volumes became larger.

The corn minimum access volumes are quite small (3% increasing to 5% of consumption based on the Modalities Agreement)[8] compared to total demand; therefore it is quite understandable to consider that its impact on prices, supply and demand in the TRQ model should be limited. The discussion in the following section will illustrate this observation. Under the present policy, the out-quota tariff that is relatively high in the initial years may be the essential policy instrument in determining import volumes and domestic prices in the model for corn. The simulations also show that the corn market can be in Case 2 where the TRQ is binding (years 1 to 3) and then move into Case 3 where the out-quota tariff is binding (years 4 through 10).

Results of the Policy Experiments

The TRQ model was re-calibrated and simulated for the period 2003 – 2010. It was noted that although the base run model TRQ tracked the actual supply and demand, the other parameters (i.e., exchange rate, world price, growth rate in supply) over the period 1995 – 2004 have changed. The re-calibrated model had modifications in the domestic and world price, exchange rate, quota, and in the in-quota and out-quota tariffs. Several versions of the re-calibrated model that were developed looked at various policy scenarios and the parameters associated with each experiment have been discussed in Chapter 4.

The first model is our 2003 – 2010 Baseline Model wherein the assumption was that the present TRQ system would be continued (i.e. the 2005 quota level is carried through until 2010, and in-quota and out-quota tariffs remain at 35% and 50%). The results of the Baseline Model are presented in Table 5.2. The results of the policy experiments are compared with the Baseline Model results. The simulation results of the 38 policy experiments are in Appendix A, as Appendix Tables A.1 – A.15.

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[8] The Uruguay Round Agreement on Agriculture (URAA) is made up of three components, the text of the Agreement, the Country Schedules submitted to the WTO that included base year data and the commitments, and the "modality" documents of the Negotiating Group on Agriculture. The Modalities Agreement, although not legally binding were agreed to by the negotiating parties and serves as the suggested set of general objectives, procedures to use to calculate various indicators and commitments (including numerical targets as well as rules) and the way to achieve them. For example, with regards to tariff reductions, a modality for developing countries would be an average reduction of 24% with a minimum 10 % reduction per tariff line, over ten years (WTO, 2006c).

Policy Experiments # 1 – # 3(Individual TRQ Components)

The results of policy experiments #1 to #3 illustrate the effect of the individual TRQ parameter on the Philippine corn market (Tables 5.3 – 5.5). In policy experiment #1, the import quota is the sole policy instrument in use. The results are compared to those from the Baseline Model. The comparisons show that the introduction of a TRQ would have no significant impact on the quantity of supply or domestic production – an increase of 0.5% in 2005 to 2.7% in 2010, respectively. The effect of the quota, however, is that there is a pronounced drop on the quantity of demand (or a contraction of the corn market). The volumes of imports that enter the country are at levels just equal to the quota, hence, consumer, producer and net surplus, and total revenues fall. The quota affects domestic prices in favor of producers (but to the detriment of consumers) as they increase from a 3% in 2005 to 17.5% by 2010, respectively, when compared to the Baseline Model results. Usually, when imports decline, production must be increased in order to meet domestic demand, but no increases were noted in the simulation for this scenario. Consumer surplus registered declines (24% in 2005 to 67% in 2010) at a bigger rate compared to producer surplus (23% in 2005 to 66% in 2010). Overall, net surplus registered an overall decline if quotas were to be the norm of the day for the corn market (42% in 2005 to 89% in 2010).

In policy experiment #2 the quota and the in-quota tariff were removed and the out-quota tariff becomes the operative parameter as it determines domestic prices. It also implies that there is a *de facto* liberalization of corn market at the out-quota tariff rate of 50%. Results of the simulation suggests that this scenario is no different from the present system of TRQ that is in place as there is no change in the quantities of supply, demand, imports, consumer, producer and net surpluses, and prices, compared to the baseline. However, there is a large change in total revenues that would go to the government (an 11% increase by 2010 from corn imports) since a higher tariff of 50% would be applied to all imports.

In policy experiment #3, the quota and the out-quota tariff are removed and the in-quota tariff becomes the operative parameter and the in-quota tariff determines domestic prices. Similar to policy experiment #2, it also implies that there is a *de facto* liberalization of corn market at the in-quota tariff rate of 35%. Results of the simulation suggest that the policy have effects on demand, imports, consumer, producer and net surpluses, prices, total revenues and per unit quota rents. The effect of the policy on the quantity of supply is minimal, but it reflects a

decline of about 2% per year just the same. An increase in the quantity of demand (2.5% by 2010) is expected with the decline in prices (10%). To make up for the shortfall between the quantity of supply and quantity of demand, import levels increase (about 38% by 2010). Revenues collected by the government increase, and although the government continues to collect revenues from the corn imports, the lower tariff of 35% also meant that collections would decline (as much as 22% in 2010 compared to the baseline). There are consumer and net surplus gains – in terms of lower prices and increase in corn demand.

It is recognized that a limitation of the model is that the policy or policies are introduced as a complete measure at one time such that the effect looks like a kink on a line. However, the effects observed in terms of direction are correct and follow economic logic – quantities of supply and demand change with respect to changes in prices; and in terms of changes in magnitude, the results are reasonable and within reasonable bounds when compared to actual data. Another limitation is that the model treated as partial equilibrium model and does not consider the effect and impact of the policies on related sectors like the livestock and poultry industry – the main importers of corn in the Philippines, and the rest of the economy. Hence, this should be kept in mind when the magnitude of the change in consumer, producer, and net surplus are discussed.

Policy Experiments # 4 – # 25(Variations in the Combinations of the Components)

Policy experiments #4 - #25 are variations of the combination quota – tariff scheme, where different tariff reductions in the out-quota and in-quota tariffs are analyzed while the quota is fixed at 2005 levels. The scenarios and the parameters associated with each experiment have been discussed in Chapter 4 earlier.

Policy experiments #4 – # 8 (Fixed Quota, 10-percentage Point Differences in the Out-quota Tariff, and 5% Fixed In-quota Tariff)

Policy experiments #4 - #8 are cases where all three policy instruments are in place, with the quota fixed at 2005 levels, the out-quota tariffs are reduced by 10 percentage points, and the in-quota rate steady at 5% (Tables 5.3 – 5.5). Results of policy experiment #4 reveal that it is in many ways similar to the baseline. Dropping the in-quota tariff rate to 5% beginning in 2005 had no significant effect on the quantities of supply, demand, imports, consumer, producer and net surplus, and prices. The effect, however, there is an effect on the government revenues and in the

quota rents. Government revenues from the out-quota tariffs remain the same since the out-quota tariff is also 50%. The lower in-quota tariff, however, translates to lower revenues from imports that come in within the quota, and thus, total revenues register a decline (59.3% in 2005 to 22.3% in 2010). The large difference between the in-quota and out-quota tariffs also translates to higher quota rents, about 200% higher compared to the baseline.[9] Recall that the out-quota tariff determines the domestic market price when imports are above the quota, if these are reduced as simulated in each experiment, domestic prices decrease as a result.

Policy experiments #5 – #8 are similar in some respects. Lowering the in-quota tariff to 5% negatively affects the quantity of supply – about 1% in policy experiment #5 to 4% in policy experiment #8 in 2010. Demand on the other hand shows a more responsive to the decline in the out-quota tariff – there is about a 1.7% increase in policy experiment #5 to a 6.7% increase in policy experiment #8 in 2010. The result is that imports increase in large proportions compared to the baseline. In policy experiment #5 imports increase by 25%, in policy experiment #6 by 51%, in policy experiment #7 by 76%, and in policy experiment #8 by as much as 101% in 2010. The percent change in consumer, producer and net surpluses are higher in these experiments compared to the baseline, with policy experiment #8, which is by-far the most liberal, registering the highest level of difference in net surplus (295% in 2010). In terms of revenue, all four experiments registered decreasing revenues for the government, and as expected policy experiment #8 proved to be the lowest collector of revenues as the difference from the baseline was 59% below the baseline. Policy experiment #5 registered the highest difference in the level of quota rents (133%) compared to the baseline among the four experiments and this is due to the wide gap between the out-quota and in-quota tariffs.

The next four sets of policy experiments (#9 – #13, #14 – #19, #20 – #23, #24 – #25) are similar to the above set of scenarios where the quota is fixed at 2005 levels. The out-quota tariff is kept at 50%, 40%, 30%, and 20%, respectively for each set. Within each set, the in-quota tariff rate is reduced by 5 percentage points from 30% to 10%, 25%-10%, and 15% to 10%, respectively.

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[9] Please see Figure 5.3 for an illustration of how the difference between the out-quota and in-quota tariff rates affects the quota rents.

Policy experiments #9 – #13 (Fixed Quota, Out-quota Tariff Fixed at 50%, and In-quota Tariff Reduced by 5-percentage Points from 30% to 10%)

Policy experiments #9 – #13 are simulations where the quota is fixed at 2005 levels (217,000 MT), and the out-quota tariff is kept at 50%, while the in-quota tariff rate is reduced by 5 percentage points from 30% to 10%. In general, reducing the in-quota tariff rates by 5 percentage points negatively affect the quantity of supply – about 2% in policy experiment #9 to around 4% in policy experiment #13 in 2010. The quantity of demand, however, is affected more as increases are noted in all experiments compared to the baseline. As expected imports increase considerably. Prices in this set of experiments are not affected because the out-quota tariff of the baseline and this set are the same at 50% (Tables 5.6 – 5.8).

Increases over the baseline are noted for the consumer, producer and net surpluses for experiments #9 - #13. Policy experiment #13, which is relatively the most liberal in this set of experiments, registered the highest difference in the level of net surplus (295% in 2010). In terms of revenue, the five experiments registered increasing revenues for the government even if reduced collections were noted from the in-quota tariff. Surprisingly, policy experiment #13 provides the government the biggest source of revenue, and this come mainly from the out-quota tariffs slapped on larger levels of imports. Policy experiment #13 registered the highest level of quota rents among the five due to the wide gap between the out-quota and in-quota tariffs, 50% and 10%, respectively.

Policy experiments #14 – #19 (Fixed Quota, Out-quota Tariff Fixed at 40%, and In-quota Tariff Reduced by 5-percentage Points from 30% to 10%)

Policy experiments #14 – #19 are distinguished from experiments #9 – #13 through differences in their out-quota tariff levels. The former's out-quota tariff is set at 40% while for the latter it is set at 50% which is similar to the baseline model. Due to this difference in out-quota tariff rates, it is expected that domestic prices in policy experiments #14 – #19 would be lower. Results of the simulations show that bringing down the out-quota tariff rate to 40% would have similar impact in magnitude on the quantities of supply, demand and imports compared to the baseline (Tables 5.6 – 5.8 and 5.9 – 5.11) as in policy experiments #9 – #13.

In policy experiments #14 – #15 the lower domestic price (from the reduction of the out-quota rate) and keeping the in-quota rate at 35% or 30%, had the effect of reducing the quota rents, compared to the baseline. What happened in these two experiments was that a reduction in

the difference between the in-quota and out-quota rates took place. However, if the reductions in the in-quota rates were continued beyond 30% (i.e. policy experiments #16 – #19) and the out-quota is kept constant, the differences increase between tariffs and the trend is reversed; as a consequence the per unit quota rents increase. This behavior in the quota rents is noted in all the other experiments where the differences between the out-quota and in-quota tariffs increase or decrease.

Increases over the baseline are noted for the consumer, producer and net surpluses for these experiments. Policy experiment #14, which is relatively the 'least' liberal in this set of five experiments, registered a large difference in net surplus of 88.5% in 2010 compared to the baseline. Policy experiment #19 on the other hand shows a difference with the baseline of 295% in 2010.

Policy experiments #20 – #23 (Fixed Quota, Out-quota Tariff Fixed at 30%, and In-quota Tariff Reduced by 5-percentage Points from 25% to 10%)

Policy experiments #20 – #23 have the out-quota tariff set at 30% while for the in-quota tariff is reduced from 25% to 10%, with the quota fixed at 217,000 MT. The 30% out-quota tariff rate translates to lower domestic prices (13.3%) compared to the baseline. Results of the simulations show that bringing down the out-quota tariff rate to 30% from 50% and reducing the in-quota tariffs would have almost similar outcomes as with the scenario discussed in the previous set (i.e. policy experiments #14 – #19) when compared to the baseline (Tables 5.9 – 5.11).

Obviously, there would be a decrease in the total revenues as the out-quota tariff and in-quota tariffs are reduced. Revenues from the in-quota tariff declined in all cases from 28.6% to 71.4%. The impact on revenues from the out-quota tariff is less pronounced although the trend is also declining. Increases over the baseline are noted for the consumer, producer and net surpluses for these experiments. This means that welfare as a result of changing from the existing TRQ system to a more liberalized setting is positive as consumers are gaining more than what producers are losing. Policy experiment #23, which is relatively the 'most' liberal in this set of four experiments, registered the highest level of change in net surplus at 295% in 2010 when compared to the baseline.

Policy experiments #24 - #25(Fixed Quota, Out-quota Tariff Fixed at 20%, and In-quota Tariff Reduced at 15% and 10%)

Policy experiments #24 – #25 simulate conditions where the quota is fixed at 2005 levels, and the out-quota tariff is kept at 20%, while the in-quota tariff rate is reduced to 15% and 10%, respectively. The 20% out-quota tariff rates translate to lower domestic prices (20.0%) compared to the baseline (Tables 5.9 – 5.11 and Tables 5.12 – 5.14). Results of the simulations show that bringing down the out-quota tariff rate to 20% from 50% and reducing the in-quota tariffs would have almost similar outcomes as with the scenario discussed in the previous set (i.e. policy experiments #14 – #19) when compared to the baseline.

Total revenues declined as expected since the revenues from both tariff sources went down. In all cases, revenues from the in-quota tariff declined compared to the baseline. Overall welfare showed improvement over the baseline, as the consumer surplus is greater than the losses incurred by producers. Per unit quota rents declined in both experiments as the gap between the out-quota and in-quota have lessened considerably. Figure 5.5 illustrates how the differences in the out-quota and in-quota tariffs affect the rents generated by the system.

Policy Experiments # 26 – # 37 (Increase in Quota, Fixed Out-quota and In-quota Tariff Rates)

The next sets of policy experiments investigate scenarios where the corn market is liberalized by increasing the quotas while the out-quota and in-quota tariffs are fixed. Several proposals have been put forth about increasing market access through the liberalization of quotas. Josling and Rae suggested increasing minimum access by a proportion of consumption – say 1% of consumption each year. We instead simulate the effects of increasing the quota volume from 217,000 MT to 317,000 MT (policy experiments #26 – #29), from 5% of consumption to 10% (policy experiments #30 – #33), and from 5% of consumption to 15% (policy experiments #34 – #37).

Policy experiments #26 - #29 (Quota Increased to 317,000 MT, Out-quota Tariff Fixed (from 50% to 20%), and In-quota Tariff Reduced by 5-percentage Points from 35% to 10%)

Policy experiments #26 – #29 simulate the alternative method of liberalizing the corn market by increasing the quotas (in this set the quota is increased by 100,000 MT above the 2004

level), while the out-quota tariff is kept at 50%, 40%, 30%, and 20%, respectively in each case. The in-quota tariff rate is set at 35%, 30%, 20%, and 10%, respectively.

Results of the simulations for policy experiment #26 when compared to the baseline reveal that simply increasing the quota by 100,000 MT will not make any difference in most of the parameters that we have been looking at. What is obvious though is that total government revenues shrink as a result of more import quantities being charged at the lower in-quota rate and less that are taxed at the out-quota rate (Tables 5.12 – 5.14).

Policy experiments #30 - #33(Quota Increased to 434,000 MT, Out-quota Tariff Fixed (from 50% to 20%), and In-quota Tariff Reduced by 5-percentage Points from 35% to 10%)

Policy experiments #30 – #33 simulate the corn market when the quota for the TRQ is raised to 10% of domestic consumption to 434,000 MT, while the out-quota tariff is set at 50%, 40%, 30%, and 20%, respectively in each case (Tables 5.12 – 5.14 and Tables 5.15 – 5.17). The in-quota tariff rate is set at 35%, 30%, 20%, and 10%, respectively. Increasing the TRQ quota to 10% of consumption may be a far fetched idea at the moment, but the simulation results indicate that imports would not be increasing beyond what the market can absorb. Results of the experiments are similar in trend to those in policy experiments #34 – #37.

Policy experiments #34 - #37`(Quota Increased to 651,000 MT, Out-quota Tariff Fixed (from 50% to 20%), and In-quota Tariff Reduced by 5-percentage Points from 35% to 10%)

Policy experiments #34 – #37 are models of the corn market when the quota for the TRQ is raised to 15% of domestic consumption or to 651,000 MT, while the out-quota tariff is set at 50%, 40%, 30%, and 20%, respectively in each case. Similar to earlier experiments where the quota is increased, the quantity of corn supply is negatively influenced by the increase in quota (Tables 5.15 – 5.17). Corn supply decreased in all experiments and but the decline was at a shade close to 3% (i.e. policy experiment #37) when the out-quota tariff was 20% and the in-quota was 10%. Quantity of corn demand increased at a faster rate such that required imports increased. Consumer surplus and net surplus increased as tariffs were decreased progressively, but the increase in imports also caused an increase in the loss of producer surplus. The contraction in the difference between the in-quota and out-quota tariffs led to a decline in quota rents.

Policy experiments #26, 30, and #34 (Quota Increased to 317,000 MT, 434,000 MT and 651,000 MT; Out-quota Tariff Fixed at 50%, and In-quota Tariff is 35%)

Another comparison was made between the baseline and policy experiments #26, #30 and #34 to look at what would happen if the present tariff structure was retained and only the quotas were increased. Taken together, these comparisons illustrate to what extent the quota can serve as a tool for liberalizing the corn market in the Philippines. These three experiments have different quota levels for the TRQ while the out-quota tariff and in-quota tariffs are fixed at 50% and 35%, respectively. The results suggest that only increasing the TRQ quotas will have no significant impact in liberalizing the corn market.

Increasing the quota by 100,000 MT (policy experiment #26) will not make any difference in most of the parameters that we have been looking at compared to the baseline model. What was obvious though was that total government revenues decline compared to the baseline, as a result of more import quantities being charged at the lower in-quota rate and less that are taxed at the out-quota rate (Tables 5.18 and 5.19). When the quota was raised to 434,000 MT in policy experiment #30 and to 651,000 MT in policy experiment #34, the revenues from the in-quota tariff increased by 100% and up to 200%, respectively. However, the simulations show there would be periods when there are no revenues from the out-quota tariffs, and this happen when the level of imports do not go beyond the quotas. When the quota was increased to 651,000 MT (policy experiment #34), the results show that imports are less than the quota in 2005 – 2007 (see Table A.13), and hence domestic prices were lower – *i.e.* at a level between the world price plus the in-quota or out-quota rates.[10] An increase in consumer surplus was noted although there was a corresponding increase in the surplus losses incurred by producers. The loss in producer surplus was due to the increase in imports but the overall effect on net surplus was still positive and increasing if combined with reductions in tariffs.

Reductions in the out-quota rate lead to larger changes in most parameters that are being investigated. The quantities of supply, demand and imports increase when the tariffs are adjusted downward and consumer and net surplus follow suit. A loss in producer surplus are expected with the increase in imports, but coupled with liberalizing the market is also an increase in demand that producers can take advantage of in the long run.

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[10] Please refer to Chapter 4 – Static Impacts and Chapter 5 – The 1994 – 2005 base model results, for a discussion of how prices are determined

Policy Experiment # 38 (Free Market)

The final experiment was to simulate a free market situation – no quotas, and no tariffs in place. Quantity of supply under free market showed a decrease of 5%, while demand increased by about 8.5% (Tables 5.15 – 5.17 and Table 5.20). Imports under free market were about two and a half times above the baseline which translates to about the same difference in producer surplus, in reference with the baseline. Gains in consumer surplus were still more than the loss of producer surplus that leads to almost a four fold difference in net surplus in 2010 compared to the baseline. The domestic price was lower by 33% compared to the baseline, as it reflects the world price without any tariff. No tariffs also mean that there were no revenues for the government to collect. Furthermore, there were also no rents to distribute or fight for among corn importers because there was no wedge between tariffs.

Other Comparisons – Free Market with other experiments

In this section some comparisons between experiment #38 (free market) and the other experiments was made to further illustrate some points. If the results of policy experiment #1 (absolute quota) were compared with the free market, it would clearly show that the quota is a very restrictive trade policy instrument. Quotas have the effect of severely restricting imports (as much as -66.6% in 2010) and the consequence is that the domestic price is higher by 17.5% in 2010. Quotas also has the effect of stifling market demand (-4.4% in 2010), although it encouraged supply (2.7%). The outcome of such conditions translates to lower consumer and net surpluses. The producer surplus under a quota regime is also much less compared to free market. Tables 5.18 and 5.19 provide the results of the comparisons between the 'Free Market' and other policy experiments.

Policy experiment #2 (*de facto* liberalization at the level of the out-quota rate) was also compared with the free market and it too would show that the out-quota tariff of 50% is a restrictive policy instrument to liberalize trade. Compared to free market, the quantity of corn supply and quantity of demand are static at zero. Domestic corn prices are likewise static at zero, compared to the baseline than the free market price which may explain why imports are less by 38% in 2010. Policy experiment #3 (de facto liberalization at the level of the in-quota rate) also pale in comparison to the free market, and still restricts trade.

When policy experiment # 8 was compared to #38, the results show that it is the most 'liberal' or superior trade policy instrument among the experiments since it comes closest to the results of free market conditions. The difference in price between baseline and experiment #38 (free market) was 10% and imports were only 7.6% apart. Experiment #8 estimates for supply and demand were also just slightly off from free market by 0.37% and 1.5%, respectively.

When policy experiments #26, #30, and #34 were compared to #38 (Free Market), the results show that increasing the quotas are also inferior instruments in liberalizing the corn market. Prices were still 50% - 35% higher in most years (that is if the out-quota tariff is kept at 50%). Imports were about 40% lower and demand was suppressed by as much as 7% even when the quota was increased to 15% of consumption. Figures 5.3 and 5.4 show the differences between the policy experiments and the baseline and free market for supply and demand, respectively.

Finally, the baseline was compared to the free market situation and the results were the same as when the corn market was liberalized at the level of the out-quota tariff of 50%. It would therefore be prudent to say that the binding or redundant policy instrument is the out-quota tariff. Table 5.20 provide the results of the comparisons between the 'Free Market' and the baseline.

Table 5.1. Philippines: Corn market under Present TRQ system, 1995 – 2004.

Year/ (In-quota : Out-Quota Tariffs)	Quantity of Supply in 1000 MT	Quantity of Demand in 1000 MT	Quantity of Imports in 1000 MT	Market price in P/kg ($/Kg)	Below Quota Price in P/Kg ($/Kg)	Per Unit Quota Rent in P/Kg ($/Kg)
1995 (35:100)	4213.157	4343.317	130.16	5.524 (0.221)	4.489 (0.180)	1.035 (0.041)
1996 (35:100)	4319.361	4457.121	137.76	5.690 (0.228)	4.489 (0.180)	1.201 (0.048)
1997 (35:80)	4427.302	4573.112	145.81	5.868 (0.235)	4.489 (0.180)	1.379 (0.055)
1998 (35:80)	4526.421	4706.807	180.386	5.985 (0.239)	4.489 (0.180)	1.496 (0.060)
1999 (35:80)	4608.518	4871.445	262.927	5.985 (0.239)	4.489 (0.180)	1.496 (0.060)
2000 (35:65)	4618.178	5153.070	534.892	5.486 (0.219)	4.489 (0.180)	0.997 (0.040)
2001 (35:65)	4700.275	5333.949	633.674	5.486 (0.219)	4.489 (0.180)	0.997 (0.040)
2002 (35:50)	4709.935	5636.958	927.023	4.987 (0.199)	4.489 (0.180)	0.498 (0.020)
2003 (35:50)	4792.031	5835.589	1043.558	4.987 (0.199)	4.489 (0.180)	0.498 (0.020)
2004 (35:50)	4874.128	6042.539	1168.411	4.987 (0.199)	4.489 (0.180)	0.498 (0.020)

Source: Model simulations.

Table 5.2. Philippines: Corn market parameters if the present TRQ system is continued.

	Quantity of Supply (000 MT)	Quantity of Demand (000 MT)	Quantity of Imports (000 MT)	Δ Consumer Surplus ($ M)	Δ Producer Surplus ($ M)	Net Surplus ($ M)
2003	5006.394	5211.364	204.970	69.243	-67.866	1.378
2004	5111.490	5340.090	228.600	77.262	-75.587	1.675
2005	5206.044	5490.855	284.811	96.374	-93.836	2.538
2006	5300.598	5646.861	346.263	117.311	-113.648	3.663
2007	5395.152	5808.324	413.172	140.155	-135.063	5.092
2008	5489.706	5975.471	485.765	164.987	-158.115	6.872
2009	5584.260	6148.541	564.281	191.908	-182.853	9.055
2010	5678.814	6327.782	648.968	221.000	-209.307	11.693

	Prices ($/Kg)	In-Quota Tariff Revenues ($ M)	Out-Quota Tariff Revenues ($ M)	Total Revenues ($ M)	Per Unit Quota Rents ($/Kg)
2003	0.163	7.891	0.000	7.891	0.014
2004	0.165	8.352	0.641	8.993	0.016
2005	0.165	8.355	3.730	12.084	0.016
2006	0.165	8.355	7.109	15.464	0.016
2007	0.165	8.355	10.789	19.144	0.016
2008	0.165	8.355	14.782	23.137	0.016
2009	0.165	8.355	19.100	27.455	0.016
2010	0.165	8.355	23.758	32.113	0.016

Source: Model simulations.

Table 5.3. Percentage changes in quantity of supply, demand, imports, and consumer surplus from the baseline model, policy experiments 1 – 8.

	1	2	3	4	5	6	7	8
Qty of Supply								
2005	0.49%	0.00%	-1.66%	0.00%	-1.10%	-2.21%	-3.31%	-4.42%
2006	0.90%	0.00%	-1.63%	0.00%	-1.09%	-2.17%	-3.26%	-4.34%
2007	1.32%	0.00%	-1.60%	0.00%	-1.07%	-2.13%	-3.20%	-4.26%
2008	1.76%	0.00%	-1.57%	0.00%	-1.05%	-2.10%	-3.14%	-4.19%
2009	2.21%	0.00%	-1.54%	0.00%	-1.03%	-2.06%	-3.09%	-4.12%
2010	2.67%	0.00%	-1.52%	0.00%	-1.01%	-2.03%	-3.04%	-4.05%
Qty of Demand								
2005	-0.77%	0.00%	2.64%	0.00%	1.76%	3.52%	5.27%	7.03%
2006	-1.45%	0.00%	2.62%	0.00%	1.74%	3.49%	5.23%	6.98%
2007	-2.15%	0.00%	2.59%	0.00%	1.73%	3.46%	5.19%	6.92%
2008	-2.88%	0.00%	2.57%	0.00%	1.71%	3.43%	5.14%	6.86%
2009	-3.64%	0.00%	2.55%	0.00%	1.70%	3.40%	5.10%	6.80%
2010	-4.43%	0.00%	2.53%	0.00%	1.68%	3.37%	5.05%	6.74%
Qty of Imports								
2005	-23.81%	0.00%	81.14%	0.00%	54.09%	108.19%	162.28%	216.37%
2006	-37.33%	0.00%	67.58%	0.00%	45.05%	90.10%	135.15%	180.20%
2007	-47.48%	0.00%	57.35%	0.00%	38.23%	76.46%	114.69%	152.93%
2008	-55.33%	0.00%	49.40%	0.00%	32.93%	65.86%	98.80%	131.73%
2009	-61.54%	0.00%	43.07%	0.00%	28.71%	57.43%	86.14%	114.85%
2010	-66.56%	0.00%	37.93%	0.00%	25.29%	50.58%	75.86%	101.15%
Δ CS								
2005	-23.93%	0.00%	82.05%	0.00%	54.62%	109.56%	164.79%	220.27%
2006	-37.51%	0.00%	68.39%	0.00%	45.53%	91.31%	137.32%	183.53%
2007	-47.70%	0.00%	58.09%	0.00%	38.67%	77.55%	116.61%	155.82%
2008	-55.58%	0.00%	50.08%	0.00%	33.34%	66.85%	100.50%	134.29%
2009	-61.81%	0.00%	43.69%	0.00%	29.09%	58.32%	87.67%	117.12%
2010	-66.84%	0.00%	38.51%	0.00%	25.64%	51.40%	77.25%	103.19%

Source: Model simulations; CS – Consumer surplus.

Table 5.4. Percentage changes in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue from the baseline model, policy experiments 1 – 8.

	1	2	3	4	5	6	7	8
Δ PS								
2005	-23.45%	0.00%	78.18%	0.00%	52.42%	103.64%	153.66%	202.47%
2006	-36.77%	0.00%	64.85%	0.00%	43.48%	85.97%	127.46%	167.94%
2007	-46.78%	0.00%	54.79%	0.00%	36.74%	72.64%	107.70%	141.91%
2008	-54.52%	0.00%	46.98%	0.00%	31.50%	62.28%	92.34%	121.67%
2009	-60.67%	0.00%	40.76%	0.00%	27.33%	54.03%	80.11%	105.55%
2010	-65.63%	0.00%	35.71%	0.00%	23.94%	47.34%	70.18%	92.47%
NS								
2005	-41.80%	0.00%	225.30%	0.00%	136.08%	328.47%	576.19%	878.32%
2006	-60.53%	0.00%	178.38%	0.00%	109.18%	257.21%	443.44%	667.22%
2007	-72.21%	0.00%	145.41%	0.00%	89.96%	207.76%	352.92%	524.97%
2008	-79.84%	0.00%	121.23%	0.00%	75.67%	171.88%	288.27%	424.49%
2009	-85.02%	0.00%	102.86%	0.00%	64.68%	144.88%	240.33%	350.76%
2010	-88.64%	0.00%	88.53%	0.00%	56.02%	124.01%	203.74%	295.02%
IQTR								
2005	-100.00%	-100.00%	-100.00%	-85.71%	-85.71%	-85.71%	-85.71%	-85.71%
2006	-100.00%	-100.00%	-100.00%	-85.71%	-85.71%	-85.71%	-85.71%	-85.71%
2007	-100.00%	-100.00%	-100.00%	-85.71%	-85.71%	-85.71%	-85.71%	-85.71%
2008	-100.00%	-100.00%	-100.00%	-85.71%	-85.71%	-85.71%	-85.71%	-85.71%
2009	-100.00%	-100.00%	-100.00%	-85.71%	-85.71%	-85.71%	-85.71%	-85.71%
2010	-100.00%	-100.00%	-100.00%	-85.71%	-85.71%	-85.71%	-85.71%	-85.71%
OQTR								
2005	-100.00%	-100.00%	-100.00%	0.00%	161.75%	232.63%	212.63%	101.75%
2006	-100.00%	-100.00%	-100.00%	0.00%	76.54%	104.81%	84.81%	16.54%
2007	-100.00%	-100.00%	-100.00%	0.00%	44.42%	56.63%	36.63%	-15.58%
2008	-100.00%	-100.00%	-100.00%	0.00%	27.62%	31.42%	11.42%	-32.38%
2009	-100.00%	-100.00%	-100.00%	0.00%	17.32%	15.98%	-4.02%	-42.68%
2010	-100.00%	-100.00%	-100.00%	0.00%	10.39%	5.59%	-14.41%	-49.61%

Source: Model simulations; PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table 5.5. Percentage changes in total tariff revenue, prices and total quota rent from the baseline model, policy experiments 1 – 8.

	1	2	3	4	5	6	7	8
TTR								
2005	-100.00%	29.63%	64.37%	-59.26%	-9.34%	12.54%	6.37%	-27.85%
2006	-100.00%	23.15%	44.46%	-46.31%	-11.12%	1.88%	-7.31%	-38.70%
2007	-100.00%	18.70%	30.74%	-37.41%	-12.37%	-5.49%	-16.76%	-46.19%
2008	-100.00%	15.48%	20.76%	-30.95%	-13.31%	-10.87%	-23.65%	-51.64%
2009	-100.00%	13.04%	13.21%	-26.08%	-14.03%	-14.96%	-28.88%	-55.77%
2010	-100.00%	11.15%	7.32%	-22.30%	-14.61%	-18.16%	-32.96%	-59.00%
Prices								
2005	2.93%	0.00%	-10.00%	0.00%	-6.66%	-13.33%	-20.00%	-26.67%
2006	5.52%	0.00%	-10.00%	0.00%	-6.66%	-13.33%	-20.00%	-26.67%
2007	8.27%	0.00%	-10.00%	0.00%	-6.66%	-13.33%	-20.00%	-26.67%
2008	11.20%	0.00%	-10.00%	0.00%	-6.66%	-13.33%	-20.00%	-26.67%
2009	14.29%	0.00%	-10.00%	0.00%	-6.66%	-13.33%	-20.00%	-26.67%
2010	17.54%	0.00%	-10.00%	0.00%	-6.66%	-13.33%	-20.00%	-26.67%
TQR								
2005	262.75%	233.45%	133.45%	200.11%	133.45%	66.78%	0.00%	-66.67%
2006	288.70%	233.45%	133.45%	200.11%	133.45%	66.78%	0.00%	-66.67%
2007	316.22%	233.45%	133.45%	200.11%	133.45%	66.78%	0.00%	-66.67%
2008	345.53%	233.45%	133.45%	200.11%	133.45%	66.78%	0.00%	-66.67%
2009	376.40%	233.45%	133.45%	200.11%	133.45%	66.78%	0.00%	-66.67%
2010	408.95%	233.45%	133.45%	200.11%	133.45%	66.78%	0.00%	-66.67%

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table 5.6. Percentage changes in quantity of supply, demand, imports, and consumer surplus from the baseline model, policy experiments 9 – 16.

	9	10	11	12	13	14	15	16
Qty of Supply								
2005	-2.21%	-2.76%	-3.31%	-3.87%	-4.42%	-1.66%	-2.21%	-2.76%
2006	-2.17%	-2.71%	-3.26%	-3.80%	-4.34%	-1.63%	-2.17%	-2.71%
2007	-2.13%	-2.67%	-3.20%	-3.73%	-4.26%	-1.60%	-2.13%	-2.67%
2008	-2.10%	-2.62%	-3.14%	-3.67%	-4.19%	-1.57%	-2.10%	-2.62%
2009	-2.06%	-2.57%	-3.09%	-3.60%	-4.12%	-1.54%	-2.06%	-2.57%
2010	-2.03%	-2.53%	-3.04%	-3.54%	-4.05%	-1.52%	-2.03%	-2.53%
Qty of Demand								
2005	3.52%	4.40%	5.27%	6.15%	7.03%	2.64%	3.52%	4.40%
2006	3.49%	4.36%	5.23%	6.10%	6.98%	2.62%	3.49%	4.36%
2007	3.46%	4.32%	5.19%	6.05%	6.92%	2.59%	3.46%	4.32%
2008	3.43%	4.29%	5.14%	6.00%	6.86%	2.57%	3.43%	4.29%
2009	3.40%	4.25%	5.10%	5.95%	6.80%	2.55%	3.40%	4.25%
2010	3.37%	4.21%	5.05%	5.90%	6.74%	2.53%	3.37%	4.21%
Qty of Imports								
2005	108.19%	135.23%	162.28%	189.32%	216.37%	81.14%	108.19%	135.23%
2006	90.10%	112.63%	135.15%	157.68%	180.20%	67.58%	90.10%	112.63%
2007	76.46%	95.58%	114.69%	133.81%	152.93%	57.35%	76.46%	95.58%
2008	65.86%	82.33%	98.80%	115.26%	131.73%	49.40%	65.86%	82.33%
2009	57.43%	71.78%	86.14%	100.49%	114.85%	43.07%	57.43%	71.78%
2010	50.58%	63.22%	75.86%	88.51%	101.15%	37.93%	50.58%	63.22%
Δ CS								
2005	109.56%	166.14%	164.79%	192.50%	220.27%	82.05%	109.56%	137.14%
2006	91.31%	114.29%	137.32%	160.40%	183.53%	68.39%	91.31%	114.29%
2007	77.55%	97.06%	116.61%	136.20%	155.82%	58.09%	77.55%	97.06%
2008	66.85%	83.66%	100.50%	117.38%	134.29%	50.08%	66.85%	83.66%
2009	58.32%	72.98%	87.67%	102.38%	117.12%	43.69%	58.32%	72.98%
2010	51.40%	64.31%	77.25%	90.21%	103.19%	38.51%	51.40%	64.31%

Source: Model simulations; CS – Consumer surplus.

Table 5.7. Percentage changes in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue from the baseline model, policy experiments 9 – 16.

	9	10	11	12	13	14	15	16
Δ PS								
2005	103.64%	154.91%	153.66%	178.22%	202.47%	78.18%	103.64%	128.80%
2006	85.97%	106.84%	127.46%	147.83%	167.94%	64.85%	85.97%	106.84%
2007	72.64%	90.27%	107.70%	124.91%	141.91%	54.79%	72.64%	90.27%
2008	62.28%	77.40%	92.34%	107.10%	121.67%	46.98%	62.28%	77.40%
2009	54.03%	67.15%	80.11%	92.91%	105.55%	40.76%	54.03%	67.15%
2010	47.34%	58.83%	70.18%	81.40%	92.47%	35.71%	47.34%	58.83%
NS								
2005	328.47%	581.17%	576.19%	720.51%	878.32%	225.30%	328.47%	445.47%
2006	257.21%	345.59%	443.44%	550.68%	667.22%	178.38%	257.21%	345.59%
2007	207.76%	276.95%	352.92%	435.61%	524.97%	145.41%	207.76%	276.95%
2008	171.88%	227.57%	288.27%	353.92%	424.49%	121.23%	171.88%	227.57%
2009	144.88%	190.71%	240.33%	293.69%	350.76%	102.86%	144.88%	190.71%
2010	124.01%	162.42%	203.74%	247.95%	295.02%	88.53%	124.01%	162.42%
IQTR								
2005	-14.29%	-28.57%	-42.86%	-57.14%	-71.43%	0.00%	-14.29%	-28.57%
2006	-14.29%	-28.57%	-42.86%	-57.14%	-71.43%	0.00%	-14.29%	-28.57%
2007	-14.29%	-28.57%	-42.86%	-57.14%	-71.43%	0.00%	-14.29%	-28.57%
2008	-14.29%	-28.57%	-42.86%	-57.14%	-71.43%	0.00%	-14.29%	-28.57%
2009	-14.29%	-28.57%	-42.86%	-57.14%	-71.43%	0.00%	-14.29%	-28.57%
2010	-14.29%	-28.57%	-42.86%	-57.14%	-71.43%	0.00%	-14.29%	-28.57%
OQTR								
2005	454.38%	567.98%	681.58%	795.17%	908.77%	252.63%	343.51%	434.39%
2006	241.36%	301.69%	362.03%	422.37%	482.71%	124.81%	173.08%	221.36%
2007	161.04%	201.30%	241.57%	281.83%	322.09%	76.63%	108.84%	141.04%
2008	119.04%	148.80%	178.56%	208.32%	238.08%	51.42%	75.23%	99.04%
2009	93.31%	116.63%	139.96%	163.29%	186.61%	35.98%	54.65%	73.31%
2010	75.98%	94.98%	113.97%	132.97%	151.96%	25.59%	40.79%	55.98%

Source: Model simulations; PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table 5.8. Percentage changes in total tariff revenue, prices and total quota rent from the baseline model, policy experiments 9 – 16.

	9	10	11	12	13	14	15	16
TTR								
2005	130.36%	155.55%	180.73%	205.91%	231.10%	77.97%	96.14%	114.31%
2006	103.24%	123.27%	143.29%	163.31%	183.33%	57.38%	71.86%	86.33%
2007	84.53%	100.99%	117.44%	133.90%	150.36%	43.19%	55.10%	67.02%
2008	70.90%	84.75%	98.61%	112.46%	126.32%	32.86%	42.91%	52.96%
2009	60.57%	72.45%	84.33%	96.21%	108.09%	25.03%	33.67%	42.31%
2010	52.50%	62.84%	73.17%	83.51%	93.85%	18.93%	26.46%	33.98%
Prices								
2005	0.00%	0.00%	0.00%	0.00%	0.00%	-6.66%	-6.66%	-6.66%
2006	0.00%	0.00%	0.00%	0.00%	0.00%	-6.66%	-6.66%	-6.66%
2007	0.00%	0.00%	0.00%	0.00%	0.00%	-6.66%	-6.66%	-6.66%
2008	0.00%	0.00%	0.00%	0.00%	0.00%	-6.66%	-6.66%	-6.66%
2009	0.00%	0.00%	0.00%	0.00%	0.00%	-6.66%	-6.66%	-6.66%
2010	0.00%	0.00%	0.00%	0.00%	0.00%	-6.66%	-6.66%	-6.66%
TQR								
2005	33.33%	66.78%	100.11%	133.45%	166.78%	-66.67%	-33.33%	0.11%
2006	33.33%	66.78%	100.11%	133.45%	166.78%	-66.67%	-33.33%	0.11%
2007	33.33%	66.78%	100.11%	133.45%	166.78%	-66.67%	-33.33%	0.11%
2008	33.33%	66.78%	100.11%	133.45%	166.78%	-66.67%	-33.33%	0.11%
2009	33.33%	66.78%	100.11%	133.45%	166.78%	-66.67%	-33.33%	0.11%
2010	33.33%	66.78%	100.11%	133.45%	166.78%	-66.67%	-33.33%	0.11%

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table 5.9. Percentage changes in quantity of supply, demand, imports, and consumer surplus from the baseline model, policy experiments 17 – 24.

	17	18	19	20	21	22	23	24
Qty of Supply								
2005	-3.31%	-3.87%	-4.42%	-2.76%	-3.31%	-3.87%	-4.42%	-3.87%
2006	-3.26%	-3.80%	-4.34%	-2.71%	-3.26%	-3.80%	-4.34%	-3.80%
2007	-3.20%	-3.73%	-4.26%	-2.67%	-3.20%	-3.73%	-4.26%	-3.73%
2008	-3.14%	-3.67%	-4.19%	-2.62%	-3.14%	-3.67%	-4.19%	-3.67%
2009	-3.09%	-3.60%	-4.12%	-2.57%	-3.09%	-3.60%	-4.12%	-3.60%
2010	-3.04%	-3.54%	-4.05%	-2.53%	-3.04%	-3.54%	-4.05%	-3.54%
Qty of Demand								
2005	5.27%	6.15%	7.03%	4.40%	5.27%	6.15%	7.03%	6.15%
2006	5.23%	6.10%	6.98%	4.36%	5.23%	6.10%	6.98%	6.10%
2007	5.19%	6.05%	6.92%	4.32%	5.19%	6.05%	6.92%	6.05%
2008	5.14%	6.00%	6.86%	4.29%	5.14%	6.00%	6.86%	6.00%
2009	5.10%	5.95%	6.80%	4.25%	5.10%	5.95%	6.80%	5.95%
2010	5.05%	5.90%	6.74%	4.21%	5.05%	5.90%	6.74%	5.90%
Qty of Imports								
2005	162.28%	189.32%	216.37%	135.23%	162.28%	189.32%	216.37%	189.32%
2006	135.15%	157.68%	180.20%	112.63%	135.15%	157.68%	180.20%	157.68%
2007	114.69%	133.81%	152.93%	95.58%	114.69%	133.81%	152.93%	133.81%
2008	98.80%	115.26%	131.73%	82.33%	98.80%	115.26%	131.73%	115.26%
2009	86.14%	100.49%	114.85%	71.78%	86.14%	100.49%	114.85%	100.49%
2010	75.86%	88.51%	101.15%	63.22%	75.86%	88.51%	101.15%	88.51%
Δ CS								
2005	164.79%	192.50%	220.27%	137.14%	164.79%	192.50%	220.27%	192.50%
2006	137.32%	160.40%	183.53%	114.29%	137.32%	160.40%	183.53%	160.40%
2007	116.61%	136.20%	155.82%	97.06%	116.61%	136.20%	155.82%	136.20%
2008	100.50%	117.38%	134.29%	83.66%	100.50%	117.38%	134.29%	117.38%
2009	87.67%	102.38%	117.12%	72.98%	87.67%	102.38%	117.12%	102.38%
2010	77.25%	90.21%	103.19%	64.31%	77.25%	90.21%	103.19%	90.21%

Source: Model simulations; CS – Consumer surplus.

Table 5.10. Percentage changes in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue from the baseline model, policy experiments 17 – 24.

	17	18	19	20	21	22	23	24
$\varDelta$ PS								
2005	153.66%	178.22%	202.47%	128.80%	153.66%	178.22%	202.47%	178.22%
2006	127.46%	147.83%	167.94%	106.84%	127.46%	147.83%	167.94%	147.83%
2007	107.70%	124.91%	141.91%	90.27%	107.70%	124.91%	141.91%	124.91%
2008	92.34%	107.10%	121.67%	77.40%	92.34%	107.10%	121.67%	107.10%
2009	80.11%	92.91%	105.55%	67.15%	80.11%	92.91%	105.55%	92.91%
2010	70.18%	81.40%	92.47%	58.83%	70.18%	81.40%	92.47%	81.40%
NS								
2005	576.19%	720.51%	878.32%	445.47%	576.19%	720.51%	878.32%	720.51%
2006	443.44%	550.68%	667.22%	345.59%	443.44%	550.68%	667.22%	550.68%
2007	352.92%	435.61%	524.97%	276.95%	352.92%	435.61%	524.97%	435.61%
2008	288.27%	353.92%	424.49%	227.57%	288.27%	353.92%	424.49%	353.92%
2009	240.33%	293.69%	350.76%	190.71%	240.33%	293.69%	350.76%	293.69%
2010	203.74%	247.95%	295.02%	162.42%	203.74%	247.95%	295.02%	247.95%
IQTR								
2005	-42.86%	-57.14%	-71.43%	-28.57%	-42.86%	-57.14%	-71.43%	-57.14%
2006	-42.86%	-57.14%	-71.43%	-28.57%	-42.86%	-57.14%	-71.43%	-57.14%
2007	-42.86%	-57.14%	-71.43%	-28.57%	-42.86%	-57.14%	-71.43%	-57.14%
2008	-42.86%	-57.14%	-71.43%	-28.57%	-42.86%	-57.14%	-71.43%	-57.14%
2009	-42.86%	-57.14%	-71.43%	-28.57%	-42.86%	-57.14%	-71.43%	-57.14%
2010	-42.86%	-57.14%	-71.43%	-28.57%	-42.86%	-57.14%	-71.43%	-57.14%
OQTR								
2005	525.26%	616.14%	707.02%	300.79%	368.95%	437.10%	505.26%	258.07%
2006	269.63%	317.90%	366.17%	141.02%	177.22%	213.42%	249.63%	108.95%
2007	173.25%	205.46%	237.67%	80.78%	104.94%	129.10%	153.25%	52.73%
2008	122.85%	146.66%	170.47%	49.28%	67.14%	84.99%	102.85%	23.33%
2009	91.97%	110.63%	129.29%	29.98%	43.98%	57.97%	71.97%	5.32%
2010	71.18%	86.38%	101.57%	16.99%	28.38%	39.78%	51.18%	-6.81%

Source: Model simulations; PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table 5.11. Percentage changes in total tariff revenue, prices and total quota rent from the baseline model, policy experiments 17 – 24.

	17	18	19	20	21	22	23	24
TTR								
2005	132.49%	150.66%	168.83%	73.08%	84.24%	95.40%	106.56%	40.14%
2006	100.81%	115.28%	129.75%	49.40%	58.32%	67.25%	76.18%	19.22%
2007	78.94%	90.86%	102.78%	33.06%	40.44%	47.82%	55.20%	4.78%
2008	63.01%	73.07%	83.12%	21.17%	27.42%	33.67%	39.92%	-5.73%
2009	50.94%	59.58%	68.21%	12.16%	17.55%	22.94%	28.33%	-13.69%
2010	41.51%	49.04%	56.56%	5.13%	9.85%	14.57%	19.28%	-19.91%
Prices								
2005	-6.66%	-6.66%	-6.66%	-13.33%	-13.33%	-13.33%	-13.33%	-20.00%
2006	-6.66%	-6.66%	-6.66%	-13.33%	-13.33%	-13.33%	-13.33%	-20.00%
2007	-6.66%	-6.66%	-6.66%	-13.33%	-13.33%	-13.33%	-13.33%	-20.00%
2008	-6.66%	-6.66%	-6.66%	-13.33%	-13.33%	-13.33%	-13.33%	-20.00%
2009	-6.66%	-6.66%	-6.66%	-13.33%	-13.33%	-13.33%	-13.33%	-20.00%
2010	-6.66%	-6.66%	-6.66%	-13.33%	-13.33%	-13.33%	-13.33%	-20.00%
TQR								
2005	33.45%	66.78%	100.11%	-66.55%	-33.22%	0.11%	33.45%	-66.67%
2006	33.45%	66.78%	100.11%	-66.55%	-33.22%	0.11%	33.45%	-66.67%
2007	33.45%	66.78%	100.11%	-66.55%	-33.22%	0.11%	33.45%	-66.67%
2008	33.45%	66.78%	100.11%	-66.55%	-33.22%	0.11%	33.45%	-66.67%
2009	33.45%	66.78%	100.11%	-66.55%	-33.22%	0.11%	33.45%	-66.67%
2010	33.45%	66.78%	100.11%	-66.55%	-33.22%	0.11%	33.45%	-66.67%

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table 5.12. Percentage changes in quantity of supply, demand, imports, and consumer surplus from the baseline model, policy experiments 25 – 31.

	25	26	27	28	29	30	31
Qty of Supply							
2005	-4.42%	-0.23%	-1.10%	-2.21%	-3.31%	-1.07%	-1.10%
2006	-4.34%	0.00%	-1.09%	-2.17%	-3.26%	-0.61%	-1.09%
2007	-4.26%	0.00%	-1.07%	-2.13%	-3.20%	-0.14%	-1.07%
2008	-4.19%	0.00%	-1.05%	-2.10%	-3.14%	0.00%	-1.05%
2009	-4.12%	0.00%	-1.03%	-2.06%	-3.09%	0.00%	-1.03%
2010	-4.05%	0.00%	-1.01%	-2.03%	-3.04%	0.00%	-1.01%
Qty of Demand							
2005	7.03%	0.37%	1.76%	3.52%	5.27%	1.70%	1.76%
2006	6.98%	0.00%	1.74%	3.49%	5.23%	0.98%	1.74%
2007	6.92%	0.00%	1.73%	3.46%	5.19%	0.23%	1.73%
2008	6.86%	0.00%	1.71%	3.43%	5.14%	0.00%	1.71%
2009	6.80%	0.00%	1.70%	3.40%	5.10%	0.00%	1.70%
2010	6.74%	0.00%	1.68%	3.37%	5.05%	0.00%	1.68%
Qty of Imports							
2005	216.37%	11.30%	54.09%	108.19%	162.28%	52.38%	54.09%
2006	180.20%	0.00%	45.05%	90.10%	135.15%	25.34%	45.05%
2007	152.93%	0.00%	38.23%	76.46%	114.69%	5.04%	38.23%
2008	131.73%	0.00%	32.93%	65.86%	98.80%	0.00%	32.93%
2009	114.85%	0.00%	28.71%	57.43%	86.14%	0.00%	28.71%
2010	101.15%	0.00%	25.29%	50.58%	75.86%	0.00%	25.29%
Δ CS							
2005	220.27%	11.38%	54.62%	109.56%	164.79%	52.89%	54.62%
2006	183.53%	0.00%	45.53%	91.31%	137.32%	25.57%	45.53%
2007	155.82%	0.00%	38.67%	77.55%	116.61%	5.09%	38.67%
2008	134.29%	0.00%	33.34%	66.85%	100.50%	0.00%	33.34%
2009	117.12%	0.00%	29.09%	58.32%	87.67%	0.00%	29.09%
2010	103.19%	0.00%	25.64%	51.40%	77.25%	0.00%	25.64%

Source: Model simulations; CS – Consumer surplus.

Table 5.13. Percentage changes in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue from the baseline model, policy experiments 25 – 31.

	25	26	27	28	29	30	31
Δ PS							
2005	202.47%	11.05%	52.42%	103.64%	153.66%	50.78%	52.42%
2006	167.94%	0.00%	43.48%	85.97%	127.46%	24.57%	43.48%
2007	141.91%	0.00%	36.73%	72.64%	107.70%	4.89%	36.74%
2008	121.67%	0.00%	31.50%	62.28%	92.34%	0.00%	31.50%
2009	105.55%	0.00%	27.33%	54.03%	80.11%	0.00%	27.33%
2010	92.47%	0.00%	23.94%	47.34%	70.18%	0.00%	23.94%
NS							
2005	878.32%	23.73%	136.08%	328.47%	576.19%	130.91%	136.08%
2006	667.22%	0.00%	109.18%	257.21%	443.44%	56.58%	109.18%
2007	524.97%	0.00%	89.95%	207.76%	352.92%	10.25%	89.96%
2008	424.49%	0.00%	75.67%	171.88%	288.27%	0.00%	75.67%
2009	350.76%	0.00%	64.68%	144.88%	240.33%	0.00%	64.68%
2010	295.02%	0.00%	56.02%	124.01%	203.74%	0.00%	56.02%
IQTR							
2005	-71.43%	46.08%	25.21%	-16.52%	-58.26%	100.00%	71.43%
2006	-71.43%	46.08%	25.21%	-16.52%	-58.26%	100.00%	71.43%
2007	-71.43%	46.08%	25.21%	-16.52%	-58.26%	100.00%	71.43%
2008	-71.43%	46.08%	25.21%	-16.52%	-58.26%	100.00%	71.43%
2009	-71.43%	46.08%	25.21%	-16.52%	-58.26%	100.00%	71.43%
2010	-71.43%	46.08%	25.21%	-16.52%	-58.26%	100.00%	71.43%
OQTR							
2005	303.51%	-100.00%	43.78%	144.15%	153.64%	-100.00%	-94.25%
2006	133.09%	-77.36%	14.65%	58.40%	53.87%	-100.00%	-57.76%
2007	68.84%	-50.98%	3.64%	26.04%	16.24%	-100.00%	-44.08%
2008	35.23%	-37.21%	-2.15%	9.10%	-3.46%	-80.74%	-36.98%
2009	14.65%	-28.80%	-5.71%	-1.29%	-15.53%	-62.49%	-32.67%
2010	0.79%	-23.15%	-8.13%	-8.30%	-23.67%	-50.24%	-29.80%

Source: Model simulations; PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table 5.14. Percentage changes in total tariff revenue, prices and total quota rent from the baseline model, policy experiments 25 – 31.

	25	26	27	28	29	30	31
TTR							
2005	44.29%	1.00%	30.94%	33.07%	7.14%	38.27%	20.29%
2006	22.60%	-10.67%	20.36%	17.92%	-6.71%	8.05%	12.04%
2007	7.62%	-8.62%	13.05%	7.47%	-16.28%	-12.72%	6.33%
2008	-3.28%	-7.13%	7.73%	-0.15%	-23.25%	-15.48%	2.17%
2009	-11.55%	-6.01%	3.70%	-5.93%	-28.54%	-13.04%	-0.99%
2010	-18.00%	-5.14%	0.55%	-10.44%	-32.67%	-11.15%	-3.46%
Prices							
2005	-20.00%	-1.40%	-6.66%	-13.33%	-20.00%	-6.45%	-6.66%
2006	-20.00%	0.00%	-6.66%	-13.33%	-20.00%	-3.75%	-6.66%
2007	-20.00%	0.00%	-6.66%	-13.33%	-20.00%	-0.88%	-6.66%
2008	-20.00%	0.00%	-6.66%	-13.33%	-20.00%	0.00%	-6.66%
2009	-20.00%	0.00%	-6.66%	-13.33%	-20.00%	0.00%	-6.66%
2010	-20.00%	0.00%	-6.66%	-13.33%	-20.00%	0.00%	-6.66%
TQR							
2005	-33.33%	-13.98%	-33.33%	-33.22%	-33.33%	-64.54%	-33.33%
2006	-33.33%	0.00%	-33.33%	-33.22%	-33.33%	-37.47%	-33.33%
2007	-33.33%	0.00%	-33.33%	-33.22%	-33.33%	-8.84%	-33.33%
2008	-33.33%	0.00%	-33.33%	-33.22%	-33.33%	0.00%	-33.33%
2009	-33.33%	0.00%	-33.33%	-33.22%	-33.33%	0.00%	-33.33%
2010	-33.33%	0.00%	-33.33%	-33.22%	-33.33%	0.00%	-33.33%

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table 5.15. Percentage changes in quantity of supply, demand, imports, and consumer surplus from the baseline model, policy experiments 32 – 38.

	32	33	34	35	36	37	38
Qty of Supply							
2005	-2.21%	-3.31%	-1.66%	-2.21%	-2.63%	-3.31%	-5.52%
2006	-2.17%	-3.26%	-1.63%	-2.12%	-2.17%	-3.26%	-5.43%
2007	-2.13%	-3.20%	-1.60%	-1.61%	-2.13%	-3.20%	-5.33%
2008	-2.10%	-3.14%	-1.08%	-1.08%	-2.10%	-3.14%	-5.24%
2009	-2.06%	-3.09%	-0.55%	-1.03%	-2.06%	-3.09%	-5.15%
2010	-2.03%	-3.04%	-0.01%	-1.01%	-2.03%	-3.04%	-5.06%
Qty of Demand							
2005	3.52%	5.27%	2.64%	3.52%	4.18%	5.27%	8.79%
2006	3.49%	5.23%	2.62%	3.41%	3.49%	5.23%	8.72%
2007	3.46%	5.19%	2.59%	2.60%	3.46%	5.19%	8.65%
2008	3.43%	5.14%	1.77%	1.77%	3.43%	5.14%	8.57%
2009	3.40%	5.10%	0.91%	1.70%	3.40%	5.10%	8.50%
2010	3.37%	5.05%	0.02%	1.68%	3.37%	5.05%	8.42%
Qty of Imports							
2005	108.19%	162.28%	81.14%	108.19%	128.57%	162.28%	270.46%
2006	90.10%	135.15%	67.58%	88.01%	90.10%	135.15%	225.25%
2007	76.46%	114.69%	57.35%	57.56%	76.46%	114.69%	191.16%
2008	65.86%	98.80%	34.02%	34.02%	65.86%	98.80%	164.66%
2009	57.43%	86.14%	15.37%	28.71%	57.43%	86.14%	143.56%
2010	50.58%	75.86%	0.31%	25.29%	50.58%	75.86%	126.44%
Δ CS							
2005	109.56%	164.79%	82.05%	109.56%	130.34%	164.79%	275.97%
2006	91.31%	137.32%	68.39%	89.18%	91.31%	137.32%	229.91%
2007	77.55%	116.61%	58.09%	58.30%	77.55%	116.61%	195.18%
2008	66.85%	100.50%	34.44%	34.44%	66.85%	100.50%	168.18%
2009	58.32%	87.67%	15.55%	29.09%	58.32%	87.67%	146.67%
2010	51.40%	77.25%	0.32%	25.64%	51.40%	77.25%	129.21%

Source: Model simulations; CS – Consumer surplus.

Table 5.16. Percentage changes in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue from the baseline model, policy experiments 32 – 38.

	32	33	34	35	36	37	38
Δ PS							
2005	103.64%	153.66%	78.18%	103.64%	122.63%	153.66%	250.06%
2006	85.97%	127.46%	64.85%	84.01%	85.97%	127.46%	207.42%
2007	72.64%	107.70%	54.79%	54.99%	72.64%	107.70%	175.26%
2008	62.28%	92.34%	32.53%	32.53%	62.28%	92.34%	150.27%
2009	54.03%	80.11%	14.71%	27.33%	54.03%	80.11%	130.37%
2010	47.34%	70.18%	0.30%	23.94%	47.34%	70.18%	114.21%
NS							
2005	328.47%	576.19%	225.30%	328.47%	415.39%	576.19%	1233.94%
2006	257.21%	443.44%	178.38%	249.48%	257.21%	443.44%	927.89%
2007	207.76%	352.92%	145.41%	146.07%	207.76%	352.92%	723.44%
2008	171.88%	288.27%	78.51%	78.51%	171.88%	288.27%	580.20%
2009	144.88%	240.33%	32.67%	64.68%	144.88%	240.33%	475.90%
2010	124.01%	203.74%	0.62%	56.02%	124.01%	203.74%	397.63%
IQTR							
2005	71.43%	14.29%	137.74%	134.21%	71.43%	-14.29%	-100.00%
2006	71.43%	14.29%	167.40%	157.14%	71.43%	-14.29%	-100.00%
2007	71.43%	14.29%	199.59%	157.14%	71.43%	-14.29%	-100.00%
2008	71.43%	14.29%	200.00%	157.14%	71.43%	-14.29%	-100.00%
2009	71.43%	14.29%	200.00%	157.14%	71.43%	-14.29%	-100.00%
2010	71.43%	14.29%	200.00%	157.14%	71.43%	-14.29%	-100.00%
OQTR							
2005	40.63%	84.63%	-100.00%	-100.00%	-100.00%	-43.37%	-100.00%
2006	4.09%	17.66%	-100.00%	-100.00%	-96.64%	-49.49%	-100.00%
2007	-9.74%	-7.62%	-100.00%	-100.00%	-76.11%	-51.87%	-100.00%
2008	-17.02%	-20.87%	-100.00%	-100.00%	-65.46%	-53.17%	-100.00%
2009	-21.51%	-29.01%	-100.00%	-82.65%	-59.00%	-54.00%	-100.00%
2010	-24.55%	-34.50%	-100.00%	-69.98%	-54.69%	-54.60%	-100.00%

Source: Model simulations; PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table 5.17. Percentage changes in total tariff revenue, prices and total quota rent from the baseline model, policy experiments 32 – 38.

	32	33	34	35	36	37	38
TTR							
2005	61.92%	36.00%	64.37%	61.92%	18.52%	-23.26%	-100.00%
2006	40.47%	15.84%	44.46%	38.92%	-5.84%	-30.47%	-100.00%
2007	25.68%	1.94%	30.74%	12.22%	-11.73%	-35.47%	-100.00%
2008	14.92%	-8.18%	8.33%	-7.15%	-16.03%	-39.13%	-100.00%
2009	6.77%	-15.84%	-8.71%	-9.68%	-19.31%	-41.92%	-100.00%
2010	0.42%	-21.81%	-21.95%	-10.89%	-21.88%	-44.11%	-100.00%
Prices							
2005	-13.33%	-20.00%	-10.00%	-13.33%	-15.84%	-20.00%	-33.33%
2006	-13.33%	-20.00%	-10.00%	-13.03%	-13.33%	-20.00%	-33.33%
2007	-13.33%	-20.00%	-10.00%	-10.04%	-13.33%	-20.00%	-33.33%
2008	-13.33%	-20.00%	-6.89%	-6.89%	-13.33%	-20.00%	-33.33%
2009	-13.33%	-20.00%	-3.57%	-6.66%	-13.33%	-20.00%	-33.33%
2010	-13.33%	-20.00%	-0.08%	-6.66%	-13.33%	-20.00%	-33.33%
TQR							
2005	-33.22%	-33.33%	-100.00%	-100.00%	-58.39%	-33.33%	-100.00%
2006	-33.22%	-33.33%	-100.00%	-96.98%	-33.22%	-33.33%	-100.00%
2007	-33.22%	-33.33%	-100.00%	-67.11%	-33.22%	-33.33%	-100.00%
2008	-33.22%	-33.33%	-68.90%	-35.57%	-33.22%	-33.33%	-100.00%
2009	-33.22%	-33.33%	-35.68%	-33.33%	-33.22%	-33.33%	-100.00%
2010	-33.22%	-33.33%	-0.78%	-33.33%	-33.22%	-33.33%	-100.00%

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table 5.18. Percent differences in the quantity of supply, demand, imports and consumer surplus from the free market model (#38), various policy experiments.

	#1	#2	#3	#8	#26	#30	#34
Qty of Supply							
2005	6.36%	5.85%	4.09%	1.17%	5.60%	4.71%	4.09%
2006	6.69%	5.74%	4.02%	1.15%	5.74%	5.09%	4.02%
2007	7.03%	5.63%	3.94%	1.13%	5.63%	5.48%	3.94%
2008	7.39%	5.53%	3.87%	1.11%	5.53%	5.53%	4.39%
2009	7.76%	5.43%	3.80%	1.09%	5.43%	5.43%	4.85%
2010	8.14%	5.33%	3.73%	1.07%	5.33%	5.33%	5.32%
Qty of Demand							
2005	-8.79%	-8.08%	-5.66%	-1.62%	-7.74%	-6.52%	-5.66%
2006	-9.35%	-8.02%	-5.61%	-1.60%	-8.02%	-7.12%	-5.61%
2007	-9.94%	-7.96%	-5.57%	-1.59%	-7.96%	-7.75%	-5.57%
2008	-10.55%	-7.90%	-5.53%	-1.58%	-7.90%	-7.90%	-6.26%
2009	-11.19%	-7.83%	-5.48%	-1.57%	-7.83%	-7.83%	-6.99%
2010	-11.86%	-7.77%	-5.44%	-1.55%	-7.77%	-7.77%	-7.75%
Qty of Imports							
2005	-79.43%	-73.01%	-51.10%	-14.60%	-69.96%	-58.87%	-51.10%
2006	-80.73%	-69.25%	-48.48%	-13.85%	-69.25%	-61.46%	-48.48%
2007	-81.96%	-65.65%	-45.96%	-13.13%	-65.65%	-63.92%	-45.96%
2008	-83.12%	-62.22%	-43.55%	-12.44%	-62.22%	-62.22%	-49.36%
2009	-84.21%	-58.94%	-41.26%	-11.79%	-58.94%	-58.94%	-52.63%
2010	-85.23%	-55.84%	-39.09%	-11.17%	-55.84%	-55.84%	-55.70%
Δ CS							
2005	-79.77%	-73.40%	-51.58%	-14.82%	-70.37%	-59.34%	-51.58%
2006	-81.06%	-69.69%	-48.96%	-14.06%	-69.69%	-61.94%	-48.96%
2007	-82.28%	-66.12%	-46.44%	-13.33%	-66.12%	-64.40%	-46.44%
2008	-83.44%	-62.71%	-44.04%	-12.64%	-62.71%	-62.71%	-49.87%
2009	-84.52%	-59.46%	-41.75%	-11.98%	-59.46%	-59.46%	-53.15%
2010	-85.53%	-56.37%	-39.57%	-11.35%	-56.37%	-56.37%	-56.23%

Source: Model simulations; CS – Consumer surplus.

Table 5.19. Percent differences in producer surplus, net surplus, and prices from the free market model (#38), various policy experiments.

	#1	#2	#3	#8	#26	#30	#34
Δ PS							
2005	-78.13%	-71.43%	-49.10%	-13.59%	-68.28%	-56.93%	-49.10%
2006	-79.43%	-67.47%	-46.38%	-12.84%	-67.47%	-59.48%	-46.38%
2007	-80.67%	-63.67%	-43.77%	-12.12%	-63.67%	-61.89%	-43.77%
2008	-81.83%	-60.04%	-41.27%	-11.43%	-60.04%	-60.04%	-47.05%
2009	-82.93%	-56.59%	-38.90%	-10.77%	-56.59%	-56.59%	-50.21%
2010	-83.95%	-53.32%	-36.65%	-10.15%	-53.32%	-53.32%	-53.18%
NS							
2005	-95.64%	-92.50%	-75.61%	-26.66%	-90.72%	-82.69%	-75.61%
2006	-96.16%	-90.27%	-72.92%	-25.36%	-90.27%	-84.77%	-72.92%
2007	-96.63%	-87.86%	-70.20%	-24.10%	-87.86%	-86.61%	-70.20%
2008	-97.04%	-85.30%	-67.48%	-22.89%	-85.30%	-85.30%	-73.76%
2009	-97.40%	-82.64%	-64.78%	-21.73%	-82.64%	-82.64%	-76.96%
2010	-97.72%	-79.90%	-62.11%	-20.62%	-79.90%	-79.90%	-79.78%
Prices							
2005	50.77%	50.00%	35.01%	10.00%	47.90%	40.32%	35.01%
2006	54.39%	50.00%	35.01%	10.00%	50.00%	44.38%	35.01%
2007	58.29%	50.00%	35.01%	10.00%	50.00%	48.67%	35.01%
2008	62.41%	50.00%	35.01%	10.00%	50.00%	50.00%	39.67%
2009	66.81%	50.00%	35.01%	10.00%	50.00%	50.00%	44.65%
2010	71.44%	50.00%	35.01%	10.00%	50.00%	50.00%	49.88%

Source: Model simulations; PS – Producer surplus, NS – Net surplus.

Table 5.20. Philippines: Percent differences in the corn market parameters – Free Market with Baseline Model.

	Quantity of Supply	Quantity of Demand	Quantity of Imports	ΔConsumer Surplus	Δ Producer Surplus	Net Surplus	Prices
2005	-5.52%	8.79%	270.46%	275.97%	250.06%	1233.94%	-33.33%
2006	-5.43%	8.72%	225.25%	229.91%	207.42%	927.89%	-33.33%
2007	-5.33%	8.65%	191.16%	195.18%	175.26%	723.44%	-33.33%
2008	-5.24%	8.57%	164.66%	168.18%	150.27%	580.20%	-33.33%
2009	-5.15%	8.50%	143.56%	146.67%	130.37%	475.90%	-33.33%
2010	-5.06%	8.42%	126.44%	129.21%	114.21%	397.63%	-33.33%

Source: Model simulations.

Figure 5.1. Philippine Corn Production (in 000 MT), 1995 – 2004.
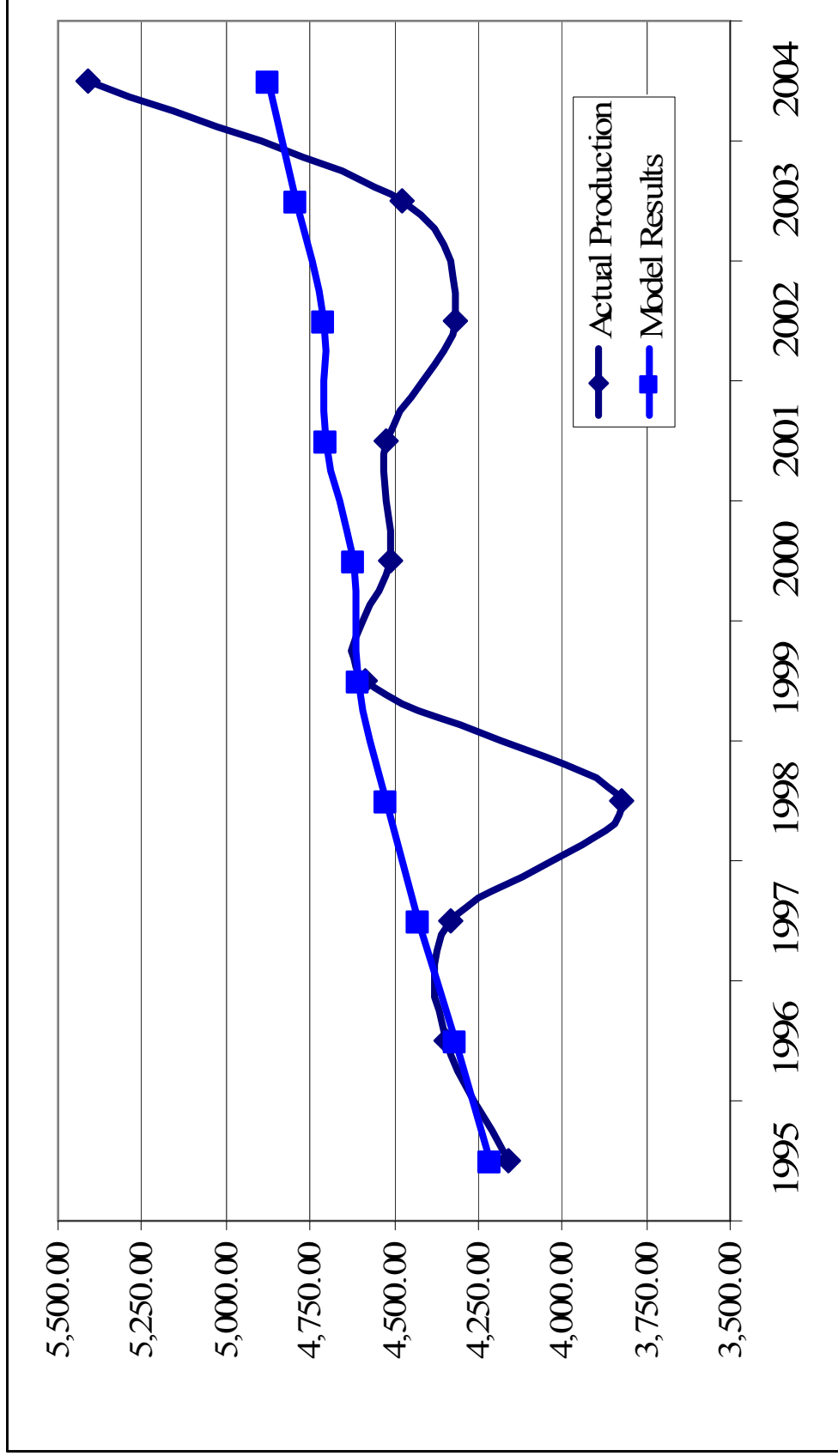
Figure 5.2. Philippines: Quantity of Corn Demand (in 000 MT), 1995-2004.
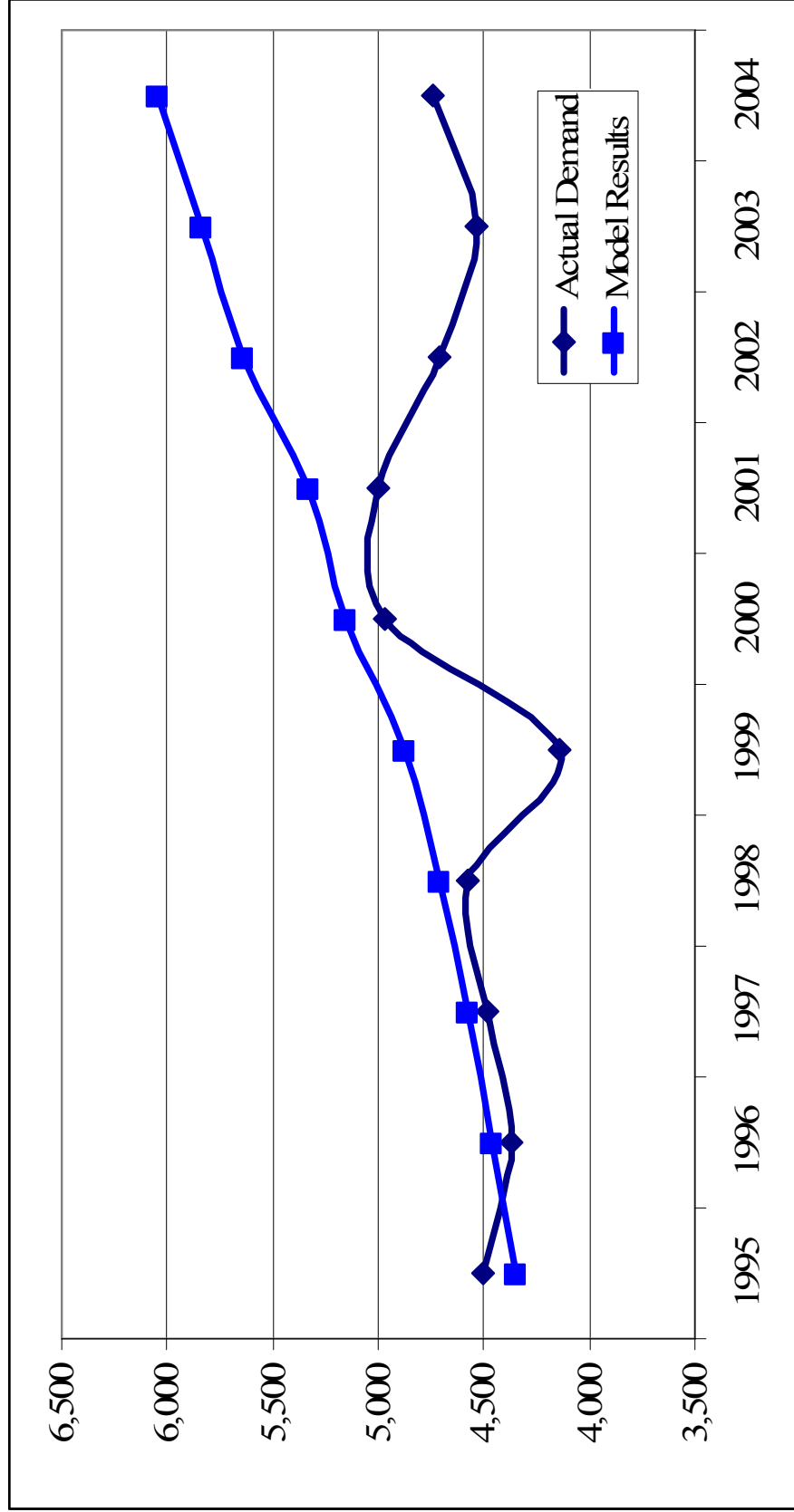
Figure 5.3. Quantity of Supply (in 000 MT) – Selected policy experiments, Baseline and Free Market, 2003-2010.
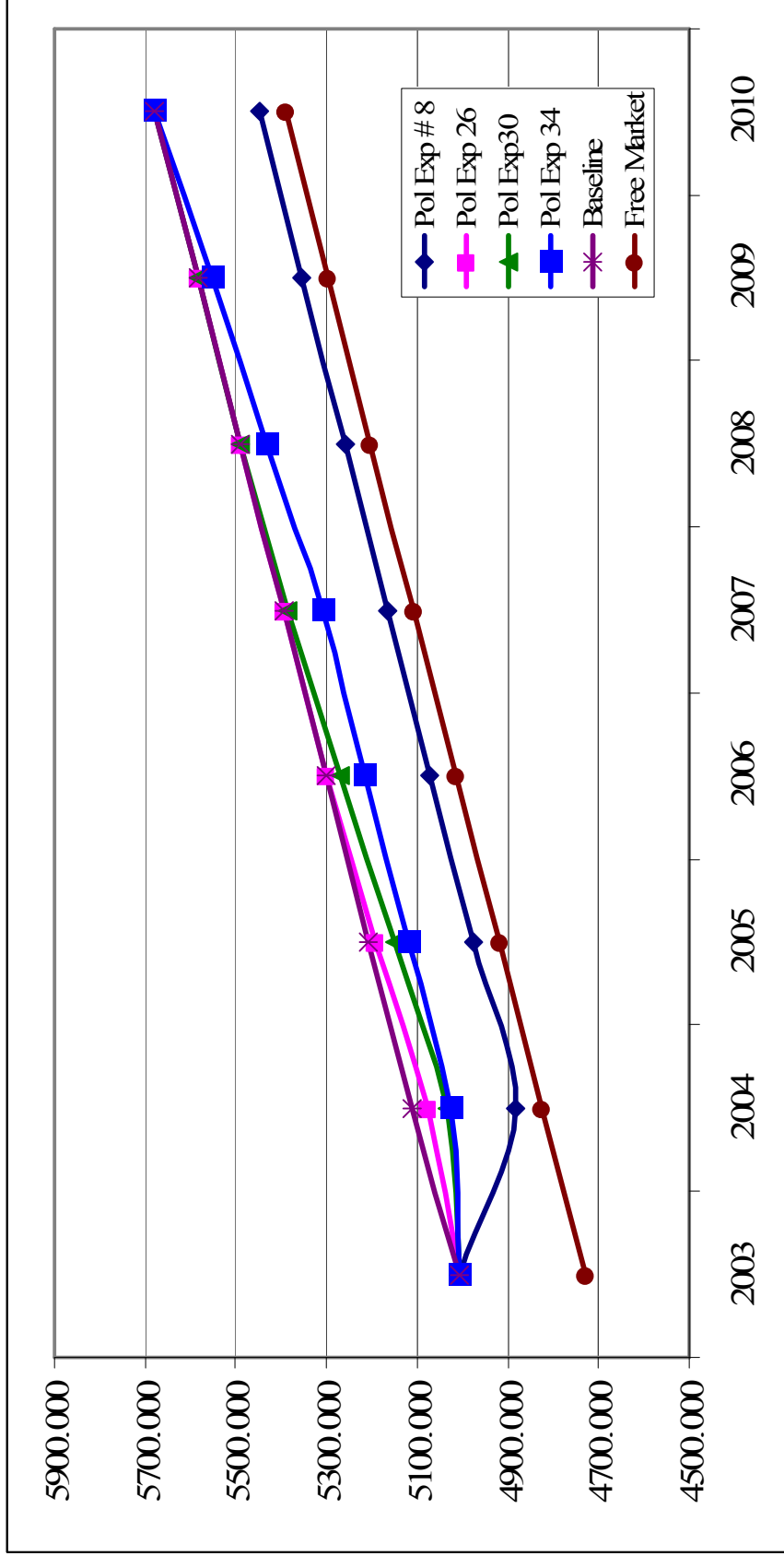
Figure 5.4. Quantity of Demand (in 000 MT) – Selected policy experiments, Baseline and Free Market, 2003-2010.
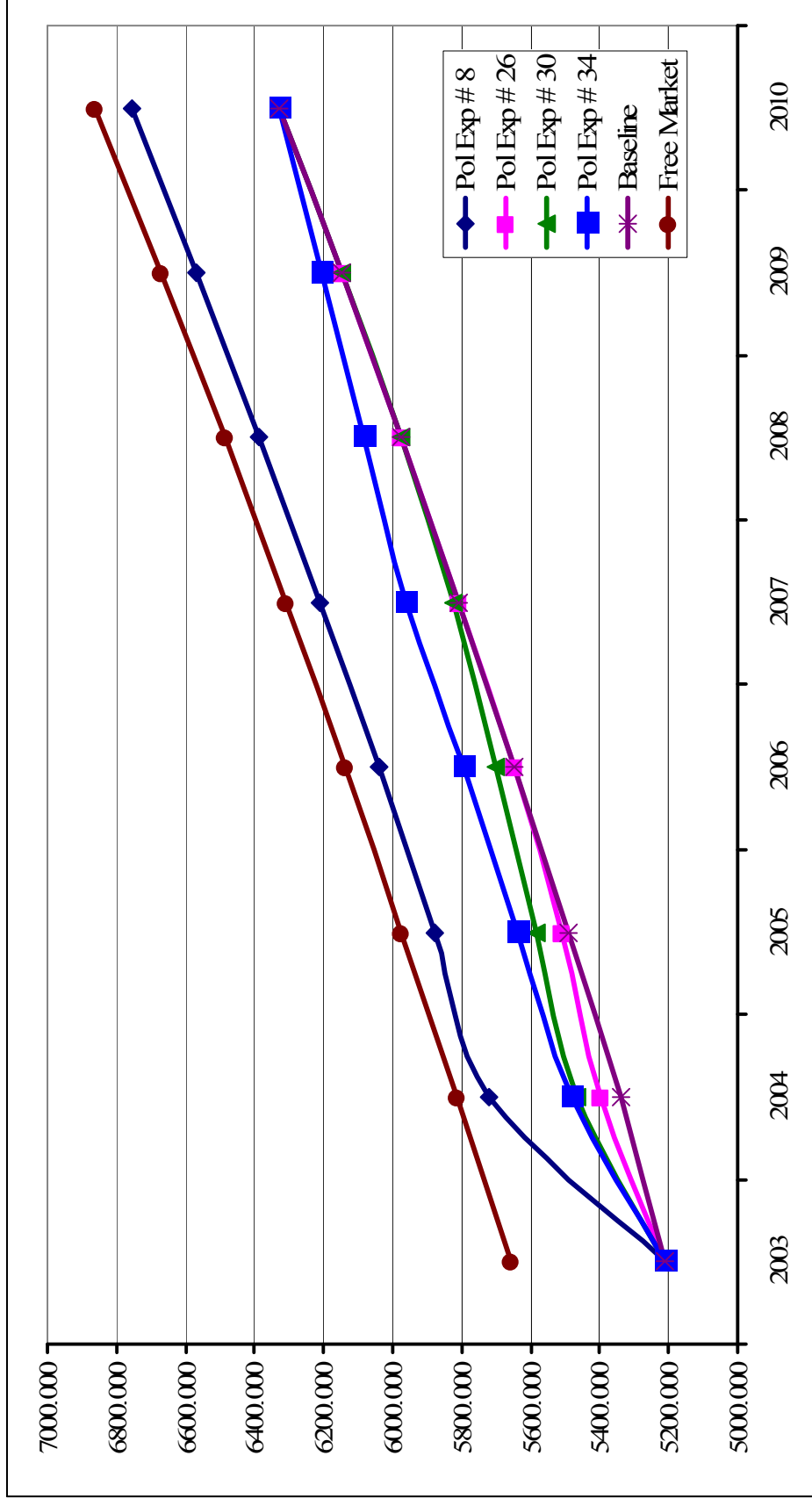
Figure 5.5. Static impacts when the out-quota tariff is binding.
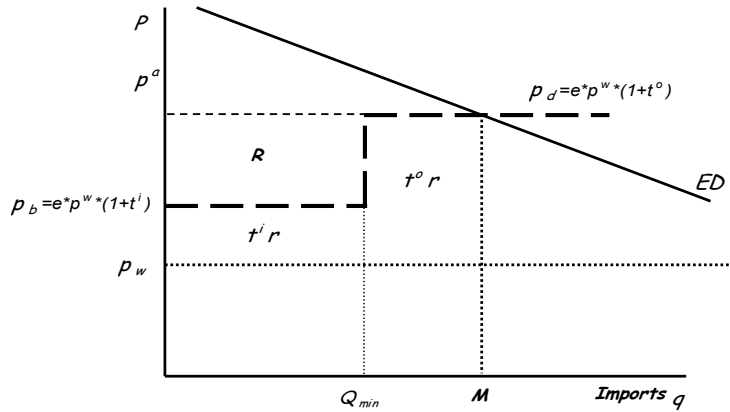
(a) at the initial period of implementation the out-quota tariff is relatively high and rent is noticeably large
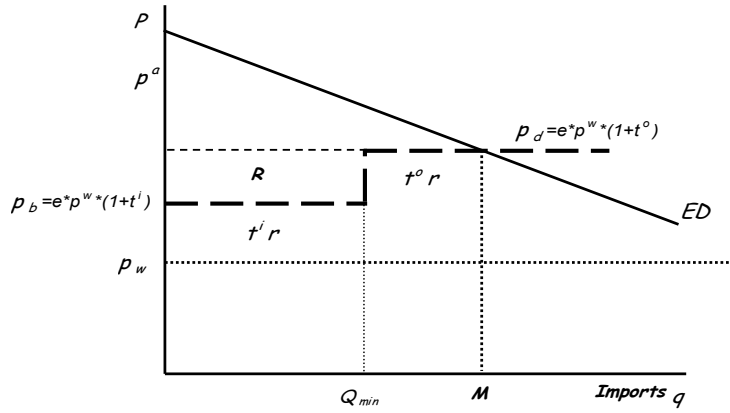
(b) in the intermeidate period, the out-quota tariff is reduced; the effect is a reduction in the size of the rent and the out-quota tariff revenue for the government
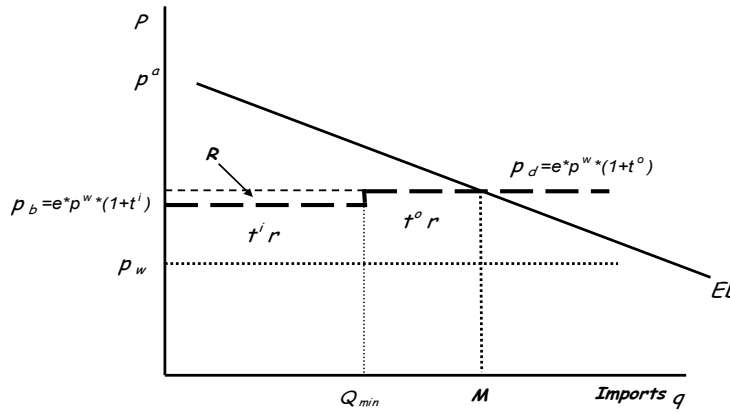
(c) in the final year of implementation, the out-quota tariff is reduced down to a level close to the in-quota tariff; the rent becomes smaller and in some instances may disappear outright when the in-quota and out-quota tariff are unified.

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CHAPTER 6 - Conclusion and Summary

In this study, an existing TRQ model was utilized to determine how effective TRQs are as a trade policy instrument in facilitating trade liberalization and increasing market access. An empirical assessment of the effects of TRQs on the Philippine corn market was conducted and the economics and implications of its implementation were presented. The purpose of the study has been to address several key questions that have come up as a result of the implementation of TRQs in agricultural trade: (1) is the TRQ an appropriate transition mechanism? (2) How is the TRQ serving as a transition mechanism? (3) To what magnitude is the TRQ liberalizing trade? And (4) what are the effects of the TRQ on liberalizing trade?

The results of the base model simulation demonstrate that the present TRQ system for corn leads to two different trade regimes: (1) an effective quota regime (Case 1), and (2) an effective out-quota tariff regime (Case 2). In the first three years, total imports were about equal to the volumes allowed under the TRQ, and the TRQ acts like a quota. The out-quota tariff was at its highest levels (100%) during this time and it was not profitable to import. In the years (1998 to 1999), the out-quota tariffs were adjusted down to 80% and the model results show that imports would increase beyond the TRQ quota – from the fourth to the tenth year of corn TRQ model, the out-quota tariff was binding. The discrepancy in growth between demand and supply make imports profitable despite the relatively high tariffs in the beginning and this was further confirmed by higher per unit quota rents. Changes in the size of the rent were noted – the further apart the in-quota and out-quota tariffs, the greater the amount of rents created, the greater the incentive to seek these rents (Boughner and de Gorter). As the out-quota rate was progressively reduced, market prices declined together with per unit quota rents. In the final year of implementation, the level of imports was sufficiently large and the domestic equilibrium price was close to the in-quota price.

The number of policy experiments that can be set up can become very large given the wide range of possible combinations of the three components of the TRQ. In this study, the 38 policy experiments that were selected is not exhaustive, but these experiments provide a good representation of possible scenarios that show the individual and combined effects of the components of the TRQ that may be of interest to policy makers. The results will show that as

the trade regimes evolve, with reductions in the out-quota and in-quota tariff rates, there are increases in the quotas, and changes in world market prices or in the exchange rates, they become more interesting.

Results from the different policy experiments have given us some important insights into the workings of the TRQ and the effect of each component as a mechanism for trade liberalization. We get these by comparing the parameters of the different policy experiments with a baseline model of the present TRQ regime. We have learned that keeping the present TRQ system puts pressure on consumer surplus and dampens supply and demand in the corn market. Presently, the Philippine corn market is restricted by the out-quota tariff and it determines to a large extent, domestic prices paid for by consumers and importers.

An experiment that mimics a *de facto* liberalization at the level of the out-quota rate of 50% was compared with the baseline of the present TRQ regime, and the outcome was analogous. Bringing down the tariff to 35% or to the level of the in-quota rate does not do much to liberalize the corn market either. Abbott (2002) and Skully (2001c) noted that the reduction of the out-quota tariff rates were preferable, since when it is not binding – then it makes no difference, and when it is binding, the effect is that it is trade enhancing. Reducing the out-quota rate, which is in essence the MFN rate, also brings the TRQ system nearer to being phased-out.

In experiments where the quota was fixed but both the in-quota and out-quota tariffs were progressively reduced, a steady increase in the quantities of supply, demand and imports were observed when compared to the baseline. Although government revenues would be affected as a result of the lower tariffs, by progressively reducing the out-quota tariff, incremental increases in consumer surplus together with relatively smaller losses in producer surplus lead to positive net surpluses. The quota rents were observed to decline as a result of the smaller gap between the in-quota and out-quota tariffs. Skully (2001c), however, pointed out that the in-quota tariff should not be reduced too much if in doing so would increase the gap between tariff rates and likely result is an increase of the quota rents. It is thus important for policy makers to find a workable tariff level that would serve the interest of stakeholders in the sector – producers, consumers and government.

The alternative of increasing the TRQ quotas will have no significant impact in liberalizing the corn market as it is the out-quota tariff that determines domestic market prices. It was shown that even increasing the quota to levels of up to 15% of consumption does not

improve consumer and net surplus, and only have marginal downward effects on prices. The increase in the level of imports hurt producer surplus in all cases.

In Chapter 5, it was shown that there is another issue with using the TRQ as a liberalization mechanism – the quota portion of the TRQ. To illustrate, as a result of implementing the quota, rents were created and inefficient procedures for the distribution of those rents have surfaced. Bougner and de Gorter and Monnich (2003b) have suggested that rent seeking was induced by varying methods of allocation of rights to import (or export), resulting in the possible dissipation of those rents. Imperfect competition and non-tradability of quotas and licenses lead to potential loses in economic efficiency, and low quota fill rates often keep domestic markets insulated.

This study of the implementation of TRQs gives policy makers and trade negotiators a better understanding of how the TRQ operate and there are important policy implications that emerge from this analysis of the TRQ as a mechanism for trade liberalization. The analysis of the Philippine corn market reveals that the impact of TRQ implementation is quite similar to that of traditional quantitative restrictions. Quota rents are prevalent and efficiency losses occur. The TRQ model of Philippine corn sector further revealed that, depending upon the regime in which the country is trading, an increase in the import quota and/or a decrease in the out-quota tariff would have different impacts on consumer, producer and net surplus.

This is an important point that needs to be emphasized in the ongoing negotiations on TRQ reform and market access in the WTO. A clear understanding and knowledge of the regime in which the country is trading can help policy makers determine which individual or combination of the policy components of the TRQ – the in-quota and out-quota tariff and the import quota, should be used in order to increase market access or to address the concerns of stakeholders in the corn sector – producers and consumers.

It must be pointed out that there is no single trade instrument that can be used in all cases – no one size fits all. Boughner commented that in principle, "if it was shown that the out-quota tariffs were effective, then the elimination of quotas should have no significant effect on the level of supply, demand and imports and so the out-quota tariffs can be reduced from their current levels. On the other hand, if it was the in-quota tariffs that were effective, then they should be reduced to the tariff equivalent created by the import quota and further reduced from there. This

could be done if the quota was not set beyond the free trade level of imports. If quotas were effective, then the quotas should be replaced with their tariff equivalents and reduced."

Some future areas of study could cover an expansion of the model coverage to include the other inter-related sectors with the corn industry – i.e. the swine and chicken industries. The swine and chicken industries are equally important in Philippine agriculture since they are largest users of corn in the market; pork and chicken meat are also governed by the TRQ system. The model could also be expanded to come up with band estimates of quantities of supply, demand and imports. Rice market may also be considered since this is a complementary commodity with corn, and they both affect the food security of the country. The impact of the implementation of TRQs cannot be generalized and unique outcomes are expected from different commodities and markets; some areas for future research are to look at the effects of implementation and administration of TRQs across the different commodities covered by the TRQ – e.g. sugar market.

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Appendix A - Appendix Tables

Table A.1. Quantity of supply, demand, imports, and change in consumer surplus, policy experiments 1 – 8.

	1	2	3	4	5	6	7	8
Qty of Supply								
2005	5231.360	5206.044	5119.769	5206.044	5148.527	5091.011	5033.494	4975.978
2006	5348.259	5300.598	5214.323	5300.598	5243.081	5185.565	5128.048	5070.532
2007	5466.581	5395.152	5308.877	5395.152	5337.635	5280.119	5222.602	5165.086
2008	5586.339	5489.706	5403.431	5489.706	5432.190	5374.673	5317.156	5259.640
2009	5707.544	5584.260	5497.985	5584.260	5526.744	5469.227	5411.711	5354.194
2010	5830.209	5678.814	5592.539	5678.814	5621.298	5563.781	5506.265	5448.748
Qty of Demand								
2005	5448.360	5490.855	5635.673	5490.855	5587.400	5683.945	5780.490	5877.035
2006	5565.259	5646.861	5794.574	5646.861	5745.337	5843.812	5942.288	6040.764
2007	5683.581	5808.324	5958.991	5808.324	5908.769	6009.214	6109.659	6210.104
2008	5803.339	5975.471	6129.152	5975.471	6077.925	6180.379	6282.833	6385.287
2009	5924.544	6148.541	6305.296	6148.541	6253.044	6357.547	6462.050	6566.553
2010	6047.209	6327.782	6487.672	6327.782	6434.375	6540.969	6647.562	6754.155
Qty of Imports								
2005	217.000	284.811	515.904	284.811	438.873	592.934	746.996	901.057
2006	217.000	346.263	580.251	346.263	502.256	658.247	814.240	970.232
2007	217.000	413.172	650.114	413.172	571.134	729.095	887.057	1045.018
2008	217.000	485.765	725.721	485.765	645.735	805.706	965.677	1125.647
2009	217.000	564.281	807.311	564.281	726.300	888.320	1050.339	1212.359
2010	217.000	648.968	895.133	648.968	813.077	977.188	1141.297	1305.407
Δ CS								
2005	73.312	96.374	175.450	96.374	149.012	201.961	255.186	308.654
2006	73.304	117.311	197.541	117.311	170.722	224.431	278.406	332.615
2007	73.296	140.155	221.564	140.155	194.355	248.842	303.584	358.549
2008	73.289	164.991	247.605	164.991	219.996	275.278	330.803	386.540
2009	73.281	191.908	275.752	191.908	247.737	303.829	360.152	416.677
2010	73.274	221.000	306.098	221.000	277.668	334.587	391.724	449.052

Source: Model simulations; CS – Consumer surplus.

Table A.2. Change in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue, policy experiments 1 – 8.

	1	2	3	4	5	6	7	8
Δ PS								
2005	-71.835	-93.836	-167.194	-93.836	-143.020	-191.086	-238.023	-283.823
2006	-71.859	-113.648	-187.344	-113.648	-163.060	-211.346	-258.500	-304.512
2007	-71.881	-135.063	-209.067	-135.063	-184.682	-233.170	-280.520	-326.724
2008	-71.903	-158.118	-232.402	-158.118	-207.924	-256.594	-304.120	-350.496
2009	-71.925	-182.853	-257.385	-182.853	-232.826	-281.656	-329.337	-375.864
2010	-71.945	-209.307	-284.053	-209.307	-259.424	-308.394	-356.208	-402.863
NS								
2005	1.477	2.538	8.256	2.538	5.992	10.875	17.163	24.831
2006	1.446	3.663	10.197	3.663	7.662	13.085	19.906	28.103
2007	1.415	5.092	12.497	5.092	9.673	15.672	23.064	31.825
2008	1.385	6.873	15.203	6.873	12.072	18.684	26.683	36.044
2009	1.357	9.055	18.368	9.055	14.911	22.173	30.815	40.814
2010	1.329	11.693	22.045	11.693	18.243	26.193	35.516	46.189
IQTR								
2005	0.000	0.000	0.000	1.194	1.194	1.194	1.194	1.194
2006	0.000	0.000	0.000	1.194	1.194	1.194	1.194	1.194
2007	0.000	0.000	0.000	1.194	1.194	1.194	1.194	1.194
2008	0.000	0.000	0.000	1.194	1.194	1.194	1.194	1.194
2009	0.000	0.000	0.000	1.194	1.194	1.194	1.194	1.194
2010	0.000	0.000	0.000	1.194	1.194	1.194	1.194	1.194
OQTR								
2005	0.000	0.000	0.000	3.730	9.762	12.406	11.660	7.525
2006	0.000	0.000	0.000	7.109	12.551	14.561	13.139	8.286
2007	0.000	0.000	0.000	10.789	15.582	16.899	14.741	9.108
2008	0.000	0.000	0.000	14.782	18.864	19.427	16.471	9.995
2009	0.000	0.000	0.000	19.100	22.409	22.154	18.333	10.949
2010	0.000	0.000	0.000	23.758	26.227	25.086	20.335	11.972

Source: Model simulations PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table A.3. Total tariff revenue, prices and total quota rent, policy experiments 1 – 8.

	1	2	3	4	5	6	7	8
TTR								
2005	0.000	15.665	19.862	4.923	10.956	13.599	12.853	8.718
2006	0.000	19.044	22.340	8.303	13.745	15.755	14.333	9.479
2007	0.000	22.724	25.029	11.983	16.775	18.093	15.935	10.302
2008	0.000	26.717	27.940	15.976	20.058	20.621	17.664	11.189
2009	0.000	31.035	31.081	20.294	23.603	23.347	19.527	12.142
2010	0.000	35.693	34.463	24.952	27.421	26.280	21.528	13.166
Prices								
2005	0.170	0.165	0.149	0.165	0.154	0.143	0.132	0.121
2006	0.174	0.165	0.149	0.165	0.154	0.143	0.132	0.121
2007	0.179	0.165	0.149	0.165	0.154	0.143	0.132	0.121
2008	0.183	0.165	0.149	0.165	0.154	0.143	0.132	0.121
2009	0.189	0.165	0.149	0.165	0.154	0.143	0.132	0.121
2010	0.194	0.165	0.149	0.165	0.154	0.143	0.132	0.121
TQR								
2005	0.060	0.055	0.039	0.050	0.039	0.028	0.016	0.005
2006	0.064	0.055	0.039	0.050	0.039	0.028	0.016	0.005
2007	0.069	0.055	0.039	0.050	0.039	0.028	0.016	0.005
2008	0.073	0.055	0.039	0.050	0.039	0.028	0.016	0.005
2009	0.079	0.055	0.039	0.050	0.039	0.028	0.016	0.005
2010	0.084	0.055	0.039	0.050	0.039	0.028	0.016	0.005

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table A.4. Quantity of supply, demand, imports, and change in consumer surplus, policy experiments 9 – 16.

	9	10	11	12	13	14	15	16
Qty of Supply								
2005	5091.011	5062.252	5033.494	5004.736	4975.978	5119.769	5091.011	5062.252
2006	5185.565	5156.807	5128.048	5099.290	5070.532	5214.323	5185.565	5156.807
2007	5280.119	5251.361	5222.602	5193.844	5165.086	5308.877	5280.119	5251.361
2008	5374.673	5345.915	5317.156	5288.398	5259.640	5403.431	5374.673	5345.915
2009	5469.227	5440.469	5411.711	5382.952	5354.194	5497.985	5469.227	5440.469
2010	5563.781	5535.023	5506.265	5477.506	5448.748	5592.539	5563.781	5535.023
Qty of Demand								
2005	5683.945	5732.217	5780.490	5828.762	5877.035	5635.673	5683.945	5732.217
2006	5843.812	5893.050	5942.288	5991.526	6040.764	5794.574	5843.812	5893.050
2007	6009.214	6059.437	6109.659	6159.882	6210.104	5958.991	6009.214	6059.437
2008	6180.379	6231.606	6282.833	6334.060	6385.287	6129.152	6180.379	6231.606
2009	6357.547	6409.799	6462.050	6514.302	6566.553	6305.296	6357.547	6409.799
2010	6540.969	6594.265	6647.562	6700.859	6754.155	6487.672	6540.969	6594.265
Qty of Imports								
2005	592.934	669.965	746.996	824.026	901.057	515.904	592.934	669.965
2006	658.247	736.243	814.240	892.236	970.232	580.251	658.247	736.243
2007	729.095	808.076	887.057	966.038	1045.018	650.114	729.095	808.076
2008	805.706	885.691	965.677	1045.662	1125.647	725.721	805.706	885.691
2009	888.320	969.330	1050.339	1131.350	1212.359	807.311	888.320	969.330
2010	977.188	1059.242	1141.297	1223.353	1305.407	895.133	977.188	1059.242
Δ CS								
2005	201.961	256.490	255.186	281.891	308.654	175.450	201.961	228.541
2006	224.431	251.387	278.406	305.483	332.615	197.541	224.431	251.387
2007	248.842	276.183	303.584	331.040	358.549	221.564	248.842	276.183
2008	275.278	303.012	330.803	358.647	386.540	247.605	275.278	303.012
2009	303.829	331.964	360.152	388.392	416.677	275.752	303.829	331.964
2010	334.587	363.130	391.724	420.367	449.052	306.098	334.587	363.130

Source: Model simulations; CS – Consumer surplus.

Table A.5. Change in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue, policy experiments 9 – 16.

	9	10	11	12	13	14	15	16
$\varDelta$ PS								
2005	-191.086	-239.201	-238.023	-261.065	-283.823	-167.194	-191.086	-214.696
2006	-211.346	-235.065	-258.500	-281.649	-304.512	-187.344	-211.346	-235.065
2007	-233.170	-256.988	-280.520	-303.766	-326.724	-209.067	-233.170	-256.988
2008	-256.594	-280.500	-304.120	-327.452	-350.496	-232.402	-256.594	-280.500
2009	-281.656	-305.641	-329.337	-352.745	-375.864	-257.385	-281.656	-305.641
2010	-308.394	-332.445	-356.208	-379.681	-402.863	-284.053	-308.394	-332.445
NS								
2005	10.875	17.289	17.163	20.826	24.831	8.256	10.875	13.845
2006	13.085	16.322	19.906	23.834	28.103	10.197	13.085	16.322
2007	15.672	19.195	23.064	27.275	31.825	12.497	15.672	19.195
2008	18.684	22.512	26.683	31.195	36.044	15.203	18.684	22.512
2009	22.173	26.323	30.815	35.646	40.814	18.368	22.173	26.323
2010	26.193	30.685	35.516	40.686	46.189	22.045	26.193	30.685
IQTR								
2005	7.161	5.968	4.774	3.581	2.387	8.355	7.161	5.968
2006	7.161	5.968	4.774	3.581	2.387	8.355	7.161	5.968
2007	7.161	5.968	4.774	3.581	2.387	8.355	7.161	5.968
2008	7.161	5.968	4.774	3.581	2.387	8.355	7.161	5.968
2009	7.161	5.968	4.774	3.581	2.387	8.355	7.161	5.968
2010	7.161	5.968	4.774	3.581	2.387	8.355	7.161	5.968
OQTR								
2005	20.676	24.913	29.150	33.386	37.623	13.152	16.541	19.930
2006	24.269	28.558	32.848	37.138	41.428	15.983	19.415	22.847
2007	28.165	32.509	36.853	41.197	45.541	19.057	22.532	26.007
2008	32.379	36.778	41.177	45.576	49.976	22.384	25.903	29.422
2009	36.923	41.378	45.834	50.289	54.745	25.974	29.538	33.103
2010	41.810	46.323	50.836	55.349	59.862	29.838	33.448	37.059

Source: Model simulations PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table A.6. Total tariff revenue, prices and total quota rent, policy experiments 9 – 16.

	9	10	11	12	13	14	15	16
TTR								
2005	27.837	30.881	33.924	36.967	40.010	21.506	23.702	25.898
2006	31.430	34.526	37.622	40.718	43.815	24.338	26.576	28.814
2007	35.326	38.477	41.627	44.778	47.928	27.412	29.693	31.975
2008	39.540	42.746	45.951	49.157	52.363	30.738	33.064	35.390
2009	44.084	47.346	50.608	53.870	57.132	34.328	36.699	39.070
2010	48.971	52.291	55.610	58.930	62.249	38.192	40.609	43.026
Prices								
2005	0.165	0.165	0.165	0.165	0.165	0.154	0.154	0.154
2006	0.165	0.165	0.165	0.165	0.165	0.154	0.154	0.154
2007	0.165	0.165	0.165	0.165	0.165	0.154	0.154	0.154
2008	0.165	0.165	0.165	0.165	0.165	0.154	0.154	0.154
2009	0.165	0.165	0.165	0.165	0.165	0.154	0.154	0.154
2010	0.165	0.165	0.165	0.165	0.165	0.154	0.154	0.154
TQR								
2005	0.022	0.028	0.033	0.039	0.044	0.005	0.011	0.017
2006	0.022	0.028	0.033	0.039	0.044	0.005	0.011	0.017
2007	0.022	0.028	0.033	0.039	0.044	0.005	0.011	0.017
2008	0.022	0.028	0.033	0.039	0.044	0.005	0.011	0.017
2009	0.022	0.028	0.033	0.039	0.044	0.005	0.011	0.017
2010	0.022	0.028	0.033	0.039	0.044	0.005	0.011	0.017

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table A.7. Quantity of supply, demand, imports, and change in consumer surplus, policy experiments 17 – 24.

	17	18	19	20	21	22	23	24
Qty of Supply								
2005	5033.494	5004.736	4975.978	5062.252	5033.494	5004.736	4975.978	5004.736
2006	5128.048	5099.290	5070.532	5156.807	5128.048	5099.290	5070.532	5099.290
2007	5222.602	5193.844	5165.086	5251.361	5222.602	5193.844	5165.086	5193.844
2008	5317.156	5288.398	5259.640	5345.915	5317.156	5288.398	5259.640	5288.398
2009	5411.711	5382.952	5354.194	5440.469	5411.711	5382.952	5354.194	5382.952
2010	5506.265	5477.506	5448.748	5535.023	5506.265	5477.506	5448.748	5477.506
Qty of Demand								
2005	5780.490	5828.762	5877.035	5732.217	5780.490	5828.762	5877.035	5828.762
2006	5942.288	5991.526	6040.764	5893.050	5942.288	5991.526	6040.764	5991.526
2007	6109.659	6159.882	6210.104	6059.437	6109.659	6159.882	6210.104	6159.882
2008	6282.833	6334.060	6385.287	6231.606	6282.833	6334.060	6385.287	6334.060
2009	6462.050	6514.302	6566.553	6409.799	6462.050	6514.302	6566.553	6514.302
2010	6647.562	6700.859	6754.155	6594.265	6647.562	6700.859	6754.155	6700.859
Qty of Imports								
2005	255.186	281.891	308.654	228.541	255.186	281.891	308.654	281.891
2006	278.406	305.483	332.615	251.387	278.406	305.483	332.615	305.483
2007	303.584	331.040	358.549	276.183	303.584	331.040	358.549	331.040
2008	330.803	358.647	386.540	303.012	330.803	358.647	386.540	358.647
2009	360.152	388.392	416.677	331.964	360.152	388.392	416.677	388.392
2010	391.724	420.367	449.052	363.130	391.724	420.367	449.052	420.367
$\varDelta$ CS								
2005	255.186	281.891	308.654	228.541	255.186	281.891	308.654	281.891
2006	278.406	305.483	332.615	251.387	278.406	305.483	332.615	305.483
2007	303.584	331.040	358.549	276.183	303.584	331.040	358.549	331.040
2008	330.803	358.647	386.540	303.012	330.803	358.647	386.540	358.647
2009	360.152	388.392	416.677	331.964	360.152	388.392	416.677	388.392
2010	391.724	420.367	449.052	363.130	391.724	420.367	449.052	420.367

Source: Model simulations; CS – Consumer surplus.

Table A.8. Change in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue, policy experiments 17 – 24.

	17	18	19	20	21	22	23	24
Δ PS								
2005	-238.023	-261.065	-283.823	-214.696	-238.023	-261.065	-283.823	-261.065
2006	-258.500	-281.649	-304.512	-235.065	-258.500	-281.649	-304.512	-281.649
2007	-280.520	-303.766	-326.724	-256.988	-280.520	-303.766	-326.724	-303.766
2008	-304.120	-327.452	-350.496	-280.500	-304.120	-327.452	-350.496	-327.452
2009	-329.337	-352.745	-375.864	-305.641	-329.337	-352.745	-375.864	-352.745
2010	-356.208	-379.681	-402.863	-332.445	-356.208	-379.681	-402.863	-379.681
NS								
2005	17.163	20.826	24.831	13.845	17.163	20.826	24.831	20.826
2006	19.906	23.834	28.103	16.322	19.906	23.834	28.103	23.834
2007	23.064	27.275	31.825	19.195	23.064	27.275	31.825	27.275
2008	26.683	31.195	36.044	22.512	26.683	31.195	36.044	31.195
2009	30.815	35.646	40.814	26.323	30.815	35.646	40.814	35.646
2010	35.516	40.686	46.189	30.685	35.516	40.686	46.189	40.686
IQTR								
2005	4.774	3.581	2.387	5.968	4.774	3.581	2.387	3.581
2006	4.774	3.581	2.387	5.968	4.774	3.581	2.387	3.581
2007	4.774	3.581	2.387	5.968	4.774	3.581	2.387	3.581
2008	4.774	3.581	2.387	5.968	4.774	3.581	2.387	3.581
2009	4.774	3.581	2.387	5.968	4.774	3.581	2.387	3.581
2010	4.774	3.581	2.387	5.968	4.774	3.581	2.387	3.581
OQTR								
2005	23.320	26.709	30.099	14.948	17.490	20.032	22.574	13.355
2006	26.279	29.710	33.142	17.135	19.709	22.283	24.857	14.855
2007	29.483	32.958	36.433	19.506	22.112	24.718	27.325	16.479
2008	32.942	36.461	39.980	22.067	24.706	27.346	29.985	18.231
2009	36.667	40.231	43.796	24.827	27.500	30.174	32.847	20.116
2010	40.669	44.280	47.890	27.794	30.502	33.210	35.917	22.140

Source: Model simulations PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue,
OQTR – Out-quota tariff revenue.

Table A.9. Total tariff revenue, prices and total quota rent, policy experiments 17 – 24.

	17	18	19	20	21	22	23	24
TTR								
2005	28.094	30.290	32.486	20.915	22.264	23.612	24.961	16.935
2006	31.053	33.291	35.529	23.103	24.483	25.863	27.244	18.436
2007	34.257	36.538	38.820	25.473	26.886	28.299	29.712	20.059
2008	37.716	40.042	42.367	28.034	29.480	30.926	32.372	21.811
2009	41.441	43.812	46.183	30.794	32.274	33.754	35.234	23.696
2010	45.443	47.860	50.277	33.761	35.276	36.790	38.304	25.720
Prices								
2005	0.154	0.154	0.154	0.143	0.143	0.143	0.143	0.132
2006	0.154	0.154	0.154	0.143	0.143	0.143	0.143	0.132
2007	0.154	0.154	0.154	0.143	0.143	0.143	0.143	0.132
2008	0.154	0.154	0.154	0.143	0.143	0.143	0.143	0.132
2009	0.154	0.154	0.154	0.143	0.143	0.143	0.143	0.132
2010	0.154	0.154	0.154	0.143	0.143	0.143	0.143	0.132
TQR								
2005	0.022	0.028	0.033	0.006	0.011	0.017	0.022	0.005
2006	0.022	0.028	0.033	0.006	0.011	0.017	0.022	0.005
2007	0.022	0.028	0.033	0.006	0.011	0.017	0.022	0.005
2008	0.022	0.028	0.033	0.006	0.011	0.017	0.022	0.005
2009	0.022	0.028	0.033	0.006	0.011	0.017	0.022	0.005
2010	0.022	0.028	0.033	0.006	0.011	0.017	0.022	0.005

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table A. 10. Quantity of supply, demand, imports, and change in consumer surplus, policy experiments 25 – 31.

	25	26	27	28	29	30	31
Qty of Supply							
2005	4975.978	5194.027	5148.527	5091.011	5033.494	5150.347	5148.527
2006	5070.532	5300.598	5243.081	5185.565	5128.048	5268.248	5243.081
2007	5165.086	5395.152	5337.635	5280.119	5222.602	5387.568	5337.635
2008	5259.640	5489.706	5432.190	5374.673	5317.156	5489.706	5432.190
2009	5354.194	5584.260	5526.744	5469.227	5411.711	5584.260	5526.744
2010	5448.748	5678.814	5621.298	5563.781	5506.265	5678.814	5621.298
Qty of Demand							
2005	5877.035	5511.027	5587.400	5683.945	5780.490	5584.347	5587.400
2006	6040.764	5646.861	5745.337	5843.812	5942.288	5702.248	5745.337
2007	6210.104	5808.324	5908.769	6009.214	6109.659	5821.568	5908.769
2008	6385.287	5975.471	6077.925	6180.379	6282.833	5975.471	6077.925
2009	6566.553	6148.541	6253.044	6357.547	6462.050	6148.541	6253.044
2010	6754.155	6327.782	6434.375	6540.969	6647.562	6327.782	6434.375
Qty of Imports							
2005	901.057	317.000	438.873	592.934	746.996	434.000	438.873
2006	970.232	346.263	502.256	658.247	814.240	434.000	502.256
2007	1045.018	413.172	571.134	729.095	887.057	434.000	571.134
2008	1125.647	485.765	645.735	805.706	965.677	485.765	645.735
2009	1212.359	564.281	726.300	888.320	1050.339	564.281	726.300
2010	1305.407	648.968	813.077	977.188	1141.297	648.968	813.077
Δ CS							
2005	308.654	107.345	149.012	201.961	255.186	147.342	149.012
2006	332.615	117.311	170.722	224.431	278.406	147.313	170.722
2007	358.549	140.155	194.349	248.842	303.584	147.284	194.355
2008	386.540	164.991	219.996	275.278	330.803	164.991	219.996
2009	416.677	191.908	247.737	303.829	360.152	191.908	247.737
2010	449.052	221.000	277.668	334.587	391.724	221.000	277.668

Source: Model simulations; CS – Consumer surplus.

Table A. 11. Change in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue, policy experiments 25 – 31.

	25	26	27	28	29	30	31
Δ PS							
2005	-283.823	-104.204	-143.020	-191.086	-238.023	-141.482	-143.020
2006	-304.512	-113.648	-163.060	-211.346	-258.500	-141.577	-163.060
2007	-326.724	-135.063	-184.676	-233.170	-280.520	-141.670	-184.682
2008	-350.496	-158.118	-207.924	-256.594	-304.120	-158.118	-207.924
2009	-375.864	-182.853	-232.826	-281.656	-329.337	-182.853	-232.826
2010	-402.863	-209.307	-259.424	-308.394	-356.208	-209.307	-259.424
NS							
2005	24.831	3.140	5.992	10.875	17.163	5.861	5.992
2006	28.103	3.663	7.662	13.085	19.906	5.736	7.662
2007	31.825	5.092	9.672	15.672	23.064	5.614	9.673
2008	36.044	6.873	12.072	18.684	26.683	6.873	12.072
2009	40.814	9.055	14.911	22.173	30.815	9.055	14.911
2010	46.189	11.693	18.243	26.193	35.516	11.693	18.243
IQTR							
2005	2.387	12.205	10.461	6.974	3.487	16.709	14.322
2006	2.387	12.205	10.461	6.974	3.487	16.709	14.322
2007	2.387	12.205	10.461	6.974	3.487	16.709	14.322
2008	2.387	12.205	10.461	6.974	3.487	16.709	14.322
2009	2.387	12.205	10.461	6.974	3.487	16.709	14.322
2010	2.387	12.205	10.461	6.974	3.487	16.709	14.322
OQTR							
2005	15.049	0.000	5.362	9.106	9.460	0.000	0.214
2006	16.571	1.609	8.151	11.261	10.939	0.000	3.003
2007	18.216	5.289	11.182	13.599	12.541	0.000	6.034
2008	19.990	9.282	14.464	16.127	14.271	2.847	9.316
2009	21.898	13.600	18.009	18.854	16.133	7.165	12.861
2010	23.945	18.258	21.827	21.786	18.135	11.823	16.679

Source: Model simulations PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table A. 12. Total tariff revenue, prices and total quota rent, policy experiments 25 – 31.

	25	26	27	28	29	30	31
TTR							
2005	17.436	12.205	15.823	16.080	12.947	16.709	14.536
2006	18.958	13.814	18.612	18.235	14.426	16.709	17.325
2007	20.603	17.494	21.643	20.573	16.028	16.709	20.356
2008	22.377	21.487	24.925	23.101	17.758	19.556	23.638
2009	24.285	25.805	28.470	25.828	19.620	23.874	27.183
2010	26.332	30.463	32.288	28.760	21.622	28.532	31.001
Prices							
2005	0.121	0.149	0.143	0.132	0.121	0.149	0.143
2006	0.121	0.149	0.143	0.132	0.121	0.149	0.143
2007	0.121	0.149	0.143	0.132	0.121	0.149	0.143
2008	0.121	0.149	0.143	0.132	0.121	0.149	0.143
2009	0.121	0.149	0.143	0.132	0.121	0.149	0.143
2010	0.121	0.149	0.143	0.132	0.121	0.149	0.143
Total QR							
2005	0.011	0.014	0.011	0.011	0.011	0.006	0.011
2006	0.011	0.016	0.011	0.011	0.011	0.010	0.011
2007	0.011	0.016	0.011	0.011	0.011	0.015	0.011
2008	0.011	0.016	0.011	0.011	0.011	0.016	0.011
2009	0.011	0.016	0.011	0.011	0.011	0.016	0.011
2010	0.011	0.016	0.011	0.011	0.011	0.016	0.011

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.

Table A.13. Quantity of supply, demand, imports, and change in consumer surplus, policy experiments 32 – 38.

	32	33	34	35	36	37	38
Qty of Supply							
2005	5091.011	5033.494	5119.769	5091.011	5069.333	5033.494	4918.461
2006	5185.565	5128.048	5214.323	5188.237	5185.565	5128.048	5013.015
2007	5280.119	5222.602	5308.877	5308.555	5280.119	5222.602	5107.569
2008	5374.673	5317.156	5430.297	5430.297	5374.673	5317.156	5202.123
2009	5469.227	5411.711	5553.475	5526.744	5469.227	5411.711	5296.677
2010	5563.781	5506.265	5678.102	5621.298	5563.781	5506.265	5391.231
Qty of Demand							
2005	5683.945	5780.490	5635.673	5683.945	5720.333	5780.490	5973.579
2006	5843.812	5942.288	5794.574	5839.237	5843.812	5942.288	6139.239
2007	6009.214	6109.659	5958.991	5959.555	6009.214	6109.659	6310.549
2008	6180.379	6282.833	6081.297	6081.297	6180.379	6282.833	6487.741
2009	6357.547	6462.050	6204.475	6253.044	6357.547	6462.050	6671.057
2010	6540.969	6647.562	6329.102	6434.375	6540.969	6647.562	6860.748
Qty of Imports							
2005	592.934	746.996	515.904	592.934	651.000	746.996	1055.118
2006	658.247	814.240	580.251	651.000	658.247	814.240	1126.224
2007	729.095	887.057	650.114	651.000	729.095	887.057	1202.980
2008	805.706	965.677	651.000	651.000	805.706	965.677	1285.618
2009	888.320	1050.339	651.000	726.300	888.320	1050.339	1374.380
2010	977.188	1141.297	651.000	813.077	977.188	1141.297	1469.517
$\varDelta$ CS							
2005	201.961	255.186	175.450	201.961	221.991	255.186	362.334
2006	224.431	278.406	197.541	221.929	224.431	278.406	387.027
2007	248.842	303.584	221.564	221.870	248.842	303.584	413.708
2008	275.278	330.803	221.812	221.812	275.278	330.803	442.461
2009	303.829	360.152	221.755	247.737	303.829	360.152	473.376
2010	334.587	391.724	221.700	277.668	334.587	391.724	506.542

Source: Model simulations; CS – Consumer surplus.

Table A.14. Change in producer surplus, net surplus, in-quota tariff revenue, and out-quota tariff revenue, policy experiments 32 – 38.

	32	33	34	35	36	37	38
Δ PS							
2005	-191.086	-238.023	-167.194	-191.086	-208.909	-238.023	-328.477
2006	-211.346	-258.500	-187.344	-209.128	-211.346	-258.500	-349.375
2007	-233.170	-280.520	-209.067	-209.339	-233.170	-280.520	-371.776
2008	-256.594	-304.120	-209.544	-209.544	-256.594	-304.120	-395.716
2009	-281.656	-329.337	-209.742	-232.826	-281.656	-329.337	-421.231
2010	-308.394	-356.208	-209.934	-259.424	-308.394	-356.208	-448.355
NS							
2005	10.875	17.163	8.256	10.875	13.081	17.163	33.857
2006	13.085	19.906	10.197	12.801	13.085	19.906	37.651
2007	15.672	23.064	12.497	12.530	15.672	23.064	41.931
2008	18.684	26.683	12.268	12.268	18.684	26.683	46.745
2009	22.173	30.815	12.013	14.911	22.173	30.815	52.145
2010	26.193	35.516	11.765	18.243	26.193	35.516	58.188
IQTR							
2005	14.322	9.548	19.862	19.567	14.322	7.161	0.000
2006	14.322	9.548	22.340	21.483	14.322	7.161	0.000
2007	14.322	9.548	25.029	21.483	14.322	7.161	0.000
2008	14.322	9.548	25.064	21.483	14.322	7.161	0.000
2009	14.322	9.548	25.064	21.483	14.322	7.161	0.000
2010	14.322	9.548	25.064	21.483	14.322	7.161	0.000
OQTR							
2005	5.245	6.886	0.000	0.000	0.000	2.112	0.000
2006	7.400	8.365	0.000	0.000	0.239	3.591	0.000
2007	9.738	9.967	0.000	0.000	2.577	5.193	0.000
2008	12.266	11.697	0.000	0.000	5.105	6.923	0.000
2009	14.993	13.559	0.000	3.313	7.832	8.785	0.000
2010	17.925	15.561	0.000	7.131	10.764	10.787	0.000

Source: Model simulations PS – Producer surplus, NS – Net surplus, IQTR – In-quota tariff revenue, OQTR – Out-quota tariff revenue.

Table A.15. Total tariff revenue, prices and total quota rent, policy experiments 32 – 38.

	32	33	34	35	36	37	38
TTR							
2005	19.567	16.434	19.862	19.567	14.322	9.273	0.000
2006	21.722	17.913	22.340	21.483	14.561	10.752	0.000
2007	24.060	19.515	25.029	21.483	16.899	12.354	0.000
2008	26.588	21.245	25.064	21.483	19.427	14.084	0.000
2009	29.315	23.107	25.064	24.796	22.154	15.946	0.000
2010	32.247	25.109	25.064	28.614	25.086	17.948	0.000
Prices							
2005	0.132	0.121	0.149	0.143	0.132	0.121	0.110
2006	0.132	0.121	0.149	0.143	0.132	0.121	0.110
2007	0.132	0.121	0.149	0.143	0.132	0.121	0.110
2008	0.132	0.121	0.149	0.143	0.132	0.121	0.110
2009	0.132	0.121	0.149	0.143	0.132	0.121	0.110
2010	0.132	0.121	0.149	0.143	0.132	0.121	0.110
TQR							
2005	0.011	0.011	0.000	0.000	0.007	0.011	0.000
2006	0.011	0.011	0.000	0.000	0.011	0.011	0.000
2007	0.011	0.011	0.000	0.005	0.011	0.011	0.000
2008	0.011	0.011	0.005	0.011	0.011	0.011	0.000
2009	0.011	0.011	0.011	0.011	0.011	0.011	0.000
2010	0.011	0.011	0.016	0.011	0.011	0.011	0.000

Source: Model simulations; TTR – Total Tariff Revenue, TQR – Tariff Quota Rents.