Costa Rica

Welfare effects of a change in the trade policy regime for rice in Costa Rica

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Abstract

The rice market in Costa Rica has several distinctive features. First, rice is an essential staple in the diet of Costa Ricans, particularly for the poorest segments of the population. Second, while rice is produced in the country, local production does not reach the level necessary to satisfy domestic demand. Third, rice imports have been subject to policy measures targeting both local production and imports, including a performance requirement for the importation of paddy rice from the United States. Fourth, a price-fixing mechanism designed as part of the policy package applied to the rice sector has increased paddy rice prices paid to local producers to double that of international prices. As a result, Costa Rican consumers have been paying a high price for a key commodity in their daily consumption basket. Despite the associated costs, the policies cited above have not been successful in either increasing productivity or improving conditions for small farmers. Costa Rica is also in breach of its World Trade Organization commitments as a result of the distortionary support received by producers through the price-fixing mechanism. For these reasons, Costa Rica's policies related to the rice sector are being redesigned. For example, the free trade agreement between Central America, the Dominican Republic and the United States will provide unlimited duty-free access for imports from the United States in 2025. This study shows that poor households in Costa Rica may be the segment of the population that will benefit the most from a reduction in the price of rice. In this sense, the free trade agreement may be an opportunity to effectively reduce rice prices in the domestic market and thus improve the welfare of consumers.

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1 Introduction

In recent years there has been an ongoing discussion in Costa Rica about the trade policy regime for rice. Rice is an essential product in the daily diet of Costa Ricans. According to the 2004 National Income and Expenditure Survey (ENIG),[1] rice is one of the most important products for the lowest (one through four) income quintiles. For example, rice represented 4.97 per cent of expenditure in the first quintile and, taken together, quintiles one and two accounted for 48 per cent of rice consumption in the country (Arroyo *et al.*, 2013). Based on these figures, a reduction in the price of rice would mainly benefit the poorest groups of the population.

Rice policies in Costa Rica are based on a combination of tariffs, a performance requirement for the importation of paddy rice,[2] and a price-fixing mechanism. The combined effect of these measures creates economic distortions in the sector. According to economic theory, market price support raises domestic producer and consumer prices. This results in an increase in production and a reduction in consumption, an equivalent of a welfare transfer from consumers to producers. Therefore, a market price support system distorts both production and consumption decisions (Umaña, 2011).

This mechanism is regressive in terms of incomes, as per capita spending on rice is relatively more important in low-income households. In addition, the level of distortionary subsidies resulting from the minimum producer price in Costa Rica exceeds by more than five times the level stipulated in the country's World Trade Organization (WTO) commitments. This situation has led to consultations at the WTO with partners concerned about the Costa Rican measures.

Several studies have specifically analysed Costa Rica's rice policies. According to Umaña (2011), import protection and price controls for rice in Costa Rica have not increased yields, but created instead significant rents for rice millers by transferring income from consumers to producers,

[1] ENIG stands for *Encuesta Nacional de Ingresos y Gastos*. At the time of this analysis, the 2004 survey was the most recent source of information on household consumption in Costa Rica.

[2] The performance requirement allocated to the millers is the right to import paddy rice in an amount proportional to the purchase of the local harvest.

[3] According to Umaña (2011), tariffs, water subsidies and price controls have not benefited small farmers, as millers have largely captured the rents associated with protectionism. Furthermore, it is hard for small farms to achieve economies of scale, a factor relevant for the efficiency of rice production.

and by maintaining local prices above international prices for years. Nor have the rice policies improved the livelihood of small and independent farmers,[3] or promoted the expansion of consumption opportunities for the poorest households. Because most mills are vertically integrated, they have favoured imports instead of dealing with the risky process of rice farming in the country. Gains from trade have thus benefited millers, as these firms have captured the rents from lower international prices (Umaña, 2011).

Arroyo *et al.* (2013) describe the main features of the rice market in Costa Rica and conclude that the pricing scheme is not contributing to important policy objectives such as increasing productivity and improving the access of consumers to affordable rice. Many producers receive lower prices compared to the fixed price due to the difference in rice qualities (inferior qualities are punished with lower prices), consumers pay prices above international prices, productivity remains stagnant or downward, and the pricing scheme may be working towards increasing costs of some inputs and services used in rice production. In addition, Petrecolla (2006) estimates that income transfers from consumers to the rice industry (producers and processors) reached a cumulative USD 396.4 million from 1996 to 2005. Of these transfers, 80 per cent were captured by processors and only 20 per cent by farmers. During the same period, millers, wholesalers, and retailers preserved their margins.

Costa Rica has entered into the free trade agreement between Central America, the Dominican Republic, and the United States (CAFTA-DR) that will provide unlimited duty-free access to imports from the United States when the phasing-out schedule ends in 2025. The agreement may be an opportunity to effectively reduce rice prices in the domestic market and thus improve consumers' welfare.

In this context, this study aims to quantify the welfare effects of the phasing-out process and the quotas stipulated in the CAFTA-DR. By assuming a perfect transmission of changes in tariffs to domestic prices, the study presents a forecast of the welfare effects for three different scenarios: for 2015, 2020, and 2025.

The study uses Costa Rica's 2004 National Income and Expenditure Survey, along with a forecast of the evolution of prices based on the CAFTA-DR phasing-out scheme, to undertake a non-parametric analysis. The results show that a reduction in rice prices will benefit consumers, particularly the poorest households for whom rice represents a larger share of total expenditure. However, in order to prevent importers from capturing

new rents from the reduction of import tariffs, rice prices may need to be monitored on an ongoing basis. This task could be entrusted to the entities that are in charge of competition policies and consumers' interests, such as the Commission for the Promotion of Competition (COPROCOM).[4]

The next section describes developments in the rice sector in Costa Rica and the international trade regime for rice. The methodology applied in the study is then presented, followed by a discussion of the welfare implications of a reduction in the price of rice for households. The study then puts forward several policy recommendations and concludes with a summary of the main findings of the research.

2 The rice sector in Costa Rica

2.1 Production

Rice cultivation accounts for 3.9 per cent of total value added of agricultural, livestock, and fisheries production in Costa Rica (SEPSA, 2012). During the 2011–2012 harvest, 1,355 producers were engaged in rice production in the country. Micro and small producers represent approximately 80 per cent of the total number of farmers, but they cultivate only around 20 per cent of the total rice-planted land (Table 1). Medium-sized producers, with farms between 50 and 200 hectares (ha), and large farmers, with farms larger than 200 ha, supply 80 per cent of national production. After 1950, the rice sector underwent a structural change towards the organization of production in large and medium-sized agro-enterprises; today, small farms only account for a small share of total production (Arroyo *et al.*, 2013).

[4] COPROCOM stands for *Comisión para Promover la Competencia*. Its fundamental purpose is to protect and promote free competition, as well as investigate and punish monopolistic practices and other restrictions to the efficient functioning of the market. For more details, see the organization's website at: *http://www.coprocom.go.cr*.

[5] CONARROZ stands for *Corporación Arrocera Nacional*, which is an institution composed of producers, millers and the government that supports Costa Rica's rice sector by promoting good relationships between farmers and millers and the overall development of the sector. CONARROZ manages a parafiscal fund financed by a 1.5 per cent contribution levied on the price of delivered rice, which is paid both by producers and millers, and by a 1.5 per cent levy on the price of imported rice that is paid by importers. The purpose of the fund is to enable CONARROZ to fulfill the duties entrusted to it by Law No. 8285.

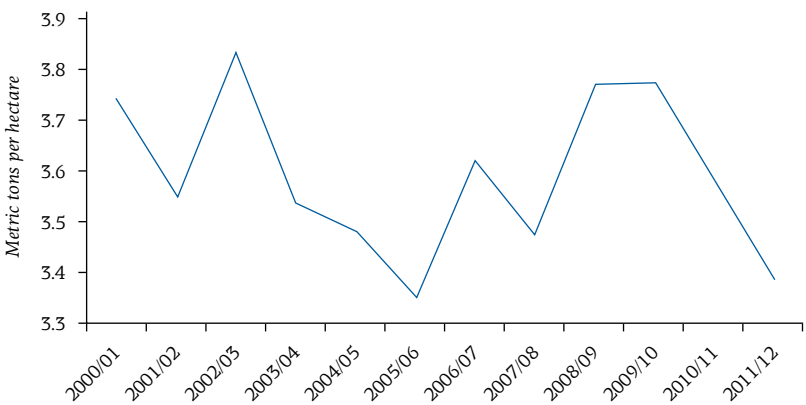
Table 1 Structure of rice production, 2011–2012

Type of producer	Size of farm	Number of producers	Hectares planted	Share of area planted (per cent)	Average size of area (hectares)
Micro	Less than 10 ha	542	3,118	4.0	5.8
Small	Between 10 and 50 ha	528	12,633	16.4	23.9
Medium	Between 50 and 200 ha	222	21,611	28.0	97.3
Large	More than 200 ha	63	39,877	51.6	633.0
	Total	1'355	7,240	100.0	56.9

Source: CONARROZ.

Between the harvests of 2000–2001 and 2005–2006, Costa Rica experienced a downward trend in paddy rice yields, which fell annually by 2.2 per cent, reaching 3.35 metric tons per ha during the 2005–2006 harvest (Figure 1). The decline in yields that occurred during the 2004–2006 period coincided with the emergence in the country of the acarus *Steneotarsonemus spinki*, which caused major losses in the sector, and an increase in production costs, according to the National Rice Corporation (CONARROZ).[5] During the subsequent two harvests, yields recovered up to 3.78 metric tons per ha. However, they declined again for the 2010–2012 harvest to settle at 3.39 metric tons per ha.[6]

Figure 1 Paddy rice yield, 2000–2001 to 2011–2012 (metric tons per hectare)



Source: CONARROZ.

[6] CONARROZ, *Informes Estadísticos*, various issues.

According to the Food and Agriculture Organization of the United Nations (FAO), average yields in metric tons per ha over 2008–2011 were much higher in several producing countries compared to Costa Rica (3.6 metric tons per ha). Those countries included Uruguay (7.8 metric tons per ha), Argentina (6.6 metric tons per ha), China (6.6 metric tons per ha), and Nicaragua (4.9 metric tons per ha). Furthermore, the national yield was low compared to the United States (7.7 metric tons per ha), the main supplier of Costa Rica's imports of rice.[7] However, larger farms in Costa Rica, with access to irrigation and more advanced technology, reached a yield close to 6 metric tons per ha (Umaña, 2011).

In Costa Rica, there is a significant difference in costs between the two common rice production methods: irrigated and rain-fed production. Irrigated rice is the country's most productive method of production, generating on average 24 per cent more yield per ha than rain-fed rice production. Nevertheless, most rice farmers in Costa Rica (70 per cent) use the rain-fed method. Irrigated fields are concentrated in the Tempisque River Basin, where 45 per cent of total national production takes place (Umaña, 2011).

During the 2011–2012 harvest, rice plantations covered 77,240 ha, 4.8 per cent less compared to the 2010–2011 harvest. The Chorotega Region represented 35 per cent of the total planted area, followed by the Huetar Norte Region (25 per cent) and the Brunca Region (23 per cent). Between 2006–2007 and 2010–2011, planted area increased by 72 per cent to 81,116 ha in 2010–2011 (Figure 2).[8] This was due to the rise in international rice prices and incentives to expand production provided in the National Food Plan, which aimed to enhance basic grain production (rice, beans, and white corn) in order to reduce the country's vulnerability to imports due to high international prices (Arroyo *et al.*, 2013).

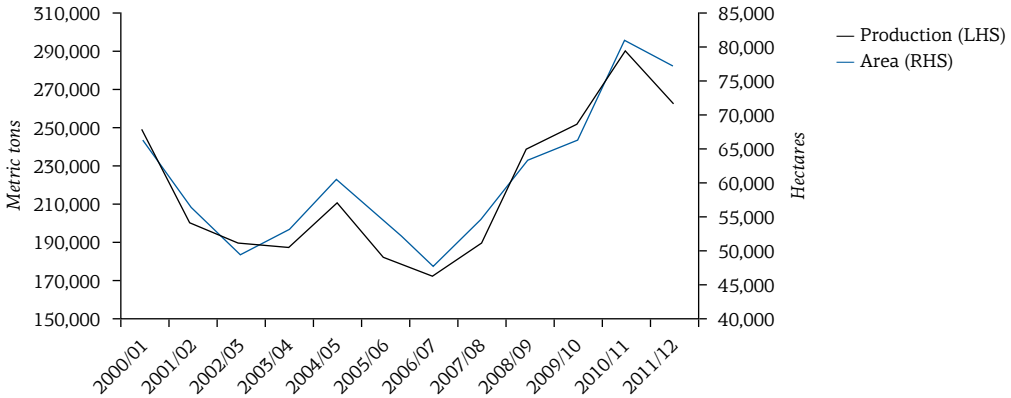
Paddy rice production, after a downward trend until 2006–2007, also began to rise and reached more than 290,000 metric tons in 2010–2011. This expansion caused storage capacity problems. For instance, the increase in planted area during 2009–2012 in the Huetar Norte and Atlántica Regions forced producers to transport their production to other regions. This increased transportation costs and sometimes caused a deterioration of rice quality due to the increase in time between the felling and the receipt of grain. This affected the final price producers received for their crop (Arroyo

[7] FAO statistics, available at: *http://faostat.fao.org/site/339/default.aspx*.

[8] According to the Regional Agriculture Sectoral Committee of the Chorotega Region (2008), which is the country's largest rice producer, 94 per cent of cultivated area in that region is occupied by traditional production such as sugar cane, rice, and livestock. Corn and bean crops are grown mainly in the districts of La Cruz, Santa Cruz, Nicoya, and Nandayure.

et al., 2013). As a result, producers agreed to reduce the planted area by 5 per cent during 2011–2012: this led to a 10 per cent decrease of paddy rice production during the same period.[9]

Figure 2 Paddy rice production and rice, 2000–2001 to 2011–2012



Source: CONARROZ.
Note: LHS stands for left-hand scale, RHS for right-hand scale.

2.2 Value chain

At the industry level, 15 plants were in operation during the 2011–2012 harvest, mainly in the Chorotega Region, where millers purchased 49 per cent of national paddy rice production. These plants provide storage, drying and milling, and they sell rice that should serve for direct consumption to wholesalers. Around 84 per cent of paddy rice produced by Costa Rica was purchased by industries in the Chorotega and Central Pacific Regions, where most of the rice industry is located.[10] The two regions have five mills each, followed by the Brunca Region with three, and the Central Region with two. Also, four plants owned by the National Production Council are used for grain storage (Arroyo *et al.*, 2013). According to CONARROZ, the rice industry purchased all the 2010–2011 rice harvest.

Four mills, which account for 70 per cent of production, source paddy rice from their own fields (vertical downstream integration). Domestic rice production does not satisfy total consumption demand. As a result, larger millers import paddy rice from the United States, using the performance

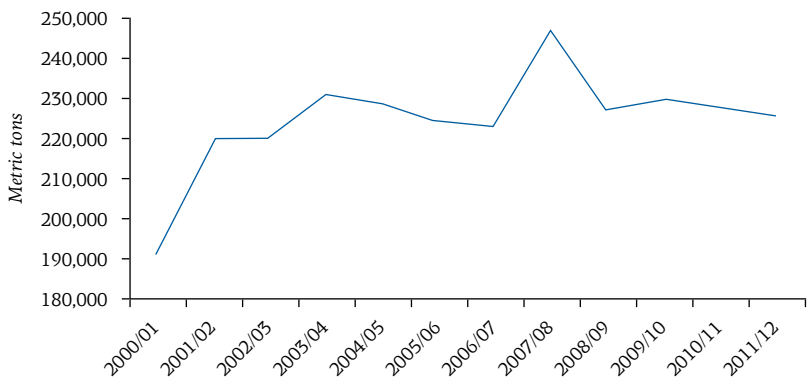
[9] CONARROZ, *Informes Estadísticos*, various issues.
[10] CONARROZ, *Informes Estadísticos*, 2010–2011.

requirement applied for the CAFTA-DR quota to keep the mills operating (Umaña, 2011; Arroyo *et al.*, 2013).[11]

During 2000–2012, milled rice stocks at the end of each month averaged 56,600 metric tons. These stocks increased between 2009 and 2012, reaching a maximum of 111,182 metric tons in November 2011, enough to cover 5.8 months with an average consumption of 19,000 metric tons. The increase in stocks of equivalent milled rice was related to the increased production promoted in the National Food Plan, which set a target of covering 80 per cent of consumption through domestic production. To achieve this goal, the sown area increased, but the ability to receive, dry, and store rice did not follow. Consequently, during the peak harvest months (September and October), there were not enough facilities to dry and store the grain (Arroyo *et al.*, 2013).

Between 2000–2001 and 2003–2004, milled rice sales grew at a 6.6 per cent annual average rate. The most significant expansion occurred during 2007–2008, when sales rose by 10.3 per cent compared to the 2006–2007 harvest (Figure 3). However, the subsequent four harvest periods reported lower sales, from 246,130 metric tons in 2007–2008 down to 225,169 metric tons in 2011–2012 (an 8.5 per cent decrease).[12] According to millers, this reduction may have been caused by the entry of 6,000 metric tons of milled rice imported by third parties (supermarket chains and wholesalers) under the tariff rate quota (TRQ) scheme of the CAFTA-DR (Arroyo *et al.*, 2013).

Figure 3 Milled rice sales by domestic industries, 2000–2001 to 2011–2012 (metric tons)



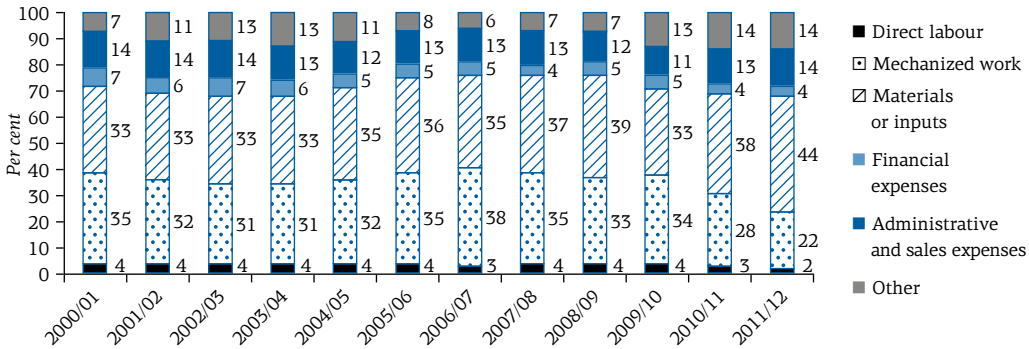
Source: CONARROZ.

[11] Section 2.4.2 explains the performance requirement applied by Costa Rica for the paddy rice import quota from the United States under the CAFTA-DR.

[12] CONARROZ, *Informes Estadísticos*, various issues.

Regarding the composition of costs related to paddy rice production in Costa Rica, materials or inputs represent on average 36 per cent of total costs, followed by mechanized labour (32 per cent), administrative and sales costs (13 per cent), other expenses (10 per cent), financial costs (5 per cent), and direct labour (4 per cent) (Figure 4). These data indicate that rice farming depends largely on machine work and has low labour requirements (Arroyo *et al.*, 2013).

Figure 4 Percentage composition of paddy rice production costs, 2000–2001 to 2011–2012



Source: Institute for Economic Sciences Research (Instituto de Investigaciones en Ciencias Económicas).

Retail rice marketing is basically in the hands of supermarkets that sell rice with little value added in the domestic market. There are many brands, with differentiation between them mainly based on the percentage of whole grain. In supermarkets, rice is usually marketed with 80, 90, 95, and 98 per cent whole grain. The percentage of whole rice, which is identified in each bag, and the brand are the main attractions for the consumer (Jovel and Díaz, 2007).

2.3 Consumption

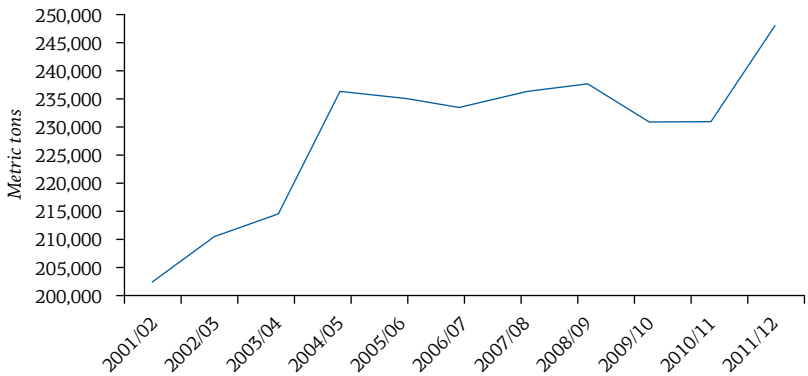
Rice is essential to the diet of Costa Ricans, whose level of consumption is similar to that of Japan (57 kilograms per person per year). Rice represents 8 per cent of the total value of the food basket, and is a key source of total calorie intake (Umaña, 2011).

According to CONARROZ, consumption of rice (production plus imports minus exports) in 2011–2012 was estimated at 247,892 metric tons of milled rice, equivalent to per capita consumption of 53.71 kilograms, considerably higher than in previous periods. Domestic rice covered 69 per

cent of national consumption, with imported rice accounting for the remaining 31 per cent. The shortfall of rice to meet domestic consumption was covered by imports from the CAFTA-DR quota and other rice imports.

Rice consumption remained between 230,000 and 238,000 metric tons between 2006–2007 and 2010–2011 (Figure 5), with a spike in consumption towards the end of the period.

Figure 5 National consumption of milled equivalent rice, 2001–2002 to 2011–2012 (metric tons)



Source: CONARROZ.

Although total consumption has increased, per capita consumption has remained steady since the mid-1990s. This suggests that the growth in national consumption is mainly due to the increase of the population (Arroyo *et al.*, 2013).[13]

Based on the 2004 ENIG, Table 2 shows the share of household expenditure on each type of rice compared to total rice expenditure, by per capita expenditure decile.[14] Throughout all income deciles, whole rice with quality classification (e.g. 92 per cent whole grain) is the type that accounts for the highest expenditure share, followed by rice without a quality classification (e.g. rice produced by households, which includes self-production) and pre-cooked rice.

[13] The Costa Rican population increased by almost 20 per cent from 2001 to 2012.
[14] Throughout this study, expenditure is used as a proxy for income.

Table 2 Share of household expenditure on each type of rice compared to total rice expenditure, by per capita expenditure decile (per cent)

Decile	Rice without quality classification	Whole rice with quality classification	Brown rice	Pre-cooked rice	Total
1	35.1	53.1	..	11.7	100.0
2	34.7	52.2	..	13.1	100.0
3	28.8	71.2	..	..	100.0
4	27.9	32.4	30.0	9.7	100.0
5	23.3	42.7	8.2	25.8	100.0
6	32.8	37.1	..	30.0	100.0
7	41.9	44.9	..	13.2	100.0
8	16.0	53.0	17.8	13.1	100.0
9	31.4	55.9	..	12.7	100.0
10	..	60.9	14.8	24.3	100.0

Source: 2004 ENIG.
Note: Two dots (..) indicate that data are not available.

2.4 The rice policy regime in Costa Rica[15]

The foreign trade regime applicable to rice in Costa Rica is composed of several elements, including the government price-fixing mechanism, tariffs and the performance requirement.

2.4.1 Government price-fixing mechanism

The most important form of assistance to the rice industry in Costa Rica is the support of the market price (Umaña, 2011). The country's rice market is comprehensively regulated. At almost every step along the production chain – as rice passes from the farmer to the miller, the wholesaler, the distributor, the retailer, and finally the consumer – the price of rice is controlled by the government through a system of established price ceilings. In addition, Decree 37699-MEIC, which entered into force in 2013, also defines price floors.

[15] The Ministry of Foreign Trade of Costa Rica (COMEX) is one of the main sources of information for this section.

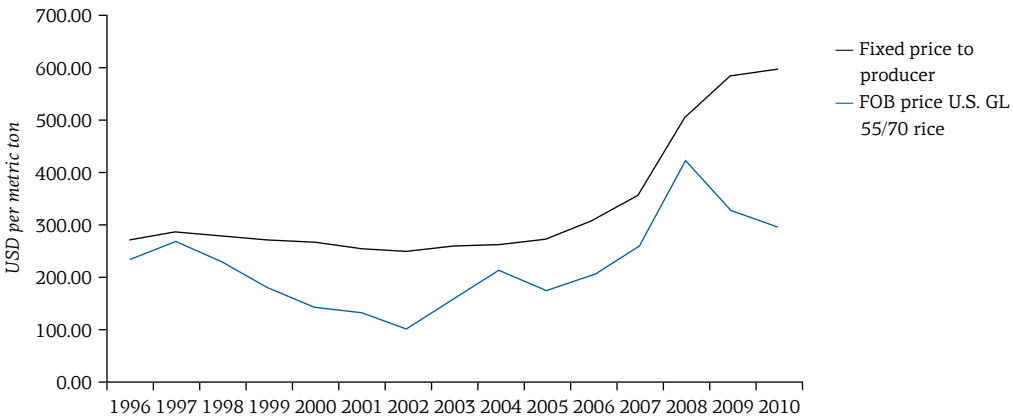
Rice should be purchased at the official price set by the Ministry of Economy, Industry and Commerce (MEIC). CONARROZ recommends the price for producers, and based on that recommendation, the MEIC defines prices for the other steps of the value chain. The price-fixing mechanism includes the official definition of a purchase price for the rice industry to buy from producers. This model considers an internal cost structure with a profit margin. The calculation is based on an irrigated farm of 250 ha, and considers all costs in the production of paddy rice assigned to the consumable units of each good and the respective costs, including a profit margin of 20 per cent on costs, excluding financial expenses (COMEX *et al.*, 2010).

The officially established price for producers increased significantly from USD 305 per metric ton in 2006 to USD 633 in 2010, which represents a 107 per cent increase in four years (see Annex 2, Table A2.2). Furthermore, when comparing the officially established price during 1995–2010 with the international price of GL55/70 rice, which is the type of rice imported by Costa Rica, the country's official price remained significantly higher than the international market price.

As shown in Figure 6, the transmission of the international price to Costa Rican households is direct when the trend is on the rise, but not when international prices fall. Between 2008 and 2010, the gap between the two prices widened considerably (COMEX *et al.*, 2010). Given that the definition of the producer price considers an internal cost structure, and due to the increase in the cost of inputs, the government raised the producer price.

Imported milled rice is currently sold at the floor prices defined in Decree 37699-MEIC, which are calculated on the basis of the price for domestic producers. This allows the imported milled rice, which has highly competitive prices, to fetch a greater profit margin compared to domestic milled rice. Similarly, importers (millers) of paddy rice, which has a much lower price than that paid to domestic producers, use this low-cost raw material in their production processes and capture profits defined by the above decree for each stage in the rice value chain.

Figure 6 Comparison between the fixed price to rice producers and the international price for GL55/70 rice, 1996–2010 (USD per metric ton)



Source: COMEX.
Note: FOB stands for free on board.

According to the WTO Agreement on Agriculture, price support measures such as the minimum price that the producers receive in Costa Rica represent a subsidy, which is classified as highly trade distorting and is subject to an annual value limit which a WTO member cannot exceed. The value of distorting subsidies is expressed in the aggregate measurement of support (AMS). For Costa Rica, the bound total AMS is USD 15.9 million (COMEX *et al.*, 2010). The amounts of subsidies provided to rice producers in recent years through the minimum producer price exceeded by more than five times Costa Rica's commitments in terms of its total bound AMS. Consequently, Costa Rica is in violation of its obligations under the Agreement on Agriculture.

This situation has led to consultations at the WTO with trade partners concerned about this measure. In 2013, the Costa Rican government, producers and millers agreed to work on an alternative mechanism that would substitute the existing price-fixing scheme. This mechanism is embodied in Decree 37699-MEIC, which aims to remove any rice price regulation scheme.[16] The decree also defines a coordinated programme of work between the government and CONARROZ to reduce the costs of inputs

[16] The decree also includes a transitional price-fixing scheme that regulates all qualities of milled rice, not only the 80/20 (80 per cent whole grain) milled rice quality.

(agrochemicals and seeds), and prioritizes the implementation of a complementary agenda aimed at increasing productivity in the rice sector.[17]

In June 2013, the country's decision to reduce its rice subsidies was welcomed by WTO members as an achievement both for Costa Rica in bringing its support back within its WTO commitments, and also for the role of the WTO Agriculture Committee in solving possible contentious issues.[18]

2.4.2 Current import regime: Tariffs and the performance requirement under the CAFTA-DR

Costa Rica has traditionally been a net importer of rice. In recent years, imports of milled rice have mainly come from the United States and other countries in the Americas.[19] In 2012, 84 per cent of Costa Rica's imports came from the United States, 8.6 per cent from Central America, 4.9 per cent from Argentina, and 2.1 per cent from Uruguay.[20] During 1995–2009, the average size of imports and national production relative to total domestic supply was 37.9 per cent and 65.2 per cent, respectively (see Annex 2, Table A2.1). However, in recent years, domestic production has been contributing more to national consumption of rice due to the stimulus from the price-fixing mechanism.

The bound tariff for Costa Rica in the WTO on paddy and milled rice is 35 per cent; the most-favoured-nation (MFN) tariff for pre-cooked rice is 15 per cent.[21] In addition, Costa Rica applies a phytosanitary fee of USD 20 per metric ton (equivalent to around 5 per cent of the international price based on figures of 13 March 2013).

The import of rice from any country in Central America is duty-free under the Central American Common Market (CACM). Within the CAFTA-DR,

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[17] The complementary agenda includes the adoption of: (a) good agricultural practices manuals and a Technology Development Plan for the rice sector; (b) agribusiness training, maintenance, and business management; and (c) a process to strengthen credit mechanisms.

[18] "Members welcome Costa Rica's decision to bring its rice subsidies within agreed limits", WTO press release, 13 June 2013. Available at: *http://www.wto.org/english/news_e/news13_e/agcom_13jun13_e.htm.*

[19] There is a phytosanitary ban imposed on rice originating from South-East Asia due to *Trogoderma granarium.* Although the risks associated with this pest have been estimated as being very low, the ban is still enforced.

[20] Figures from COMEX, based on data from the Central Bank of Costa Rica.

[21] The MFN tariff applied by Costa Rica to rice includes an additional duty of 1 per cent pursuant to Law No. 6946; this duty is applicable to all imports, with a few exceptions As a result, the MFN tariff for paddy and milled rice is 36 per cent, equivalent to the sum of the bound tariff (35 per cent) and the 1 per cent additional duty from Law No. 6946.

Costa Rica granted a duty-free import quota of 51,000 metric tons of paddy rice to the United States, which is increasing by 1,000 metric tons per year until 2024. This quota is allocated to the millers. In order to be granted a part of the import quota, millers must first purchase rice from domestic producers. The performance requirement here relates to the right to import rice only in an amount proportional to the purchase of the local harvest (Umaña, 2011).

There are two types of rice millers in Costa Rica: non-integrated independent producers with greater business risk, and integrated mills with lower business risk (Arroyo *et al.*, 2013). The latter often source rice from their own fields. Vertical integration of mills causes the rents of large producers to be added as they move through each step of their chain (production, manufacturing, and wholesale) as the mechanism guarantees a minimum price at the different levels (COMEX *et al.*, 2010). In addition, prices received by rice millers are higher compared to their competitors in major exporting countries. Costa Rican millers have benefited from prices that are consistently above world market levels due to the protectionist policies that have been implemented (Umaña, 2011).

The local mills also are the largest rice producers, so higher domestic prices of rice increase their income. Also, an increase in local prices of rice makes paddy rice imports from the United States relatively cheaper, and, as a result, a larger margin is left for millers when they process and finally sell this imported rice in the domestic market. But not only local mills benefit from a high price to producers. Small producers also gain, although large producers enjoy economies of scale and higher productivity levels that allow them to obtain greater benefits from an increase in rice prices.

As part of the commitments defined by the CAFTA-DR, rice was placed in a non-linear 20- year phasing-out category.[22] The objective is for the out-of-quota rice imports from the United States to be duty-free in 2025.[23] The base rate will remain in 2006–2015, but starting from 2016 (until 2020), tariffs will be reduced by 8 per cent annually, and after 1 January 2021 (until 2024), by 12 per cent per year. The CAFTA-DR should ultimately liberalize rice trade between Costa Rica and the United States, which after the 20-year phase-out period should be completely duty-free. At that

[22] The CAFTA-DR entered into force in Costa Rica in 2009; however, the tariff phasing-out schedule started in 2006, when El Salvador began to implement the CAFTA-DR.

[23] Prior to the CAFTA-DR, the tariff rate for imports of paddy and milled rice from the United States was 36 per cent. There was no quota providing preferential treatment to these imports.

time, there will not be a need to continue applying the quota (COMEX *et al.*, 2010). Furthermore, in 2020, pre-cooked rice imports will be duty-free.

In 2012, the CAFTA-DR quota for paddy rice imports from the United States, established according to industry participation in domestic purchases during the 2010–2011 harvest, was used up to its maximum by the millers (Table 3). Four millers accounted for 72 per cent of the quota, while 28 per cent of the quota was assigned to eight other millers (Arroyo *et al.*, 2013).

Table 3 Paddy rice tariff rate quota established and used, 2009–2012

Year	TRQ established (metric tons)	TRQ used (metric tons)	Share used (per cent)
2009	54,000	52,260	96.8
2010	55,000	54,762	99.6
2011	56,000	55,651	99.4
2012	57,000	57,000	100.0

Sources: COMEX and National Association of Rice Millers of Costa Rica.

With regard to imports of milled rice from the United States using the CAFTA-DR quota, an initial duty-free quota of 5,250 metric tons of milled rice is being increased by 250 metric tons per year until 2024. There is no performance requirement associated with access to the import quota for milled rice, so any relevant economic actor can apply for an allocation. Consequently, the quota is distributed among a larger number of actors. For instance, in 2012, the quota of 6,750 metric tons was distributed among 131 participants, although 10 industries or companies received 3,203 metric tons, equivalent to 47 per cent of the milled rice import quota for the year. The allocation process saw the participation of 84 new applicants that obtained a total of 1,349 metric tons, equivalent to 20 per cent of the quota, with each of them allocated a total of 16 metric tons (Arroyo *et al.*, 2013).

Both the size of the established milled rice quota and its use have been increasing. In 2009, 56 per cent of the quota (3,334 of 6,000 metric tons) was used. Table 4 shows that the share increased to 93 per cent (5,804 of 6,250 metric tons) in 2010 and 95 per cent (6,396 of 6,750 metric tons) in 2012. The exception was 2011, with 88 per cent of the quota (5,736 of 6,500 metric tons) used.

Table 4 Milled rice tariff rate quota established and used, 2009–2012

Year	TRQ established (metric tons)	TRQ used (metric tons)	Share used (per cent)
2009	6,000	3,334	55.6
2010	6,250	5,804	92.9
2011	6,500	5,736	88.3
2012	6,750	6,396	94.8

Source: COMEX.

3 Methodology

The purpose of this analysis is to quantify the effects on consumers of one of the two major changes in Costa Rica's rice policy discussed in the previous section: the adjustment in the country's trade regime applicable to rice as a result of implementation of the CAFTA-DR, which may lead to a reduction in the price of rice for consumers.

The methodology includes the estimation of non-parametric regressions of the welfare effect due to a price decrease of rice on Costa Rican households. Deaton (1989) uses non-parametric density estimations and regressions to study the distributional effects of changes in prices. In this case, the welfare effects from a price change can be assessed by comparing budget and income shares of the good:

$$cv^h = (\varphi_i^h - s_i^h) \, d\ln p_i \qquad (1)$$

where cv^h is the compensating variation (the revenue that the household would need to compensate for the effects of the price change), φ_i^h is the share of household income derived from the production of good i, and s_i^h is the budget share of the household spent on good i.

Based on this equation, after a decrease in the price of a good, net consumers will be better off and net producers will be worse off. Thus, the welfare effects of a price change can be assessed by comparing budget and income shares.[24]

In our case, the analysis only considers the consumption effect, not the income effect. This is because the number of producers in Costa Rica is around 1,000 but Costa Rica's ENIG only contains a few observations on these producers, which precludes running a complete analysis of producer welfare.

[24] In addition, the present study applies a kernel-weighted local polynomial regression.

Costa Rica's case is different from countries such as Madagascar, for example, which in its 2001 household survey reported almost 7,500 observations regarding rice production out of a total number of 11,781 households. For Costa Rica, the assumption is that, on average, households are net consumers of rice, as rice constitutes a basic element of the daily diet, and that the net effect of a decrease in the price of rice will consequently be an increase in welfare.

Our results reflect only partially the effect of price changes of rice on household welfare. In addition to consumption effects, there are other channels for the impact of price changes on welfare. For example, it may be important to address the issue of workers in the rice (and rice-related) sectors, since this source of income may be substantial in parts of the country. In this case, the lack of data prevents incorporating this issue into the estimates, but it is nevertheless important to be aware of these other channels through which price changes can affect welfare.

In a study of the welfare effects of Argentina joining the Common Market of the South (MERCOSUR), Porto (2006) affirmed that the first-order argument omits dynamic household responses, and that consumers may respond, for example, by substituting more expensive goods with cheaper ones. In rural areas, farmers may increase agricultural production, farm employment and wages, and purchases of inputs and services in local markets. Consequently, the net position of the household becomes endogenous: sufficiently large consumption and income responses may cause an *ex-ante* net consumer to become an *ex-post* net producer, thus benefiting from the price increase. Furthermore, according to Porto (2010), first-order effects omit the response of labour markets. Many households earn some of their living from wages. If wages depend on the prices of the goods affected by the trade reforms, then these mechanisms should be incorporated when classifying households as net producers or net consumers. Other variables to consider are the integration or segmentation of labour markets and the presence of spillovers and linkages. The way labour markets function may also depend on factors such as labour market regulations, labour laws and the flexibility to hire and fire workers, and migration costs.

Several authors have presented household models that include labour income effects occurring through other channels. For example, in a study on Cambodia, Soloaga (2005) relied heavily on defining the poor in terms of patterns of expenditure and sources of income (ordered by deciles of adult equivalent per capita expenditure) and then on describing their main sources of income. Each household has different endowments (e.g. different quality of land and different numbers of skilled and unskilled workers)

that generate income. Also, each household has different patterns of expenditure (e.g. food and non-food expenditure). Soloaga (2005) found that the changes in prices and quantities that would be observed under the baseline scenario of implementation of the Doha Development Agenda would only have a marginal impact on Cambodia's poor. Meanwhile, under a more ambitious implementation of the agenda, the changes in international prices coupled with the elimination of all Cambodian tariffs would produce gains of about 7.5 per cent of per capita consumption on average.

McCulloch *et al.* (2001) provided an analytical framework for understanding the linkages between trade liberalization and poverty at the household level. They considered a number of potential generalizations related to the basic view of households, including the following:

- Households can provide several forms of labour (e.g. skilled and unskilled), so their endowments in this regard and the different wages they command need to be considered.

- Working on and off the farm may not be perfect substitutes for household members (travel costs for off-farm working) and the farm may be better served by family than by non-family labour (perhaps because non-family labour needs to be monitored more than a family member). Thus, the (implicit) "wage" paid to family members may be different from the wage paid to those outside the family, even for the same task.

- It is necessary to incorporate some assumptions about how households allocate their time across the many different activities in which they are involved. Poor households typically earn income in a wide variety of ways, and the allocation of their time to these different activities may change significantly with changes in trade policy.

- Some jobs may only be available for a fixed number of hours per day. Thus, if trade policy affects employment by increasing the amount of time that individuals work, it could have significant effects on poverty.

Several other authors have also examined the link between trade and poverty. Topalova (2010) used the case of the Indian trade liberalization in 1991 to measure the impact of trade liberalization on poverty and to examine the mechanisms underpinning this impact. McCaig (2011) analysed the effects of increased United States market access on poverty in Viet Nam and found that poverty fell faster in provinces that experienced the largest tariff cuts. Goldberg and Pavcnik (2005) investigated the relationship between protection and industry wage premiums in Colombia. The authors relate

wage premiums to trade policy in an empirical framework that accounts for the political economy of trade protection. Goldberg and Pavcnik (2004) reviewed country case studies that analyse micro data from household or plant-level surveys and establish certain patterns that seem common across countries and trade liberalization episodes, and that may be informative with regard to how developing countries adjust to trade reforms.

The analysis of the decrease in rice prices is based on the reduction of import tariffs due to the application of the CAFTA-DR. Welfare effects under three scenarios will be analysed, each related to a particular tariff liberalization phase (2015, 2020, and 2025), based on the implementation of the CAFTA-DR's phasing-out process.

Since we assume a perfect pass-through of tariff reductions, the results here are an upper-bound estimate of the benefits of the tariff phasing-out under the CAFTA-DR. In this sense, the estimation of the pass-through effect for rice may be difficult because there are factors that influence the internal price and that are not easy to measure or quantify, such as political decisions and the degree of integration and competition regarding markets. Also, international prices may not reflect or accurately explain the evolution of internal rice prices in Costa Rica, as prices paid to producers are based on a cost structure that includes elements such as the value of inputs used in production.

The regressions will be run at the national level, but also disaggregated at the following levels: (a) urban versus rural households, (b) region, (c) education level of the head of the household, and (d) household size.

The results obtained from the non-parametric regressions across the different characteristics of households and their per capita consumption level will be particularly useful in terms of determining how an import tariff phase-out process may affect consumers

3.1 Definition of the scenarios: Estimate of the welfare effect from a decrease in the price of rice

The scenarios used in this study were defined based on the estimate of a weighted average tariff for the importation of rice under the CAFTA-DR phasing-out schedule and quotas for rice.[25] The period of analysis starts in 2009, when the CAFTA-DR entered into force in Costa Rica, and ends in 2025, when the phasing-out period for paddy and milled rice will be completed.[26]

It is assumed that the import quotas defined in the CAFTA-DR for paddy and milled rice will be completely used during the years ahead (2013–2024). The estimated share of intra-quota CAFTA-DR imports of rice in total rice imports from the United States for 2009–2012 was 69 per cent for paddy rice and 80 per cent for milled rice. These shares were applied to the respective CAFTA-DR quota volumes for each year from 2013 to 2024 in order to define the extra-quota volumes and, as a result, the total estimated imports of paddy and milled rice from the United States. Note that almost all of Costa Rica's paddy rice imports come from the United States.

For milled rice imports from the rest of the world (aside from the United States), the volume forecast for 2013 was obtained by multiplying the annual average growth rate for rice consumption in Costa Rica during the 2001–2002 and 2011–2012 harvest seasons (2.03 per cent) by the average imported volume during 2009–2012 from each of the countries of origin. For countries other than the United States, the same growth rate (2.03 per cent) was applied for the estimation of 2013–2024 milled rice imports.

Welfare evaluations are done for four points in time: a baseline scenario based on the data from 2009–2012, which represents the first four years of CAFTA-DR implementation in Costa Rica; a second scenario in 2015, the last year in which the MFN tariff will be applied to out-of-quota CAFTA-DR imports from the United States; a third scenario in 2020, when pre-cooked rice imports from the United States will enjoy duty-free access; and the final scenario in 2025, when all rice imports from the United States will be duty-free.

As shown in Table 5, the overall weighted average tariff for rice will move from 12.1 per cent in 2009–2012 to 6.6 per cent in 2020. In 2025, the overall weighted tariff will be zero. This general average tariff can be used to define a price change.[27] As a result, the estimated price change for each of the scenarios in relation to the baseline years (2009–2012) will be the following:

[25] These simulations include paddy, milled and pre-cooked rice. The weights used are based on the total imported volume of rice. Complete pass-through is a reasonable assumption in our case, as the domestic market for rice is influenced by political decisions that may be arbitrary and, as a result, difficult to reflect or quantify in the estimation of the pass-through.

[26] Costa Rica's import data for 2009–2012 are available at the 10-digit level of disaggregation (national tariff classification).

[27] Although the best way to justify complete pass-through assumption is by assigning each tariff change to the particular good in household expenditure, in our analysis this was not possible because the rice classification in Costa Rica's 2004 ENIG is different from the one in international trade statistics (based on the Harmonized System). Therefore, in order to address this limitation, we proceeded by establishing an "overall weighted average" obtained from tariff changes, which was then applied to the share of households' total expenditure on rice. Rice flour is not defined as an individual product according to the 2004 survey, and it was not considered for the estimation of the scenarios.

- 2025 scenario: –12.1 per cent
- 2020 scenario: –5.52 per cent
- 2015 scenario: –1.51 per cent

For pre-cooked rice, the average weighted tariff for each of the years from 2013–2024 results from the multiplication of the applied tariff in each year by the share that each exporting country represented in the total volume imported by Costa Rica in 2012. The base year 2012 for the exporting country's share was chosen because that year shows a better representation of how imports would be distributed by country of origin during the following years. In 2012, the United States accounted for the highest share of Costa Rica's total imports of pre-cooked rice (50.1 per cent).

Table 5 Weighted average tariff for rice imports to Costa Rica, 2009–2012, 2015 and 2020 (per cent)

Rice product	Weight	Weighted average tariff (by product)
		2009-2012
Paddy	83.4	12.3
Milled	13.2	11.4
Pre-cooked	3.4	9.3
Total	100.0	12.1
		2015
Paddy	81.8	10.9
Milled	14.8	10.0
Pre-cooked	3.4	6.0
Total	100.0	10.6
		2020
Paddy	81.1	6.5
Milled	15.5	8.3
Pre-cooked	3.4	0.0
Total	100.0	6.6

Source: Author's calculations, based on data from the Central Bank of Costa Rica and COMEX.
Notes: Figures in the table are forecasts. Annex 3 contains more information about weights, average tariffs and assumptions for the estimate of the weighted average tariff. The column entitled "Weight" indicates the share of imports of each type of rice in the volume of total rice imports. The column entitled "Weighted average tariff (by product)" gives the trade-weighted average tariff for each rice category as well as the average tariff applied to rice weighted according to the importance of each rice category in rice imports.

[28] The fact that the expenditure structure of the households will not change is established as a *ceteris paribus* assumption for simplicity purposes.

3.2 Data access and availability

This study uses Costa Rica's 2004 National Income and Expenditure Survey, which includes three databases. The first covers variables related to the characteristics of household members, such as education level, employment, income, and transfers. A second database includes variables linked to household characteristics, such as the type of dwelling, number of rooms, and availability of appliances, domestic workers, persons who receive government aid, household incomes, and other characteristics. A third database has a more disaggregated classification of household expenditures by specific products. For example, this database provides the share of household expenditure on rice in which all four types of rice are considered as a single product.

The fact that the survey dates to 2004 is not a limitation because tariff conditions for rice have not changed. Nor has there been much change in the composition of the poorest quintile. This study thus assumes that the structure of household expenditure has not changed between 2004 and the following years, including the baseline years of 2009–2012 and the phasing-out scenarios years (2015, 2020, and 2025).[28]

4 Welfare estimates for Costa Rica's households from a decrease in the price of rice

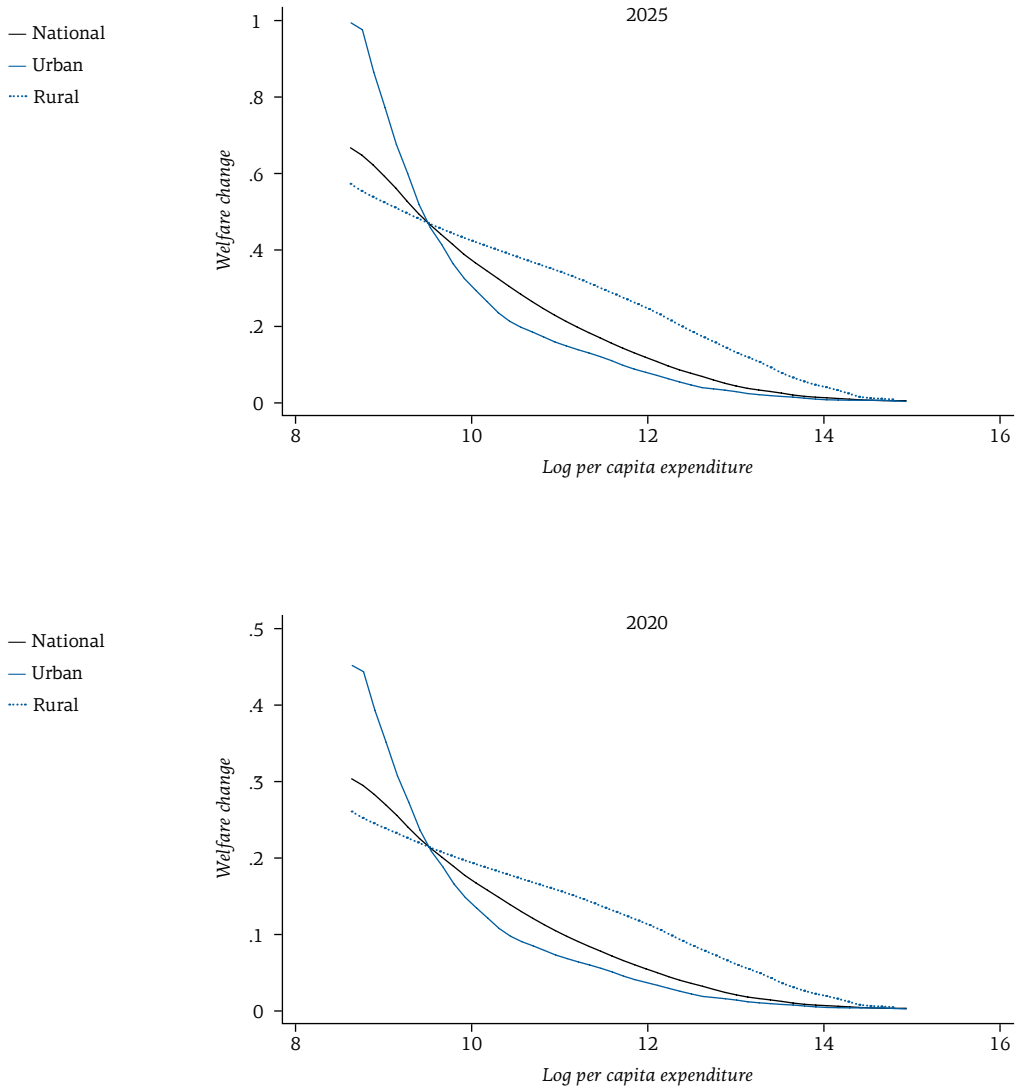
4.1 Estimates at the national, urban and rural levels

Figures 7–10 show welfare gains from the decrease in the price of rice in the years ahead, assuming that the reduction in import tariffs will be completely transmitted to local prices.

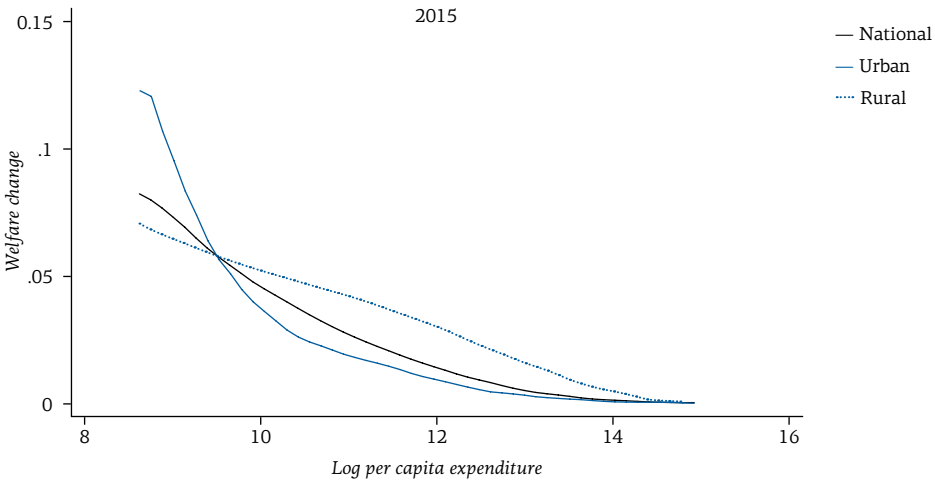
Welfare gains are expected to be positive during those years as tariffs decrease during the phasing-out process. As expected, welfare gains will become relatively more significant for poor households, particularly for poor urban households that are expected to benefit the most from a price decrease in rice. Their welfare gains may account for more than 0.05 per cent of their initial consumption level in 2015, around 0.30 per cent in 2020, and close to 1 per cent for the 2025 full tariff liberalization scenario (Figure 7).[29]

[29] Further research could assess welfare effects by showing estimates by deciles or centiles of income distribution (Nicita, 2004). The reason is that non-parametric regressions are local regressions by nature and, as such, they do not indicate the income percentile of households at each point of the estimated curve.

Figure 7 Welfare changes in the 2025, 2020 and 2015 scenarios compared to 2009–2012, at the national level and by urban and rural areas



Welfare effects of a change in the trade policy regime for rice in Costa Rica



Source: Author's calculations, based on the 2004 ENIG.

Middle-income households will also benefit from a reduction in rice prices. For example, under the 2015 scenario, welfare gains for this group of households will reach around 0.04 per cent; the 2020 scenario shows a benefit close to 0.15 per cent; and the 2025 scenario shows welfare gains of around 0.30 per cent. Welfare gains for the richest households are negligible, a fact that is consistent with Engel's Law, as the share of rice in their budget is relatively small compared to low-income households. Also, the wealthiest population can afford a more diversified diet, away from rice.

A complementary way to assess welfare effects from a reduction in the price of rice is by comparing the average welfare effect according to deciles of income distribution. In this way, and assuming that the reduction in import tariffs will be completely transmitted to local prices, Table 6 shows that, at the national level, welfare effects will be more relevant in the poorest deciles. For example, households in the first decile will show, under the 2025 scenario, a 0.66 per cent welfare increase from their initial consumption level. This is a result that complements Figure 7, as lower-income households will enjoy higher welfare increases due to a reduction in rice prices.

Table 6 Welfare changes in the 2025, 2020 and 2015 scenarios at the national level, by deciles of income distribution (per cent)

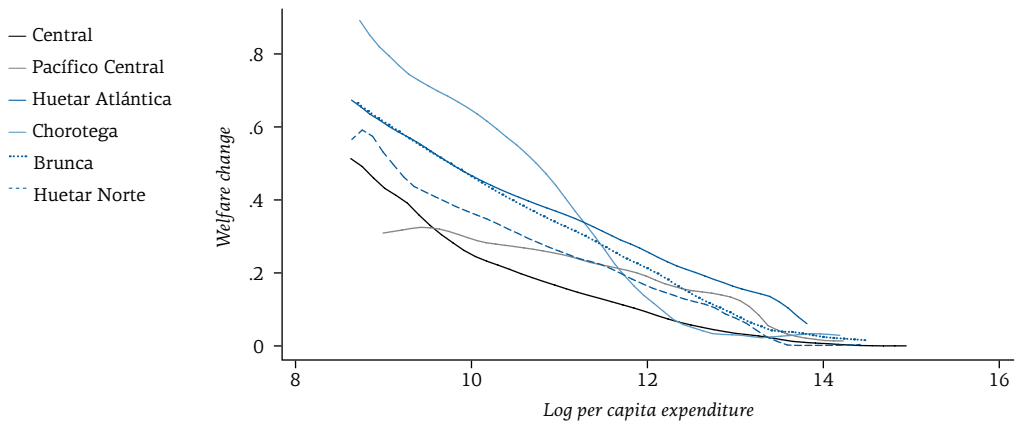
Decile	Scenario			Decile	Scenario		
	2025	2020	2015		2025	2020	2015
1	0.66	0.30	0.08	6	0.17	0.08	0.02
2	0.38	0.17	0.05	7	0.13	0.06	0.02
3	0.27	0.12	0.03	8	0.08	0.03	0.01
4	0.22	0.10	0.03	9	0.05	0.02	0.01
5	0.17	0.08	0.02	10	0.02	0.01	0.00

Source: Author's calculations, based on the 2004 ENIG.

4.2 Welfare effects by region

With regard to welfare effects by region, all regions show a common downward tendency as household income increases. Under the 2025 scenario, the region that shows the highest welfare increase for the poorest segments of the population is the Chorotega Region, followed by the Huetar Atlántica and Brunca Regions (Figure 8).[30] In these cases, welfare increases for poor households from a complete tariff liberalization of rice may reach, on average, 0.50 per cent or more from the baseline consumption level.

Figure 8 Welfare change in the 2025 scenario compared to 2009–2012, by region



Source: Author's calculations, based on the 2004 ENIG.

[30] Figure A1.1 in Annex 1 shows the results for the 2015 and 2020 scenarios.
[31] Figure A1.2 in Annex 1 shows the results for the 2015 and 2020 scenarios.
[32] Large households with more children may dedicate a larger budget share to rice.

The Chorotega Region, as well as the Huetar Atlántica and Brunca Regions, have consistently had high poverty levels. For example, according to the average poverty incidence for 2010–2012, the share of the population living in poverty was 34.1 per cent in the Brunca Region, 32.9 per cent in Chorotega, and 27.9 per cent in Huetar Atlántica.

Figure 8 shows that gains are larger for these poor regions in Costa Rica. In contrast, the Central Region shows the lowest welfare gains from a price decrease in rice (except for the poorest households), probably due to the fact that this region has recorded the lowest poverty incidence levels in Costa Rica. However, we must be cautious about interpreting this regional disaggregation, since the Chorotega Region is at the same time the largest producer of rice, and the present study does not consider income effects.

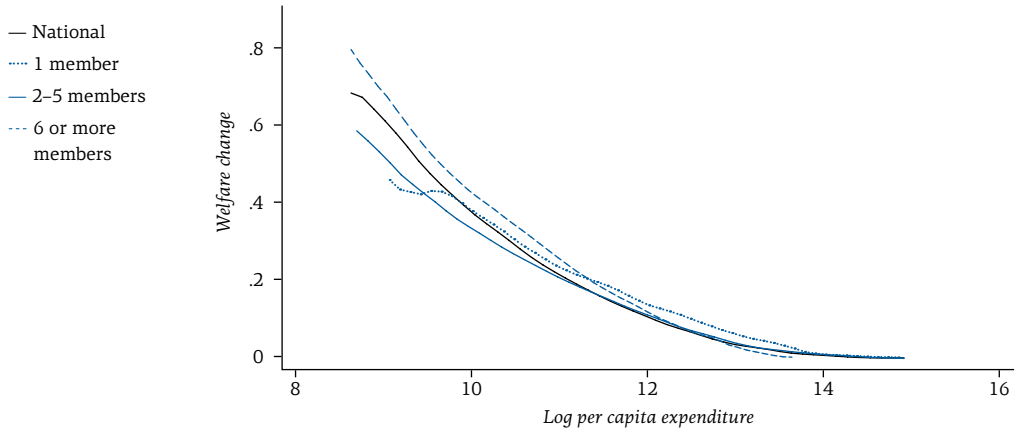
Furthermore, Figure 8 shows relatively large differences in the welfare effects across regions, conditional on per capita expenditure. This means that a poor household with the same per capita expenditure, on average, benefits more in the Chorotega Region than in the Brunca or Central Region. The differences in the expenditure share of rice across regions (e.g. due to differences in tastes) might be the underlying reason for these different effects. For instance, according to the 2004 survey, households with the same per capita expenditure dedicated 3.6 per cent of their average budget to rice in the Chorotega Region, followed by the Huetar Atlántica Region (3.1 per cent), and the Brunca Region (2.9 per cent), while they only spent, on average, 1.1 per cent of their budget on rice in the Central Region. Consequently, the increase in welfare resulting from a rice price decrease is, on average, more pronounced for households in regions with a higher share of rice in total expenditure.

4.3 Welfare effects according to household size

Figure 9 shows the welfare effects of a reduction in rice prices based on the number of household members (household size).[31] The 2025 scenario shows that the poorest and largest households, with six or more members, may enjoy the most significant welfare effects.[32] According to the 2011 census, the districts at the national level with a higher incidence of resource gaps, based on the unmet basic needs approach, are those that have a larger average size of households (4 members per household compared to 3.5 members per household at the country level) (Méndez and Bravo, 2011). Unmet basic needs refer to the housing quality, overcrowding, electricity, health, physical infrastructure, consumption capacity, primary and secondary school attendance and school achievement.

Differences in the welfare effects on households, as shown in Figure 9, can be explained by the disparities in the expenditure share of rice for different household sizes. According to the 2004 survey, in households with six or more members, rice represented, on average, 2.7 per cent of the household budget, while for households with two to five members the share was 1.6 per cent. In contrast, households composed of one member spent, on average, 1.4 per cent of their budget on rice. In other words, larger households spent, on average, a higher share of their budget on rice.

Figure 9 Welfare change in the 2025 scenario compared to 2009–2012, by household size



Source: Author's calculations, based on the 2004 ENIG.

A possible explanation for the differences in rice consumption across households is that households with only one member are less likely to cook and eat at home. Instead, they may go to restaurants or eat elsewhere. On the other hand, larger households are more likely to benefit from economies of scale when cooking and eating at home. According to the survey, single-member households spend on average 7.2 per cent of their budget on consumption of food and beverages prepared outside the home, compared to 5.4 per cent, on average, for households with two or more members.

[33] Figure A1.3 in Annex 1 shows the results for the 2015 and 2020 scenarios.

[34] Figures 7–10 remove extreme values. Fitted values from non-parametric regressions could be problematic when we are interested in the extremes, as they may have few observations to perform the regressions and thus produce imprecise estimations. For example, the dataset contains six observations for secondary education with log per capita < 9.5 (representing 0.6 per cent of the total number of observations for secondary education). Furthermore, in Figure 10, the national curve differs from the previous figure due to the different limits applied to remove potential extreme observations in the data.

[35] These four regions were Chorotega, Brunca, Huetar Atlántica, and Huetar Norte.

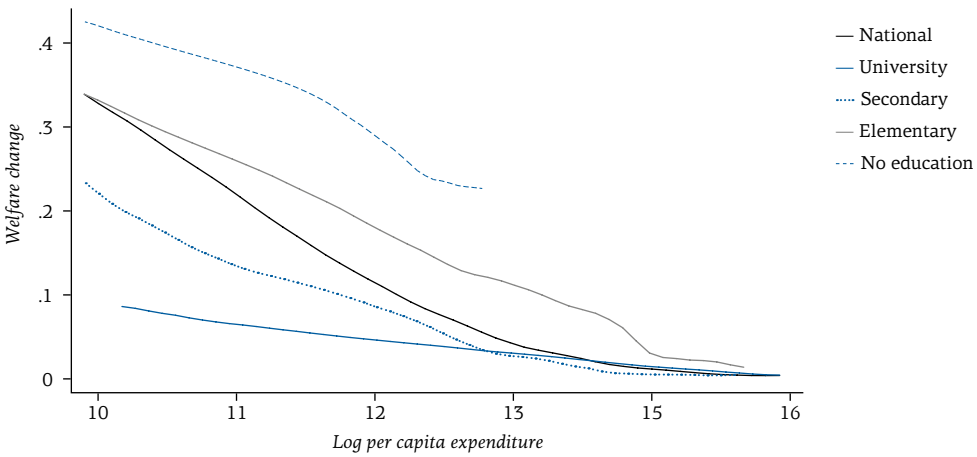
4.4 Education level of the household head

When comparing the education level of the household head, those who have not received an education experience the largest increase in welfare from a reduction in the price of rice (Figure 10).[33] Also, conditional on per capita household expenditure, their budget share spent on rice is higher.[34] For example, according to the survey, households whose head has no education display the highest rice expenditure budget share (3.6 per cent), followed by households whose head has an elementary education (2.4 per cent), secondary education (1 per cent), or university education (0.4 per cent).

As the education level of the household head decreases, the average welfare gain for households will progressively increase. Given that we are controlling for income, we do not have an *a priori* explanation for these differences. Probably, the education variable is correlated with another variable. The survey shows that in four of the six regions of Costa Rica, the share of household heads with no education or with elementary education (completed or not) reached the highest levels, with more than 65 per cent in each region.[35] The same four regions have the highest share of rice expenditure, as described in Section 4.2.

This classification thus serves as another tool to identify the profile of households that will obtain the largest gains from a decrease in the price of rice. For example, welfare gains for households whose head has no education will be double those of households whose head has a secondary education.

Figure 10 Welfare change in the 2025 scenario compared to 2009–2012, by education level



Source: Author's calculations, based on the 2004 ENIG.

5 Conclusions, policy recommendations and discussion

5.1 Conclusions

The rice market in Costa Rica has several distinct features. First, rice is an essential staple in the Costa Rican diet, particularly for the poorest segments of the population. Second, rice is produced in the country, but local production does not satisfy local demand. Third, rice has been subject to several policy measures targeting both local production and imports. The performance requirement for the importation of paddy rice from the United States, for instance, has benefited those producers that are vertically integrated (i.e. those that manage both the production and milling of rice). Fourth, the price-fixing mechanism has increased prices of paddy rice paid to local producers to double that of international prices. Consequently, Costa Rican consumers are paying a high price for a key commodity in their daily basket, the consumption of which is even more important for low-income households. Costa Rica's current rice policies have not been successful in increasing productivity, reducing prices for consumers, or improving conditions for small farmers. It is the large producers who receive the rents from the use of the performance requirement for paddy rice imports. Also, due to the price-fixing mechanism, Costa Rica is in breach of its WTO commitments, as the amount of distorting support received by producers in recent years has exceeded by more than five times the maximum amount allowed under those commitments.

At the same time, the trade regime for rice imports is changing as a result of the entry into force of the CAFTA-DR: the phasing-out process for out-of-quota import tariffs will begin in 2016, and unlimited duty-free access for imports from the United States is scheduled for 2025. The CAFTA-DR thus may be an opportunity to effectively reduce rice prices in the domestic market and in doing so improve the welfare of consumers.

This study analysed the effects of a price decrease of rice on consumers by estimating a reduction in prices for rice imports at several points in time (2015, 2020, and 2025). As a starting point, the study established a baseline scenario that considered the weighted import tariffs on rice for the period 2009–2012. The database used was Costa Rica's 2004 National Income and Expenditure Survey, and it was assumed that the expenditure structure of the households would not change.

By applying non-parametric regressions, the study arrived at several results. As expected, the poorest will benefit the most from a decrease in

the price of rice. In the 2025 scenario with duty-free access for imports from the United States, the poorest urban households may record a welfare increase close to 1 per cent from the baseline period consumption level (2009–2012). Other results have shown the links between welfare gains and characteristics such as the area and region where households are located, household size and the education of the household head.

For comparison, we considered the results of Porto (2006), who analysed the welfare effects of Argentina joining the MERCOSUR, assuming that price changes are given by tariff changes. That study calculated the budget shares for these products, and estimated the welfare effects by multiplying these shares by the price changes. In that case, the total consumption effect was positive for almost all households, except the poorest ones. By adding the consumption effects of traded and non-traded goods, the total consumption effect increased monotonically with the level of livelihood, with changes ranging from around –0.2 per cent to over 2.2 per cent of initial expenditure. The richer the household, the larger was the welfare gain.

The results of our study have shown that households in the poorest regions of the country will enjoy a greater increase in welfare as a result of price reductions in rice. Poorest households in urban areas will gain the most. Moreover, households with six or more members will greatly benefit, as will households whose head has no education. However, if the decrease in import tariffs for rice from the application of the CAFTA-DR is not reflected in a price reduction for this product in the domestic market, then the subsequent welfare gains for the poor sectors of the population will be missed.

As mentioned earlier, this study has only included consumption effects, not income effects. It has not considered any general equilibrium effect coming from reductions in employment in the rice sector. It could be the case that although many households are net rice consumers, and as such benefit from price reductions, they are also affected by negative labour outcomes derived from losses in domestic production. Furthermore, we assume a perfect pass-through for tariff reductions, and, therefore, results here are an upper-bound estimate of the benefits of the phasing-out of tariffs under the CAFTA-DR.

This study is expected to be a starting point from which other analyses in Costa Rica can be performed using micro data. At the time of our analysis, the National Institute of Statistics and Census of Costa Rica was collecting information from households for preparation of the 2012–2013 National Income and Expenditure Survey. This database will provide up-to-date information for new studies regarding the quantification of welfare effects of trade policies.

5.2 Policy recommendations

The results of this study have shown that poor households in Costa Rica will likely be the segment of the population to benefit most from a reduction in the price of rice. In this sense, the phasing-out process scheduled in the CAFTA-DR may be an opportunity to effectively reduce rice prices in the domestic market.

For this to take place, the institutions in charge of defending the interests of consumers, as well as those that supervise the functioning of the domestic market, must develop an active stance towards surveillance of price behaviour for the imported product, especially after 2016. During 2009–2012, the weighted average import tariff for rice was 12.1 per cent; this percentage therefore represents the estimated reduction in local prices of rice in 2025 (the year when imports of milled and paddy rice will enjoy duty-free access) compared to the prices of 2009–2012.

This study has kept the international price at its current level. It is important to take into consideration the fact that international prices can change in the future. However, this study did not aim to perform forecasts with regard to price levels.

As a result of Costa Rica's price-fixing mechanism, there is no transmission of international prices of rice to domestic prices. If the international price falls, then the domestic price does not move, which is equivalent to zero transmission. In the domestic market, if the price to the producer increases by virtue of a decree, then consumer prices rise at a rate given by the margins.[36]

The implementation of the phasing-out process in the CAFTA-DR will progressively reduce the relevance of the performance requirement for paddy rice imports from the United States, as well as the import quota, since the out-of-quota import tariff will move closer to zero. This means that industries will not need to purchase domestic paddy rice in order to be able to import duty-free from the United States. Large producers, which are also millers, may have an incentive to import most of the paddy rice they will process, depending on how profitable producing locally or importing rice will become. If large producers have a better business opportunity by importing most of their rice and reducing their own production, this may require an active policy of stocks and safety nets to address international price spikes.

[36] Conceptually, then, this could not be called transmission.

The reduction of the price of rice is a pro-poor measure. The results presented in this study have identified with a greater level of detail which population groups may obtain the highest welfare gains from such a reduction: poor households living in urban areas, households whose head has a lower education level, large households, and households living in the Chorotega, Huetar Atlántica, and Brunca Regions.[37] These outcomes explain why the CAFTA-DR is an opportunity for Costa Rican households, in particular the poorest, to get better access to affordably priced rice.

5.3 Discussion

With the arrival of the CAFTA-DR, the local rice sector faces the challenge of increasing its competitiveness, including: (a) productivity, which has decreased in recent years; (b) capacity-building for rice producers; (c) improved and cheaper access to inputs, a growing concern for the sector; and (d) strengthening of credit mechanisms, which is specifically crucial for small producers who may require this kind of assistance. In this sense, Decree 37699-MEIC defines a coordinated programme of work between the government and the rice sector to increase competitiveness, facilitate access to credit, and achieve an effective reduction in the costs of inputs such as agrochemicals and seeds.

Costa Rica has to continue its efforts to comply with its commitments to the WTO. A continuous dialogue needs to take place between producers, millers and the government in order to enhance productivity levels, avoid the need to apply trade-distorting policies, and prevent a loss in welfare for consumers. The CAFTA-DR might serve as an automatic price control mechanism resulting in rice imports becoming progressively cheaper. Local producers may then be pushed to reduce their prices to avoid losing their market share.

The possibility of applying price fixing should not be politicized, even if Article 5 of the Law for Promotion of Competition and Effective Consumer Protection (Law No. 7472) allows the government to regulate the prices of goods and services in exceptional situations. This measure needs to be applied only temporarily, and the need for its application has to be properly established and justified.

It is important to consider that this study is an empirical exercise regarding the estimation of a possible price decrease due to the application of the

[37] As mentioned earlier, we must be cautious in interpreting this regional disaggregation because the Chorotega Region is also the largest producer of rice, and our study did not consider income effects.

phasing-out schedule of the CAFTA-DR. However, the real context is complex and includes other elements such as policy decisions and the organization of the market. For this reason, the analysis may be considered as a first step towards assessing the welfare gains for households from a decrease in the price of rice. In addition, this research considered only consumption effects, due to the lack of observations for rice producers in Costa Rica's 2004 National Income and Expenditure Survey. It also did not include the consequences of a price decrease of rice for producers.

Finally, the study agrees with Arroyo *et al.* (2013) that the current price-fixing mechanism is neither increasing productivity nor improving consumer access to affordable rice. Among the alternative policies that may thus be proposed are to:

- Continue using the price-fixing mechanism while ensuring that the total subsidy to rice farmers does not exceed Costa Rica's WTO commitments, and focus the support on small producers.

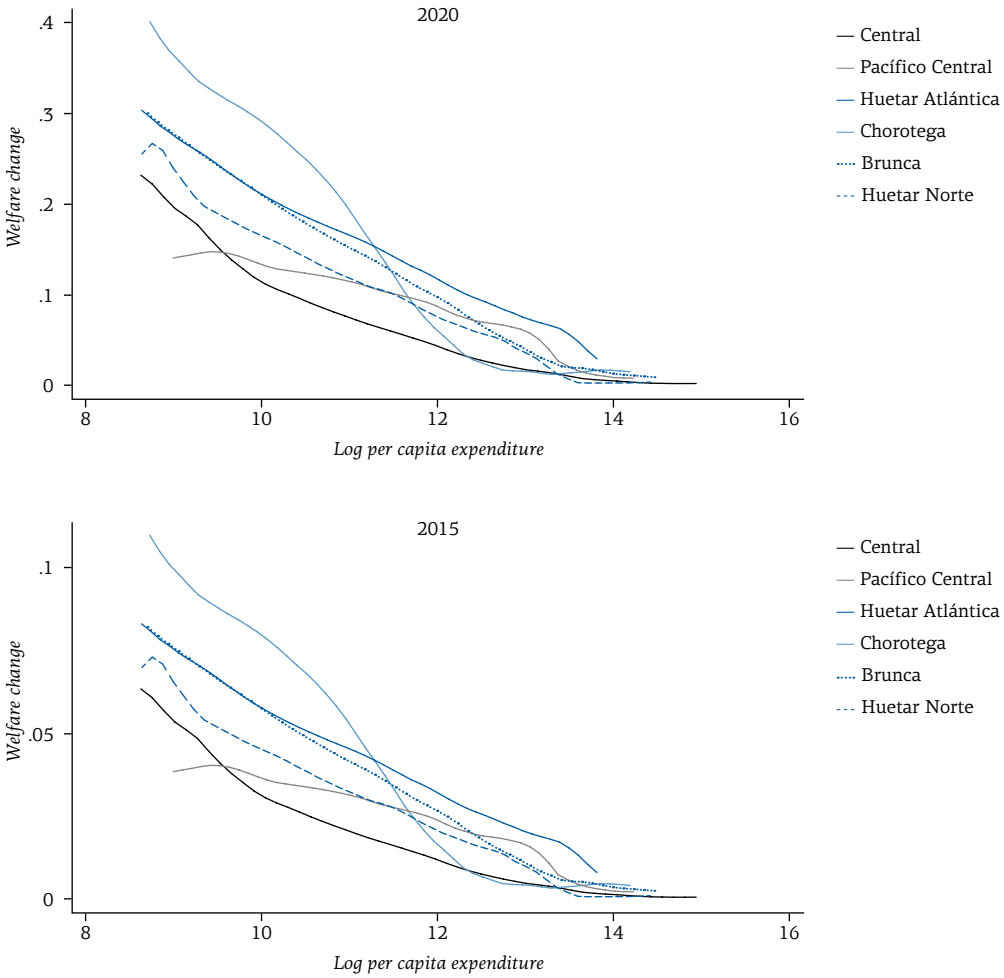
- Revise the legal scope of the current pricing mechanism to include alternatives that do not breach the commitments at the multilateral level (so-called "green box" measures in the WTO Agreement on Agriculture). The heterogeneity of the sector may be considered, as support should be more focused on small producers, who particularly need to increase productivity and competitiveness. Measures may include extension services (such as research, training, and pest and disease control), as well as direct payments to producers, provided that such payments are decoupled from production.

Finally, and importantly, whatever pricing mechanism is ultimately implemented, it must consider the potential impact on consumers.

Annexes

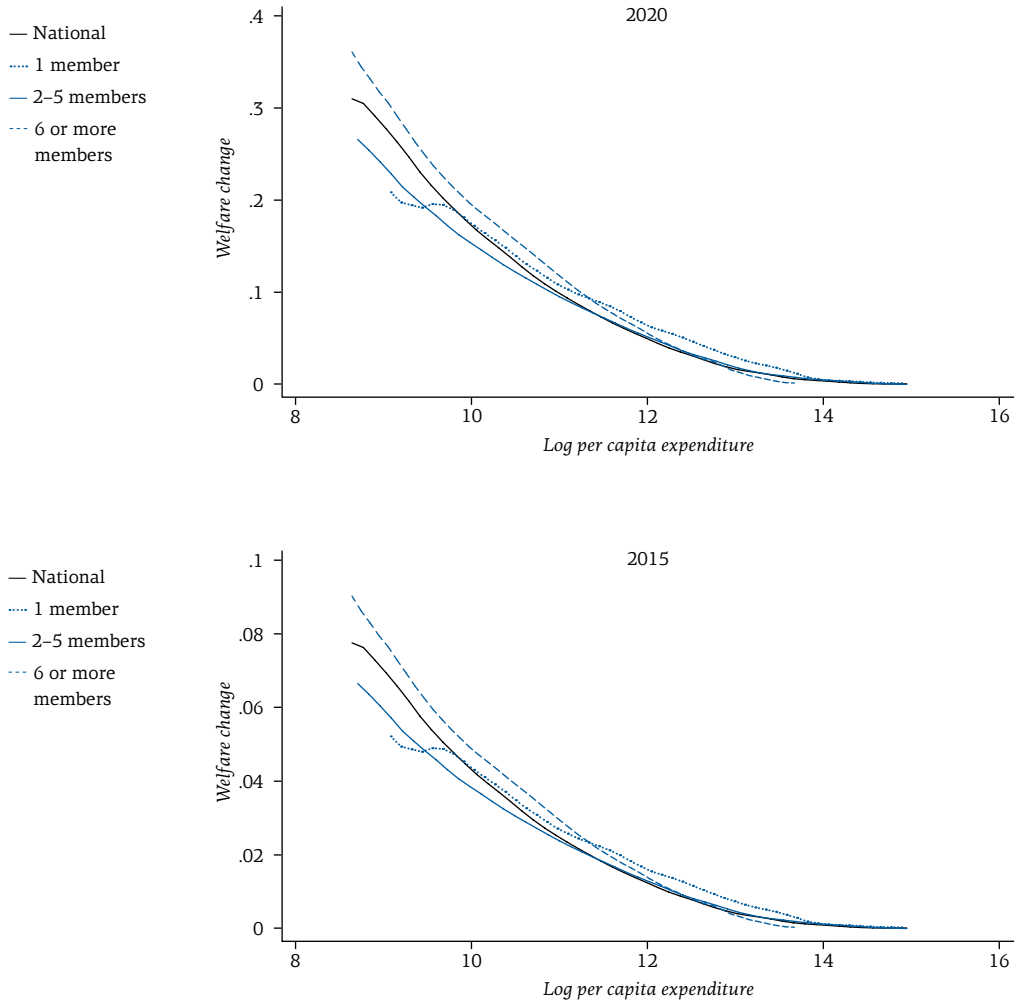
Annex 1: Figures from the econometric analysis

Figure A1.1 Welfare changes in the 2020 and 2015 scenarios compared to 2009–2012, by region



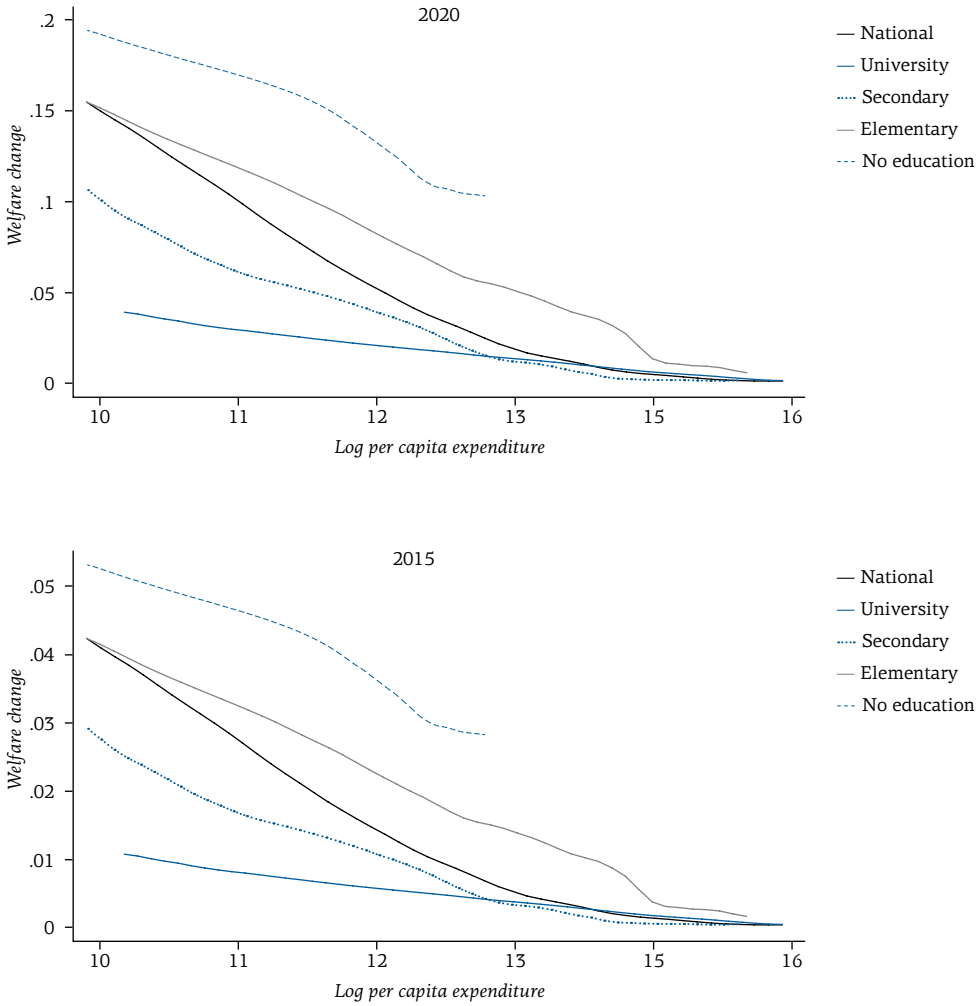
Source: Author's calculations, based on the 2004 ENIG.

Figure A1.2 Welfare changes in the 2020 and 2015 scenarios compared to 2009–2012, by household size



Source: Author's calculations, based on the 2004 ENIG.

Figure A1.3 Welfare changes in the 2020 and 2015 scenarios compared to 2009–2012, by education level



Source: Author's calculations, based on the 2004 ENIG.

Annex 2: Facts about the domestic rice market in Costa Rica

Table A2.1 Imports and national production relative to domestic supply of milled equivalent rice in Costa Rica, 1995–2009 (per cent)

Year	Imports/ Domestic consumption	National production/ Domestic consumption
1995	32.0	70.9
1996	30.2	73.1
1997	30.6	75.5
1998	38.3	66.2
1999	24.1	80.2
2000	20.5	81.7
2001	28.7	77.3
2002	35.6	66.4
2003	47.2	54.3
2004	46.6	55.3
2005	58.4	43.1
2006	56.3	44.1
2007	52.3	49.7
2008	34.2	70.6
2009	32.8	69.6
Average	37.9	65.2

Source: COMEX.
Note: Since domestic supply = imports + national production – exports, the sum of imports and national production in each row may not equal 100.

Table A2.2 Official fixed price to rice producers and national production that benefited from the price-fixing regime, 1995–2010

Year	Official fixed price (USD per metric ton)*	National production (metric tons)
1995	260.9	164,866
1996	267.6	212,873
1997	280.7	223,676
1998	280.2	215,099
1999	271.0	264,317
2000	267.3	266,422

Year	Official fixed price (USD per metric ton)*	National production (metric tons)
2001	257.8	216,700
2002	248.2	189,689
2003	259.6	183,497
2004	258.3	197,211
2005	271.7	183,251
2006	305.5	175'775
2007	353.4	179,729
2008	506.7	220,870
2009	581.3	256,612
2010	633.4	290,475**

Source: COMEX, based on data from CONARROZ.

** Based on figures provided by Costa Rica in notifications to the WTO Committee on Agriculture.*

***According to 2010–2011 harvest figures from CONARROZ.*

Annex 3: Average tariffs and weights applied to intra-CAFTA-DR imports and to non-CAFTA-DR imports[38]

Pre-cooked rice

Weights applied for 2009–2012 are based on the total sum of the share of imported volume in each year, multiplied by the applied tariff, for each import partner. Weights estimated for 2015 are based on the share of imported volume, by import partners, in 2012 (Table A3.1).[39] For 2020, it is assumed that all pre-cooked rice will be imported duty-free from the United States.

[38] Sources of information for this Annex include the CAFTA-DR phasing-out schedule for Costa Rica, trade statistics from the Central Bank of Costa Rica, and Costa Rica's MFN applied tariffs from the WTO.

[39] The same weights are applied throughout 2013–2019.

Table A3.1 Weighted average tariff for pre-cooked rice imports to Costa Rica, 2009–2012 and 2015 (per cent)

	United States	El Salvador	Uruguay	Total weighted average tariff
2009–2012				
Weight	$2 < w < 50$	$17 < w < 47$	$23 < w < 71$	9.3*
Applied tariff	$8 < at < 11$	0.0	15.0	
Weighted average tariff	2.0	0.0	6.3	
2015				
Weight	50.1	26.8	23.1	6.0
Applied tariff	5.0	0.0	15.0	
Weighted average tariff	2.5	0.0	3.5	

Source: Author's calculations.

Note: w stands for weight and at stands for applied tariff.

**During 2009–2011, Costa Rica imported pre-cooked rice from other countries that are not included in this table, which is why the total weighted average tariff (9.3 per cent) does not coincide with the sum of the weighted average tariffs of the United States and Uruguay (8.3 per cent).*

The CAFTA-DR does not apply tariff rate quotas for pre-cooked rice. The phasing-out process from a 15 per cent base rate is shown in Table A3.2

Table A3.2 Phasing-out of the pre-cooked rice import tariff in the CAFTA-DR (per cent)

	Year	CAFTA-DR tariff		Year	CAFTA-DR tariff
1	2006	14	9	2014	6
2	2007	13	10	2015	5
3	2008	12	11	2016	4
4	2009	11	12	2017	3
5	2010	10	13	2018	2
6	2011	9	14	2019	1
7	2012	8	15	2020	0
8	2013	7			

Source: Author, based on Costa Rica's phasing-out schedule in the CAFTA-DR.

Paddy rice

The weights applied in Table A3.3 are based on total imported volume of paddy rice, by import partners, during the period 2009–2012.

Table A3.3 Weighted average tariff for paddy rice imports to Costa Rica, 2009–2012, 2015 and 2020 (per cent)

	Intra-quota CAFTA-DR	Out-of-quota CAFTA-DR	El Salvador*	Total weighted average tariff
2009–2012				
Weight	65.4	34.3	0.3	12.3
Applied tariff	0	36	0	
Weighted average tariff	0	12.3	0	
2015				
Weight	68.6	30.3	1.1	10.9
Applied tariff	0	36	0	
Weighted average tariff	0	10.9	0	
2020				
Weight	68.6	30.3	1.1	6.5
Applied tariff	0	21.6	0	
Weighted average tariff	0	6.5	0	

Source: Author's calculations.

**Imports of paddy rice from El Salvador are duty-free due to the CACM. Annual forecast growth of imports from El Salvador is based on annual growth of rice consumption between 2001–2002 and 2011–2012 crop seasons (2.03 per cent).*

The following assumptions are made: (a) the CAFTA-DR TRQ is completely used, and (b) 69.4 per cent of imports from the United States are intra-CAFTA-DR quotas (based on the share reported in 2009–2012).

The MFN tariff is 36 per cent, the applied tariff for intra-CAFTA-DR imports is zero, and tariffs for out-of-quota CAFTA-DR imports from 2009 to 2025 are specified in Table A3.4.

Table A3.4 Phasing-out of the out-of-quota import tariff for paddy rice in the CAFTA-DR (per cent)

	Year	CAFTA-DR out-of-quota tariff		Year	CAFTA-DR out-of-quota tariff
4	2009	36	13	2018	27.4
5	2010	36	14	2019	24.5
6	2011	36	15	2020	21.6
7	2012	36	16	2021	17.3
8	2013	36	17	2022	13.0
9	2014	36	18	2023	8.6
10	2015	36	19	2024	4.3
11	2016	33.1	20	2025	0.0
12	2017	30.2			

Source: Author's calculations, based on Costa Rica's phasing-out schedule in the CAFTA-DR.

Milled rice

The weights applied in Table A3.5 are based on total imported volume of milled rice, by import partners, during 2009–2012.

Table A3.5 Share of milled rice imports to Costa Rica, by country of origin, 2009–2012, 2015 and 2020 (per cent)

	Import weights		
Country of origin	**2009–2012**	**2015**	**2020**
Argentina*	12.3	10.8	10.5
Brazil*	0.5	0.5	0.4
China*	0.2	0.2	0.2
Ecuador*	0.1	0.1	0.1
El Salvador**	6.7	5.9	5.7
United States intra-quota CAFTA-DR	40.3	47.2	48.3
United States out-of-quota CAFTA-DR	13.1	11.5	11.8
Guatemala**	3.0	2.6	2.5
Guyana*	0.2	0.2	0.2
Nicaragua**	18.5	16.3	15.8
Uruguay*	5.2	4.6	4.5
Total	100.0	100.0	100.0

Source: Author's calculations.

**Imports of milled rice are subject to a 15 per cent MFN import tariff.*

***Imports of milled rice from El Salvador, Guatemala, and Nicaragua are duty-free due to the CACM.*

The following assumptions are made: (a) the CAFTA-DR TRQ is used; (b) 80.4 per cent of imports from the United States are within the intra-CAFTA-DR quota (based on the share reported for 2009–2012); and (c) annual forecast growth of imports from countries other than the United States is based on annual growth in rice consumption between the 2001–2002 and 2011–2012 crop seasons (2.03 per cent).

The MFN tariff is 36 per cent, the applied tariff for intra-CAFTA-DR imports is zero, and the tariff treatment for out-of-quota CAFTA-DR imports from 2009 to 2025 is the same as that applied to out-of-quota CAFTA-DR imports of paddy rice (as presented previously in this Annex).

As a result, the weighted average tariffs for milled rice are shown in Table A3.6.

Table A3.6 Weighted average tariff for milled rice imports to Costa Rica, 2009–2012, 2015 and 2020 (per cent)

	2009–2012	2015	2020
Argentina	4.4	3.9	3.8
Brazil	0.2	0.2	0.2
China	0.1	0.1	0.1
Ecuador	0.0	0.0	0.0
El Salvador	0.0	0.0	0.0
United States intra-quota CAFTA-DR	0.0	0.0	0.0
United States out-of-quota CAFTA-DR	4.7	4.1	2.5
Guatemala	0.0	0.0	0.0
Guyana	0.1	0.1	0.1
Nicaragua	0.0	0.0	0.0
Uruguay	1.9	1.7	1.6
Total	11.4	10.0	8.3

Source: Author's calculations.

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