Mild arabica coffee trade at a time of market regulation

Abstract

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This paper explores the dynamics of mild coffee trade during the term of the International Coffee Agreement, focusing on Costa Rica as a case study. We aimed to verify the influence of the agreement on coffee exports and understand its impact on the exports of high-quality coffee. To compare the influence of the coffee agreement on the trade performance of high-quality coffee producers with that of producers specializing in similar —or lower— quality coffee, we also included exports of Brazilian coffee (low quality) and Colombian coffee (high quality) in the sample. We focused on analyzing commodity trade agreements in the second half of the twentieth century and, simultaneously, on the drivers of coffee exports based on a gravity equation consistent with international trade models. Our findings allowed us to conclude that the International Coffee Agreement gave rise to few benefits for "Other Mild" countries such as Costa Rica and greater benefits for "Colombian Mild" countries such as Colombia, at least in early versions.

Key Words: International Coffee Agreement (ICoA), commodities agreements, coffee market, coffee trade, market regulation, gravity equation

JEL: F13, 024, Q 17, Q18

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1. Introduction

Two types of coffee are traded on the world market: *Coffea arabica* (Arabic coffee) and *Coffea canephora* (Robusta coffee). The former —more vulnerable to disease— grows better in mid to high altitudes, producing a cup with good acidity, aroma, and body. The second —with excellent resistance to diseases— is grown mainly in low altitudes, and its cup has slight acidity and aroma. However, it contains twice the caffeine, making it highly demanded since the 1950s to produce soluble coffee. Arabica is grown primarily in Latin American countries, and Robusta grows predominantly in African and Asian countries (Wrigley 1988). The former has traditionally been more valued in the global market due to the organoleptic characteristics of its cup (aroma, flavor, acidity, body), and this has led some producing countries to combine both crops, even though their initial specialization was mostly based on Robusta production (Ponte 2002; Daviron & Ponte 2005). Regarding coffee exports, these could be classified as 1) Robusta, 2) Unwashed Arabica, and 3) Washed Arabica. The first two are processed in dry coffee mills, and, in both cases, the coffee bean can be stored for several years without deterioration in quality. The Washed Arabica is processed in wet coffee mills, obtaining parchment coffee which can only be stored for 6 to 8 months. The producers of this type of coffee (mainly Colombia, Mexico, and Central America) cannot control large stocks neither achieve price stabilization through retentions.

Between 1963 and 1989, international coffee markets were highly regulated. During that period the two main types of coffee exports could be classified into four groups: 1) Colombian Milds, 2) Other Milds, 3) Brazilian and Other Natural Arabicas, and finally 4) Robustas. The International Coffee Organization (ICO) maintains this classification since then, and each group has a reference price assigned. Its allocation is based on daily prices of green coffee (gold bean or parchment) of different qualities from some ICO members in the main markets (United States, Germany, France). Mild Coffee is 100% Arabica planted at altitudes above 400 meters, under temperatures between 17º C and 23º C, on mostly volcanic soils. It is also wet-processed in coffee mill plants. The main organoleptic features are powerful aroma, high acidity, and a balanced body (OIC 2022). It usually fetches better prices on the international market due to its cup-quality, although, as we will discuss later, this did not always happen during the regulated market period.

The end of the Second World War and the postwar period opened a new dynamic in the international coffee trade. The United States became the world's leading coffee buyer, and the demand from traditional European coffee-consuming countries grew again. Producers took advantage of those changes by increasing their cultivated land and coffee production, expanding the agricultural frontier, and improving their yields by implementing the Green Revolution technologies. Shortly afterward, in the late 1950s, this triggered an overproduction crisis that led to the collapse of coffee prices (Daviron 1994; Ponte 2001; Bacon 2005; Daviron & Ponte, 2005).

In the context of coffee overproduction and falling prices, producers and consumers negotiated and adopted the International Coffee Agreement (ICoA), one of several commodity agreements implemented as a strategy to foster economic growth in developing regions following the Havana Charter (1948), within the framework of the regional development policies promoted by the US during the Cold War. The objectives of the agreement were: 1) to achieve a reasonable equilibrium between supply and demand; 2) to alleviate the severe difficulties caused by burdensome surpluses and high volatility in coffee prices; 3) to develop productive resources and to promote employment and income in ICoA signatory countries; 4) to foster the purchasing power of coffee-exporting countries; 5) to encourage the consumption of coffee in the world market; and 6) to stabilize world trade markets (Great Britain Foreign Office 1965).

This article aims to analyze the performance of the coffee market during the second half of the 20th century, focusing on the evolution of the most important coffee producers in Latin America, namely Brazil, Colombia, and Costa Rica, to understand the impact of a typical international commodity agreement on trade performance and domestic production. We aim to analyze the variations in international markets resulting from this agreement and the different strategies pursued by these producers and at comparing the impact of coffee regulation on high and low-quality coffee exports. Moreover, in this context, we pay special attention to Costa Rica as a specific country-case study, analyzing if the ICoA favored exports for producers of mild (high-quality) coffee. The study is based on a new database of coffee production and international trade for the three countries under consideration, taken from both ICO and domestic sources.

We assume that coffee exports from Costa Rica ("Other Mild") and Colombia ("Colombian Mild") were high-quality coffee exports. In contrast, we consider exports from Brazil ("Brazilian and other Arabicas" and "Robustas") as a proxy for exports of low-quality coffee. Moreover, Costa Rica was the leading Central American producer

and an important Latin American producer of Arabica coffee. It was also the leader of the group of countries that wanted to improve the quotas and prices of the "Other Mild" group during the regulated period and, to a large extent, contributed to the collapse of the ICoA by advocating for market liberalization in the 1990s.

The article is divided into five sections. Section two summarizes the literature on regulatory schemes and commodity price stabilization agreements. Section three describes the ICoA and the evolution of the world coffee market. Section four proposes and tests a model to understand the impact of the ICoA on coffee trade. Section five discusses the results, and section six concludes.

2. Literature review: regulatory schemes and commodity price stabilization

Price fluctuations in international markets affect commodity export countries' income, its economic growth, its income distribution, and the level of poverty. Daviron & Ponte (2005) discuss the impact of commodity trade on developing countries' economic performance from a long-term perspective. Despite its high relevance from earlier times, it was not until the postwar period and the Cold War that this problem gained prominence in the international debate, being identified as one of the drivers of economic development. In this regard, Henderson & Lal (1976) and Maizels (1987, 1994) showed how several initiatives were launched during the postwar period to resolve the "commodity problem" through the implementation of Keynesian macroeconomic policies.

Keynes proposed the creation of the International Trade Organization to prevent the fall in commodity prices after identifying it as one of the main problems of developing countries. His idea was reviewed later, in 1947, during the United Nations Conference on Trade and Employment, which prompted the declaration of the Havana Charter (HC) a year later. According to Toye (2003), the HC laid the foundations of the subsequent international trade agreements and introduced an exception to the principle of free trade by proposing government intervention through signing international commodity agreements (ICAs). Although the HC was never ratified, it inspired most commodity agreements signed within the General Agreement on Tariffs and Trade (GATT). Baranyai & Mills (1962) and Goldstein et al. (2007) pointed out that the GATT became an instrument for negotiating tariffs and managing trade worldwide. In its early years (1947-

1955), it avoided regulating the trading of commodities, although it submitted the ICAs for consultation in 1956.

In 1964, at the height of the Cold War, the United Nations Conference on Trade and Development (UNCTAD) discussed and recognized international cooperation in commodity trade as a necessity. At the conference, Prebisch proposed that commodity management had to be linked to import substitution policies to resolve developing countries' dependency on commodity exports and to improve terms of trade (Daviron & Ponte 2005). A decade later, UNCTAD presented the Integrated Program for Commodities with the aim of 1) stabilizing trade, 2) improving and sustaining real income, 3) expanding markets, 4) ensuring commodity supply, 5) diversifying production, 6) improving competitiveness and marketing, distribution, and transportation systems, and 7) creating a common fund for commodities to stabilize prices (Johnson 1976; Murphy 2004; Gilbert 1985; Lamond 1977). UNCTAD focused the discussion on commodity regulation agreements and proposed three types: 1) multilateral treaties, 2) export quota agreements, and 3) stock regulation.

According to Gilbert (1985), the efforts to control commodity markets under the auspices of the United Nations during the postwar period started with the International Sugar Agreement (ISA, 1954-83) and the International Tin Agreement (ITA, 1954-85). In the following years, several agreements with "economic clauses" were signed, such as the International Coffee Agreement (ICoA, 1962-89) and the International Cocoa Agreement (ICCA, 1972-88). The ICoA was the most important ICA agreement and, at the same time, the most controversial, lasting until the end of the 1980s. The importance of the agreement relied on the fact that some developing countries were highly dependent on coffee exports, and it was controversial because it was accused of being a cartel that wanted to increase prices, which might involve international sanctions.

The problem of commodity prices and regulatory mechanisms has been addressed from different perspectives, such as optimal inventory control (Gustafson 1958), optimal price control (Massell 1969), optimal market control schemes (Gardner 1979), their impact on welfare (Massell 1969; Newbery & Stiglitz 1979; Wright & Williams 1984), rational expectations equilibrium (Deaton & Laroque 1996; Gouel 2013) and the priority of government intervention to stabilize prices (Timmer 1989; Poulton et al. 2006). In this regard, most articles questioned the real impact of these agreements on price stabilization. Schmidt (1963) argued that the high cost of storage, insurance costs, and the decline in the quality of the stored product affected the agreement's real profitability. Williams &

Wright (2005) pointed out that public control discourages and even eliminates private storage and suggested that the existence of stabilization bands leads to price speculation. Deaton & Laroque (1996) concluded that (risk-neutral) storage agents are speculators insofar as they decide when to sell, while Newberry & Stiglitz (1981) pointed out the difficulties encountered by less developed countries when seeking to intervene in prices. Larson et al. (1998) focused on the unclear definition of stabilization goals and how often quotas foster tax evasion. Lastly, Knudsen & Nash (1990) discussed examples of "confusing and contradictory stabilization" strategies applied to several commodities.

The fall of the Berlin Wall (1989) and the dissolution of the Soviet Union (1990-1991) marked the end of the Cold War. Since then, the US-led Washington Consensus strategy, in collaboration with the World Bank and the International Monetary Fund, promoted a set of policies aimed at transforming Latin American countries, which were badly hit by the impact of the debt crisis in the 1980s. In the 1990s, price stabilization mechanisms needed to be updated. International relations changed, development policies turned around, state intervention was questioned, and macroeconomic stabilization, deregulation, and economic openness were fostered (Williamson 1990, 1993, 2000).

State-led industrialization policies promoted in the 1950s and 1960s by the Economic Commission for Latin America and the Caribbean (ECLAC) were replaced by an export-oriented growth strategy based on sectors in which countries had a competitive advantage. This strengthened the specialization process based on commodity exports and caused deindustrialization, reduced public spending, and weakened the state. According to De Gorter & Swinnen (2002), this new strategy prevented public intervention in agriculture and promoted deregulated trade policy since it considered state intervention as predatory and an impediment to growth (McMichael 2000; Daviron & Ponte 2005).

3. The ICoA as an International Commodity Agreement on Trade

The first version of the ICoA was drawn up in 1962 and ratified a year later (Table 1). The 1963-68 ICoA was signed by 44 exporting countries (for 99.8% of world exports) and 26 importing countries (for 96.2% of world imports). The ICO was created to manage the agreement and was formed by the International Coffee Council and representatives of each country member. Votes within each group were distributed in proportion to imports and exports, with the limitation that a country could never exceed 40% of the total votes in its category (Kravis 1968). According to Hermann (1990), the ICoA included a quota

system that was valid for importing members and the ICO set a global annual export quota for all exporting members as the maximum to be sold in the regulated market.

Annual national export quotas were fixed and allocated as quarterly quotas. The quota scheme was controlled at the borders of importing member countries. These countries had to guarantee the existence of a valid certificate of origin for the total coffee exports of each country member. The existence of the quota scheme was linked to the evolution of prices. A crucial element of these price rules was whether the composition indicator price of the agreement (defined as the arithmetic mean of the indicator prices for other mild arabicas and Robustas) was higher or lower than the minimum price fixed by the ICO. No quota rule existed for sales to non-member countries. Besides that, the ICoA did not include a mechanism for lowering prices during boom periods, and there were no instruments to enforce export quantities higher than voluntary exports during these periods.

Table 1. Versions of the ICoA.
Source: Own elaboration based on this section.

When the 1963-68 ICoA expired, the member countries decided to continue with the market regulation scheme and signed the 1968-73 ICoA. The new version retained the same objectives but imposed tight controls to prevent the expansion of coffee-growing areas and established a diversification fund to support the production of alternatives to coffee. This plan proposed the promotion of other crops in areas where they were more profitable but had little success (Kravis 1968; Frederick 1970). Promotion in the non-quota market continued but with strong controls to prevent speculation. Therefore, from 1969 onwards, all coffee shipments had to have certificates of origin (with export stamps with a weight value issued quarterly following each country's assigned quota) (Bates & Lien 1985; Farmer 1994). The certificates were designed to stop the problem of "tourist coffee," that is, coffee illegally re-exported by non-member importing countries to member importing countries.

When the 1968-73 ICoA expired, the member countries agreed on two extension protocols (1973-75 and 1975-76). During this time, the agreement proceeded without economic clauses or export quotas. After the extensions, the 1976-82 ICoA was signed and became the third version of the agreement. Meanwhile, some producing countries in Latin America stepped up the organization's efforts to unilaterally support international

coffee prices (Daviron & Ponte 2005). The producing countries had greater bargaining power over importing countries due to the market price recovery. Due to the 1975 Brazilian frost, the drop in production allowed operations to continue without quotas until the 1979-80 harvest.

The high coffee prices from 1975 encouraged a rise in production, which led to a stock increase in 1979 and a drop in price in the early 1980s. Although the member countries discussed the renewal of coffee quotas, an agreement still needed to be reached. Considering this situation, Latin American producers coordinated to foster price support policies at the regional level, thereby limiting their exports. In 1980, Brazil pointed out the need to reintroduce quotas following the provisions of the 1976-82 ICoA. However, the terms were unfavorable for some countries (Mexico, Colombia, the five Central American countries, India, and Ethiopia), which had increased their coffee-growing areas and production at high prices (ICAFE 1982). Unlike in previous versions, there was increased pressure from other countries to raise quotas. The "Other Mild" group position led by Costa Rica and Mexico was also defended by Peru, Ecuador, and the Dominican Republic. The coordination allowed them to achieve 186 votes and thus surpass the "Colombian Mild" group. As a result, they proposed that the quotas of mild coffee producers had to be modified and prices for quality coffees had to be differentiated (ICAFE 1982).

When the 1976-82 ICoA expired, the ICO Board agreed to extend it for a further year. The 1983-87 ICoA was subsequently signed. The latest version tightened sanctions for members that imported coffee from non-member countries (most of which were re-exporters) and set strict deadlines for submitting information on direct exports or transshipments of non-quota markets to the ICO (Bates & Lien 1985). Likewise, it proposed that coffee consumption continued to be promoted in traditional and non-traditional markets (Daviron & Ponte 2005).

Throughout the term of this new agreement, the problems among producers intensified. In 1986, the Brazilian drought caused the suspension of quotas, which led to negotiation problems. The large producers wanted to maintain the quota system that had previously been defined. Simultaneously, the "Other Mild" group (known as the dissidents) fought for the reallocation of quotas based on each country's exportable capacity after the quotas assigned had been fulfilled. Colombia accepted the condition, but Brazil rejected it.

During the 1960s, when ICoA was in force, prices remained stable (Figure 1). Brazil's low production in 1974 because of a frost led to a substantial increase in coffee prices. Historically, Brazilian frosts were the determining factor in maintaining or suspending the quota system on the world coffee market. The recovery of coffee prices in other producing countries was circumstantial. At the end of the 1970s, coffee prices fell again due to the recovery of Brazilian coffee production, prompting the resumption of the quota system in the 1980s. Five years later, coffee prices recovered, leading to another brief suspension of quotas from 1986 to 1987 (Table 1).

Fig. 1 World production and coffee price index, annual average (1965-1991).
Source: Own elaboration based on ICO data.

When we differentiate prices by product, we observe that "Colombian Mild" remained at high levels, followed by "Other Mild". Prices for "Brazilians and other Arabicas" were higher only in specific years. During the ICoA period, price differences between Arabica and Robusta were minimal (see Figure 2). During the market regulation period, price evolution was strongly related to quotas. Mild-coffee producers demanded that the quality differences between products had to be recognized and considered in the assignment of quotas, especially in the most recent versions of the ICoA. In this regard, low-quality coffee with a quota was sold at a higher price than high-quality coffee without a quota (Jiménez 2013).

Fig. 2 Price index by group, annual average (1965-89).
Source: Own elaboration based on ICO data.

The 1983-87 ICoA was renewed for two years to gain extra time to discuss a new version of the agreement. In 1989, producers and consumers discussed the future of the agreement, and two new proposals were made. On the one hand, Brazil, Colombia, and the European Economic Community proposed extending the current agreement and redistributing the quotas. On the other hand, the "Other Mild" producers proposed a new redistribution considering higher quotas for high-quality coffee, assigned prior to the extension of the ICoA (ICAFE 1989). Both proposals were discussed, but neither of the two proposals obtained the required number of votes. Faced with this uncertainty, the ICO Board resolved: 1) to extend the 1983-87 ICoA until 1991; 2) to suspend quotas as

of July 4th, 1989; 3) to establish regulations for certificates of origin when quotas were not in use, and 4) to suspend stock verification (ICAFE 1989). In 1990, after several meetings, the International Coffee Council concluded that there were neither the reasons nor the grounds for a future agreement nor for planning future meetings to renegotiate the next ICoA (ICAFE 1990). In 1989, after almost 30 years of interrupted regulations, the coffee market was liberalized both because of conflicts between producers and because the end of the Cold War reduced incentives to maintain development policies based on commodity agreements.

4. Methodology and Sources

Considering the performance of coffee exports of some Latin American producers during the ICoA period, we want to check our hypothesis that the coffee agreement negatively impacted the exports of high-quality coffee producers compared to low-quality coffee producers. To achieve this, we run a gravity trade model which compares the impact of several ICoA agreements on Brazilian coffee exports (as a proxy for low-quality coffee exports of Robustas and Unwashed Arabica) with the impact of those agreements on coffee exports from Colombia and Costa Rica (as a proxy for high-quality exports of Washed Arabica)[3].

This article uses the coffee variety and its processing systems as a proxy to measure quality. Washed Arabica coffee usually receives a better price than unwashed Arabica and Robusta coffee. While Colombia and Costa Rica were specialized in producing the former, Brazil mainly produced the latter. As mentioned in the previous section, during the ICoA, the coffee price gap was minimal. Therefore, to recognize the impact of the agreements on the performance of high and low-quality coffee-producing countries, we also consider the pre-ICoA (1950-1963), ICoA (1963-1989) and the APPC

[3] Following Lawless (1995) and Cardello (1995), we agree that quality is a multidimensional field of analysis that defines objective and subjective components and has a spatial and temporal framework. The concept refers to the degree of excellence of a specific product and the absence of defects covering sensory and other hidden aspects. The sensory characteristics (shape, texture, appearance, color, and smell) are easily perceived by the senses, while the hidden ones (chemical composition) require measuring instruments and concern safety and nutrition (Shewfelt 1999). Quality can also be measured through other dimensions, such as the nutritional composition, the ease of preparation, the density of the product, or the reputation of the brands or origins, among other aspects (Lawless 1995). In addition, for each of the actors involved in the production and marketing of a product chain, quality can have different meanings or connotations. Producers usually define it in sensory and hidden information terms, while consumers provide their perception of their satisfaction, thus showing a less tangible and quantifiable aspect (Shewfelt 1999; Samper 2002, 2003; Viales & Montero 2010).

periods (1993-2000) and the beginning of the 21st century (2000-2010). Following the model proposed by Pinilla & Rayes (2019) for Argentinian exports during the Belle Époque and Ayuda et al. (2020) for wine exports, we regress bilateral coffee exports in tones on the production of the exporter, the size of the exporting country's economy, the size of the importing country's demand, transport costs, the impact of the coffee agreement, and other control variables.

During the regulation period, some empirical research has modeled the agreement's impact on the coffee market. Hermann (1986) found that the agreement increased prices by 47% in 1982 and 16% in 1983. Akiyama & Varangis (1989) concluded that the quota system stabilized coffee prices between 1981 and 1985. However, they also found that in 1986 coffee prices would have been much higher without the quota system. Their forward-looking projections correctly predicted that coffee prices would drop during the first half of the 1990s with the suspension of the quota system. Using a global simulation model, Akiyama & Varangis (1990) concluded that regulation stabilized prices. The quota system reduced the real income of most small-producing countries and benefited the large ones. However, they found that small countries benefited in terms of risk reduction. Palm & Vogelvang (1991) used a simulation model for 1971-82 to conclude that the coffee market would have collapsed with or without the ICoA during the overproduction period. Although the ICoA helped stabilize coffee prices, it drove up stocks and forced government intervention. For all these reasons, it can be stated that the only way to make the regulated market viable is to establish restrictions on the demand side. The authors also concluded that prices would remain stable if world production did not exceed 70 million bags. If this limit was met, the ICoA would favor the income of exporting countries, which was associated with welfare transfers from importing to exporting members.

Based on a welfare impact model for 1975-86, Bohman & Jarvis (1999) concluded that the price differences between the member and non-member markets expanded due to the distribution of quotas. Exporting larger quantities to non-member markets was more profitable than small amounts to member markets. That research also reported the difficulty to eliminate price differentials between both markets. It showed that the profits from selling to non-member markets were unevenly distributed and not proportional to the members' market shares. The relative importance of the non-member market varied between countries. For countries such as Mexico, Indonesia, and Costa Rica, the non-member market had become an “escape valve” for coffee production that could not be

sold in the regulated market. It represented a "necessary" imperfection of the international coffee market. However, these countries considered it unfair to sell their coffee on the non-member market at discount prices.

Complementing this view, our approximation wants to focus on the differences among country exports performance as a proxy to understand the performance of coffee exports of different quality. To do that, we propose a gravity model to compare the impact of ICoA agreements on Brazilian coffee exports as a proxy for low-quality coffee with their impact on Colombian and Costa Rica coffee exports as a proxy for high-quality coffee. The functional specification of the gravity model is in line with Feenstra et al. (2001), Bergstrand (1989), and Anderson & van Wincoop (2003). Using a standard constant elasticity of substitution model and applying logarithms, we obtain the following:

$$x_{i,j,t} = \alpha_0 + \alpha_1 \cdot \ln(d_{i,j}) + \alpha_2 \cdot \ln(Prd_{i,t}) + \alpha_3 \cdot \ln(GDP_{j,t}) + \alpha_4 \cdot \ln(GDPpc_{j,t}) + \sum_{t=1}^{N} TA_{t,j} + \sum_{k=1}^{n} \alpha_k \cdot Z_{i,j,t,k} + \varepsilon_{i,j,t} \quad (1)$$

Where $x_{i,j,t}$ (i=1,2,3) corresponds to bilateral coffee exports (in tons) to country *j* from Brazil (i=1), Colombia (i=2) and Costa Rica (i=3) in year *t*, $d_{i,j}$ is the distance between the main cities of the trade partners (in km) as a proxy of trade costs and invariant over time; $Prd_{i,t}$ is the coffee production of the exporter *i* (in tons), and $GDP_{j,t}$ is the size of the importer's economy *j* (in $US constant prices). Those are the variables derived from the gravity model which assumes that the intensity of trade flows depends on the size of the importer, the exporter's supply capacity and the frictions on trade.

In that model we assume that the distance is negatively related and the size of the importer is positively related to coffee exports, and coffee production is positively related to them, being a better measure of domestic production capacity than GDP, as suggested by Pinilla & Ayuda (2019). To approach the home market bias effect due to consumer preferences for local production, we introduce a dummy for importers (j) which were also coffee producers (D_Prod_j). We also considered other variables such as $GDPpc_{j,t}$, the GDP per capita for importers (in $US constant prices), which would be positively related to coffee imports when changing consumption patterns in parallel to income expansion is observed. We also include the usual control variables for gravity models ($Z_{i,j,t,k}$) as dummies for common language (1 if both countries share the same language) and

common border (1 if both countries had common borders), as most of the gravity models consider.

To better identify the hypothesis of our analysis, we introduce specific variables to check the impact of trade agreements defined as $TA_{t,j}$: ICoA (1963) for the period 1963-67, ICoA (1968) for the period 1968-1975, ICoA (1976) for the period 1976-82 and ICoA (1983) for the period 1983-1989 as a time dummy for each ICoA agreement for those importer members. We also include ICoA (1963-1982) and ICoA (1963-89) assuming a time dummy for long periods; ACPC as a time dummy for the members of the Association of Coffee Producing Countries (ACPC) during the period of deregulation after the end of ICoA (1993-2000); and finally, we include FROBRA as a time dummy that identifies severe and very severe Brazilian frosts (we also introduced a two-year lag because the impact on the international market is not automatic).

Data about bilateral exports were obtained from several sources. For Costa Rica, we checked the *Revista del Instituto del Café* (Journal of the Coffee Institute) from 1949 to 1963, ICAFE's *Informe Anual de Labores* (Annual Work Reports) from 1965 to 1997, and ICAFE's *Informes sobre la Actividad Cafetalera* (Reports on Coffee Activity) from 1972 to 2000. For Colombia, we consulted the *Anuarios del Comercio Exterior* (Foreign Trade Yearbooks) from 1950 to 1965, the *Boletines de Comercio Exterior* (Foreign Trade Bulletins) from 1965 to 1979, the *Anuarios Estadísticos* (Statistical Yearbooks) from 1992 to 1998, and data provided by the National Federation of Coffee Growers of Colombia (1993-2000). For Brazil, we reviewed the *Anuários Estatísticos do Café* (Statistical Yearbooks on Coffee) from 1953 to 1989 and the *Anuários estatísticos do Brasil* (Statistical Yearbooks of Brazil) from 1969 to 1989. We also consulted data published by the Food and Agriculture Organization (FAO) from 1989 to 2010. We standardized the information by calendar year and used coffee bags as the main unit of weight (60 kg per bag). The variables for GDP, GDPpc, distance and other control variables were based on Conte et al. (2022). The distance between the two countries was the distance between the most populated city of each country (in km) and was based on the CEPII's GeoDist database (see Mayer & Zignago, 2011).

In line with the methodology proposed by Pinilla & Rayes (2019) and Ayuda et al. (2020), we test coffee exports performance (in tons) for the period from 1949 to 2010, which included the period preceding the ICoA, the period covering the different versions of the ICoA and, finally, the post-ICoA period. This was aimed at obtaining a better understanding of the impact of this trade agreement, and its versions, through the control

variables described. To account for country pairs without bilateral trade, we run the model using the PPML estimators proposed by Silva & Tenreyro (2006) and Head & Mayer (2013), which made it possible to obtain better results in the presence of numerous zeros in the endogenous variable, which is the case in our database. We also include fixed effect dummies to consider the characteristics of the importers (i.e., to capture specialization, taste, or size of the country), and country-pair dummies to control for multilateral resistance and unobservable heterogeneity.

5. Results.

5.1.The ICoA impact on the behavior of the high-quality coffee trade

We have estimated equation (1) considering the exports of Costa Rica, Brazil, and Colombia. The estimation results are summarized in Table 2.

Table 2. Explaining coffee trade of Latin American main producers (1949-2010).

Among the most relevant results, we found a positive and significant relationship between the exporter's production and coffee exports. As expected, this positive sign resulted from the positive relationship between the country's export capacity and local production. By contrast, and unlike expectations, we observed a negative and significant relationship with the importer's GDP. This could be related with the concentration of exports into middle size countries and the negative performance of big size countries, namely India, China, or the US (a big importer with a decreasing share since 1970s). The impact on exports of the importer's GDP per capita was significant and positive, as we expected. That is, we could confirm the existence of an increase in consumption when countries became richer. The findings also suggest a clear negative and significant relationship with distance, as a proxy for trade costs. Regarding frosts in Brazil, we observe a negative (although not always significant) impact, which would be explained by the importance of Brazilian exports performance in explaining the whole sample movements. Finally, being a producing country does not seem to have an impact on coffee imports. Unexpectedly, this result did not confirm the home bias effect. The explanation could be that coffee could be considered a differentiated product.

When we analyzed the impact of the different ICoA agreements on the coffee export performance, we observed a positive impact at the beginning of the period, but

Comentado [AH1]: Sólo en una especificación. Si estáis centrándoos en la columna 2, tendríais que decirlo y explicar por que

only significant in the case of ICoA (1963), and a negative but non-significant relationship between exports and the ICoA for the later agreements: ICoA (1976) and ICoA (1983). This means that the ICoA agreement had a small impact on exports at the beginning and a non-significant impact later. This non-significant effect is also observed during the liberalization period (ACPC), although the coefficient in this case is negative. These results and the non-significance of ICoA (1963-82) and ICoA (1963-89) reinforced our hypothesis that the ICoA period was mostly neutral concerning the export performance of Latin America's leading coffee producers.

Comentado [AH2]: Pero en la columna 2 sí es significativo (y es la columna en la que parecíais enfocaros más arriba).

In table 3 we repeat the regressions estimating equation (1), but we split the sample considering separately exports coming from Brazil, Costa Rica, and Colombia. Apart from considering the export performance by countries, we also want to consider differences by coffee quality.

Table 3
Explaining the coffee trade of Costa Rica, Colombia, and Brazil (by countries)

For Costa Rica and Brazil, as we found for the whole sample, we obtain a positive and significant relationship between the exporter's production and coffee exports. As expected, this positive sign reflected the relationship between the country's export capacity and local production. Contrary to what was expected, we obtained a negative and significant sign of the same coefficient for Colombia. One possible explanation could be the country's higher storage capacity. We also observe a negative and significant relationship between exports and the importer's GDP for Colombia and Brazil. As we have said before, this could be related with the concentration of exports from big producers into middle size countries and the negative performance of big size countries' imports. As for the importer's GDP per capita, we observe the existence of differences between Costa Rica's exports and the exports of Colombia and Brazil. In the first case, the non-significant coefficients confirm that in the case of high-quality coffee, the evolution of exports did not depend on the buyer's consumption capacity. This would be related to the branding capacity of Costa Rican exports. However, In the case of Colombia and Brazil, the positive coefficients confirm the existence of an increase in consumption when countries became richer. Regarding the impact of being a producing country on coffee imports, we observed a non-significant relationship in the case of Brazil and

Colombia, but the coefficient is negative and significant for Costa Rica. This result confirms the home bias effect for Costa Rica's high-quality coffee. In this case, consumers preferred to buy domestic coffee instead of high-quality but more expensive coffee.

Brazilian exports, which were very important due to the weight of Brazilian coffee exports in the global market, suffered from the limitations of the ICoA. Only in the early stages of the ICoAs agreement (ICoA 1963 and 1968) did we observe non-significant coefficients, which were even positive for the ICoA 1968. Later, they became negative and significant. For Colombian exports, the ICoA had a positive impact for most of the period. However, the liberalization of the coffee market changed this pattern and had a negative impact on Colombian exports. For Costa Rica, the ICoA had a negative and significant impact for all the agreements, while liberalization had a positive and significant impact. This reinforces the idea that the ICoA was not as positive for Costa Rica as it was for other countries such as Colombia. The Costa Rican case helped us understand why high quality-coffee producers agreed to break the agreement. In the case of Brazil, the results confirmed that this country was among those that made the most important sacrifices, in terms of quotas, during the period when the agreement was in force, which was also reflected in the evolution of coffee world trade. However, it is important to note that it was one of the main responsible countries for the coffee oversupply.

As we have said, when we introduced a dummy for the ACPC agreement period into the model, we observe a positive and significant impact for Costa Rica, and a negative and significant impact for Colombia and Brazil. After the market liberalization, but in a context of multilateral regulation in which only producing countries participated, Costa Rica had a certain advantage in the volume of coffee traded due to its commitment to higher-quality coffees and its desire to modify the ICoA before 1983. Furthermore, as mentioned above, the results help explain the lack of commitment, especially in Brazil, to comply with the ACPC.

5.2. Costa Rica's participation in the International Coffee Agreement

To better understand the results obtained for the period of the ICoA, it is important to note that Costa Rica's share of world production did not exceed 3.5%. If we focus on the country's share of arabica producers, it fluctuated around 6% throughout the period.

Concerning the country's share in the "Other Milds" group, the average was 10%, although it rose to 12% or 13% at times.

Although Costa Rica did not hyper-specialize in coffee exports during the market-regulation period (Montero et al. 2021), the share of coffee exports over total exports made the country vulnerable to fluctuations. From the 1960s onwards, exports were strongly influenced by the product diversification project launched by the state in the context of the ISI policies. During the market regulation period, the share of coffee in total exports was considerable. This is consistent with the results of our regression analyses. Given that it was a country that had little influence on the dynamics of the coffee market but was strongly dependent on the income resulting from coffee exports, the result was that Costa Rica had to participate in all versions of the ICoA, despite not fully agreeing with it.

From the 1963 version of the ICoA, Costa Rica questioned certain clauses and made its opinion clear in the discussions of the country's Legislative Assembly before the agreement was ratified. Its most significant criticism of the first version concerned quality, and it questioned why the agreement had not favored sales of coffee of higher quality. Unlike coffee from Brazil and many African and Asian countries, Costa Rican coffee had a niche market, with a small but demanding customer base willing to pay for a differentiated product. During the overproduction period, demand for high-altitude coffees remained constant. The countries producing such products felt that it was unfair that the limitations dictated by the agreement should also apply to them, as they were not responsible for the overproduction. Therefore, the committee in charge of discussing the ICoA recommended using altitude as a distinguishing factor in future negotiations and suggested applying a special regime to these coffees (Legislative Assembly 1963).

In the 1963-68 ICoA, Costa Rica did not have a coffee surplus, and the rise in production due to the Green Revolution package was not yet visible in the country. In the negotiations concerning the 1968 version of the ICoA, the most controversial issue was the "discriminatory treatment" in quota allocations. The quota allocation for Costa Rica was 950,000 bags (2% of the global quota). The quota remained the same in the 1968-72 ICoA despite the expansion of cultivated land and production. Costa Rica's representative in the International Coffee Council considered the quota unfair and claimed that the approval of a low quota would force the country to negotiate coffee surpluses in non-quota markets at a discount price (close to 20%), thereby promoting trade into "tourist coffees" (Legislative Assembly 1969).

Comentado [AH3]: ¿Podéis explicar un poco más por qué está información es importante para entender los coeficientes de las variables ICoA? No es tan evidente. Y quizá estaría bien decir que a partir de aquí os centráis en Costa Rica. De hecho, yo creo que tendría sentido iniciar aquí una nueva sección.

Comentado [AM4R3]: Marc, los puse como punto 5.2, es decir, como parte de los resultados.

The members of the ICoA opposed the selective quota system, which involved increasing the quota for the country whose coffee showed a price increase in the markets. Latin American countries, including Costa Rica, argued that a price rise did not always mean an increase in demand, but rather indicated better treatment by European Community countries towards African producers (which, in many cases, were former European Robusta-producing colonies) (Legislative Assembly 1969). Latin American countries blamed Europe for a discriminatory trade policy towards the region.

The 1976-82 version of the ICoA did not generate further disputes. During the early stages of negotiation, the producer countries gained bargaining power due to high coffee prices in the international market (Legislative Assembly 1976). This changed radically during the 1983-86 ICoA when Costa Rica once again complained about its assigned quota. In the context of the Cold War and the spread of civil wars in Central America, along with the new "threat" of communism for the United States, Costa Rican president Luis Alberto Monge addressed the US ambassador to remind him of the potential consequences for social peace of a fall in the quota (ICAFE 1983). This warning did not work, and Costa Rica's quota did not improve substantially; it was allocated 1,211,284 bags, with a similar quantity for export to non-quota markets at a discount price.

The lack of historical sources prevented us from reconstructing the complete series of quotas assigned per harvest year, during the period of operation of the agreement. In the years for which data are available, there was an increase in exportable production and a stagnation of the ICO's quotas (see Figure 3). Only in 1963-64 and 1964-65 the quota assigned was greater than the exportable production. After that, production increased above the allocated quota, except in 1985-86, when production was low. Given the rise in production and the stagnation of quotas, Costa Rica launched a marketing campaign to increase domestic consumption, becoming one of the producing countries with the highest consumption per capita (Jiménez 2013).

Fig. 3 Costa Rica: exportable production and annual quotas assigned by the ICO (1958-59 to 1988-89).

Source: Prepared by the authors based on data from ICAFE.

During the three decades when the agreement was in operation, Costa Rica increased its individual negotiating capacity by just three votes (from 21 votes in the 1968

ICoA to 24 in the 1983 ICoA). However, it played a crucial role in forming the "Other Latin American Mild" group, which achieved significant bargaining power in the negotiations for the latest version of the ICoA. It was also a crucial player in the breakdown of the coffee agreement. Considering this and the results obtained from the model, we conclude that the agreement had a negative impact on the coffee trade performance of this Central American country.

Costa Rica did not manage to improve its quotas, although its production increased. Its situation only improved with the easing of quotas in the 1980s. In addition, according to Bohman & Jarvis (1999), Akiyama & Varangis (1990), and Palm & Vogelvang (1991), prices remained stable during the first two versions of the agreement (1963 ICoA and 1968 ICoA). When the quotas were suspended in 1973-79, the prices increased. After that, prices fell again due to the overproduction of the 1980s, recovered between 1985 and 1987, and plummeted once again between 1989 and 1994 (see Figure 4).

In 1960, more than 40% of exports went to Germany, 35% to the United States, and the remaining 25% to the European markets (mainly the United Kingdom, the Netherlands, France, and Belgium). During the regulation period, the country intended to extend its exports to other destinations. According to Akiyama & Varangis (1990), Costa Rica benefited most from the non-member markets after Mexico and Indonesia. Our coffee trade figures indicated that the country had an average of 26 export destinations between 1939 and 1962, 38 destinations between 1963 and 1989, and 46 destinations between 1990 and 2000 (during the liberalization period). However, although export markets increased during the period of the ICoA, our data suggest that exports to some destinations were irregular, and the overall volume was limited.

Fig. 4 Coffee exports and prices in Costa Rica (1940-41 to 1998-99).
Source: Prepared by the authors based on data from ICAFE.

6. Conclusions

During the second half of the 20th century, major discussions were held concerning the impact of commodity storage programs on the stabilization of prices, when volatility negatively affected import revenues and, as a consequence, economic growth. After the

Second World War and during the Cold War, several commodity agreements were signed, but only the ICoA lasted until the end of the century. Negotiated in the context of global coffee overproduction, the ICoA aimed to foster economic development in countries with high dependence on coffee revenues in the context of the Havana Charter objectives during the Cold War. All of this took place in a context in which global polarization coexisted with economic and political instability in developing countries. Capitalist countries feared the rise of communism and supported some of these commodity agreements in the context of a broader program of dialogue on cooperation and mutual aid.

There is a consensus on the fact that the ICoA allowed price stabilization during at least the first two versions of the agreement (1963-68 ICoA and 1968-72 ICoA). The regulatory mechanisms allowed them to reduce coffee stocks and, in some cases, stabilize prices. However, this did not result in improvements in revenues, nor expanded the members' export markets share. The ICoA staged different interests and policy objectives, that were challenging to reconcile. Since the start of the regulatory context, there had been clashes between exporting and importing countries and among exporters themselves due to the allocation of quotas and the setting of prices.

Our findings allowed us to conclude that the ICoA provided few benefits for "Other Mild" countries such as Costa Rica and, on the contrary, greater benefits for "Colombian Mild" countries. This helped to explain why Costa Rica advocated for an end of the coffee agreement and Colombia agreed to extend it. The results for Costa Rica's exports confirm that coffee quality was not considered when quotas were established, despite the increase in demand for mild coffees. At the same time, differences in quality were not reflected in price differences, even though the production of mild coffees involved greater risks and higher production costs. Moreover, we did not observe significant market segmentation, perhaps because during the regulated period, mild coffees were used mainly for blends. It was not until the 1990s that pure coffee consumption increased. However, further research is required to include other case studies and to gain a better understanding of the performance of high-quality coffee producers during the regulated period.

Finally, we also observe that Costa Rica's export performance improved during the liberalization period (1989-2000). At the same time, the breakdown of the ICoA

immediately led to a fall in coffee prices. Although prices recovered afterward, they fell again in the late 1990s and early 2000s. The price collapse motivated the producing countries to sign a new coffee agreement in 1994, which was extended in 2001 and 2007. The final extension was for a decade, until 2017. Unlike the ICoA, the new agreements did not allocate quotas to stabilize prices in the international market. They merely provided a forum to discuss the world coffee economy and kept coffee statistics. Since 1989, the coffee market has been characterized by free trade.

Disclosure statement

No potential conflict of interest was reported by the authors.

Name	Period	Quotas
1963 ICoA	1963-1968	In force
1968 ICoA	1968-1972	In force
First extension 1968 ICoA	1972-1973	Suspended
Second extension 1968 ICoA	1973-1975	Suspended
1976 ICoA	1976-1982	Suspended until 1979 In force since 1980
Extension 1976 ICoA	1982-1983	In force
1983 ICoA	1983-1987	In force until 1985 Suspended since 1986
Extension 1983 ICoA	1987-1989	Suspended until 1987 In force since 1988
Breakdown ICoA	1989	

Table 1. Versions of the ICoA.

Source: Prepared by the authors based on the literature cited in this paper.

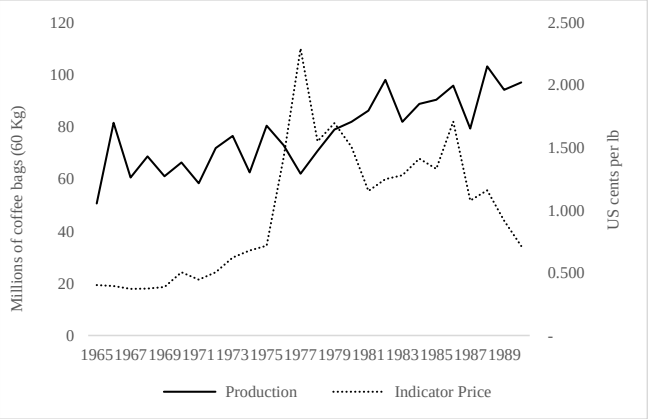

Fig. 1 World production and indicator coffee prices, monthly average (1965-1991).

Source: Prepared by the authors based on ICO data.

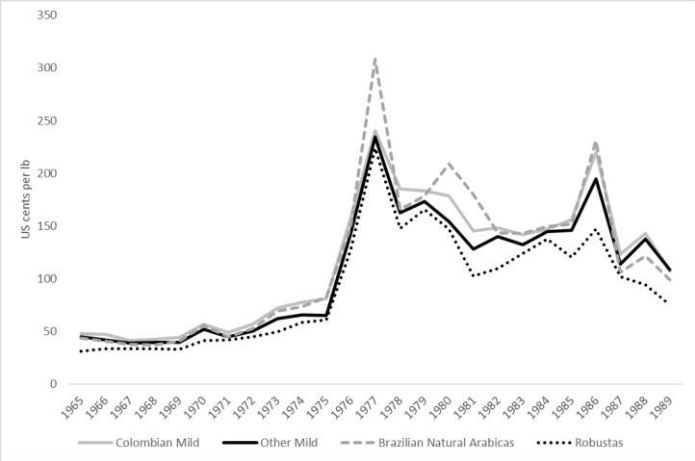

Fig. 2 Indicator price by group, monthly average (1965-89).

Source: Prepared by the authors based on ICO data.

Table 2. Explaining the coffee trade of Latin American main producers (1949-2010).

	(1)	(2)	(3)	(4)
Ln (PRD_i)	0.134	0.149***	0.135	0.132
	(0.128)	(0.0516)	(0.127)	(0.124)
Ln (GDP_j)	-1.495**	-1.509***	-1.465**	-1.456**
	(0.684)	(0.173)	(0.672)	(0.658)
D_Prod_j	0.222	0.191	0.216	0.214
	(0.357)	(0.223)	(0.358)	(0.358)
Ln (GDPpc_j)	1.756**	1.770***	1.716**	1.704**
	(0.716)	(0.185)	(0.700)	(0.683)
Ln (dist_ij)		-0.605***		
		(0.130)		
Contig_ij		0.378		
		(0.236)		
comlang_ij		-0.0544		
		(0.0969)		
D FROBRA (-2)	-0.0950***	-0.0933	-0.116***	-0.115***
	(0.0222)	(0.0745)	(0.0211)	(0.0208)
D_ICA 1963	0.0757*	0.0730		
	(0.0439)	(0.0697)		
D_ICA 1968	0.0489	0.0489		
	(0.0958)	(0.0630)		
D_ICA 1976	-0.109	-0.109*		
	(0.119)	(0.0603)		
D_ICA 1983	-0.0532	-0.0566	-0.0540	
	(0.145)	(0.0681)	(0.144)	
D_ACPC	-1.177	-1.177**	-1.170	-1.171
	(0.797)	(0.511)	(0.796)	(0.796)
D_ICA 1963-82			-0.0123	
			(0.0741)	
D_ICA 1963-89				-0.0255
				(0.0897)
Constant	38.06***	43.48***	37.55***	37.43***
	(11.58)	(3.171)	(11.38)	(11.21)
Observations	8,888	9,636	8,888	8,888
Exporter	YES	YES	YES	YES
Importer	YES	YES	YES	YES
PAIR	YES	NO	YES	YES
Adj. R^2	0.889	0.872	0.888	0.888

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 3. Explaining the coffee trade of Costa Rica, Colombia, and Brazil (by countries)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	CRI	BRA	COL	CRI	CRI	BRA	BRA	COL	COL
Ln (PRD_i)	0.317***	0.176***	-0.826***	0.320***	0.340***	0.188***	0.179***	-0.655***	-0.595***
	(0.0979)	(0.0568)	(0.179)	(0.0976)	(0.0950)	(0.0545)	(0.0530)	(0.175)	(0.170)
Ln (GDP_j)	0.204	-1.128***	-0.649**	0.198	0.183	-1.129***	-1.139***	-0.835***	-0.830***
	(0.298)	(0.180)	(0.279)	(0.297)	(0.297)	(0.177)	(0.176)	(0.292)	(0.300)
D_Prod_j	-1.218***	0.424	-0.226	-1.219***	-1.215***	0.413	0.413	-0.216	-0.184
	(0.441)	(0.282)	(0.287)	(0.441)	(0.440)	(0.289)	(0.290)	(0.291)	(0.286)
Ln (GDPpc_j)	-0.287	1.642***	1.669***	-0.270	-0.263	1.621***	1.628***	1.837***	1.828***
	(0.304)	(0.204)	(0.307)	(0.303)	(0.303)	(0.202)	(0.201)	(0.323)	(0.335)
D_ICA (1963)	-0.343***	-0.0367	0.271***						
	(0.0797)	(0.0743)	(0.0955)						
D_ICA (1968)	-0.261***	0.0104	-0.149						
	(0.0680)	(0.0618)	(0.132)						
D_ICA (1976	-0.162**	-0.359***	0.539***						
	(0.0756)	(0.0536)	(0.126)						
D_ICA (1983)	-0.149*	-0.215***	0.641***	-0.149*		-0.219***		0.581***	
	(0.0897)	(0.0632)	(0.133)	(0.0896)		(0.0628)		(0.132)	
D_ICA (1963-82)				-0.236***		-0.128***		0.186**	
				(0.0522)		(0.0491)		(0.0936)	
D_ICA (1963-89)				-0.212***		-0.153***		0.292***	
				(0.0506)		(0.0440)		(0.0918)	
D_ACPC	3.872***	-4.514***	-3.185***	3.872***	3.864***	-4.507***	-4.511***	-3.192***	-3.183***
	(0.625)	(0.909)	(1.092)	(0.625)	(0.625)	(0.910)	(0.911)	(1.091)	(1.089)
D_FROBRA	-0.00329	-0.0996	-0.0219	0.0109	0.00772	-0.135*	-0.134*	0.0267	-0.00422
	(0.0770)	(0.0761)	(0.151)	(0.0756)	(0.0756)	(0.0776)	(0.0766)	(0.147)	(0.153)
Constant	4.677	30.37***	34.05***	4.723	4.778	30.28***	30.57***	35.16***	34.24***
	(4.571)	(3.245)	(4.691)	(4.560)	(4.573)	(3.205)	(3.149)	(4.988)	(5.219)
Observations	2,915	3,102	2,871	2,915	2,915	3,102	3,102	2,871	2,871
Importer	YES	YES	YES	YES	YES	YES	YES	YES	YES
Adj. R^2	0.820	0.895	0.865	0.819	0.819	0.893	0.893	0.860	0.857

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

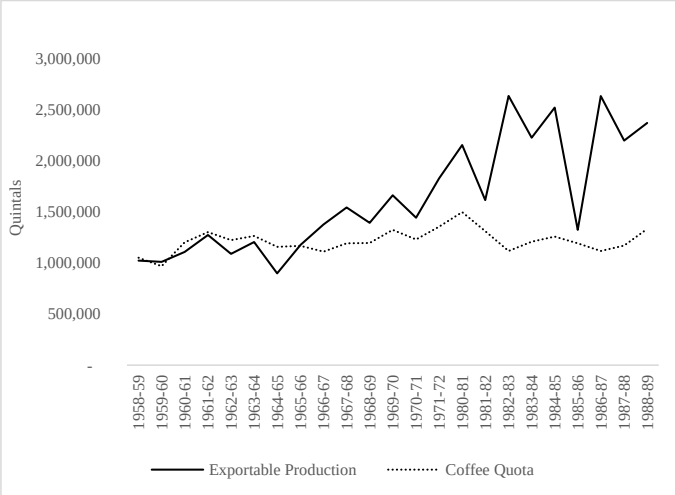

Fig. 3 Costa Rica: exportable production and annual quotas assigned by the ICO (1958-59 to 1988-89).

Source: Prepared by the authors based on data from ICAFE.

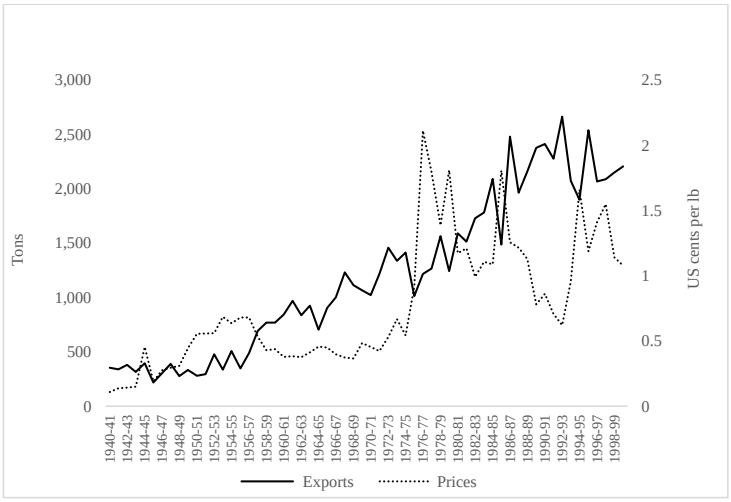

Fig. 4 Coffee exports and prices in Costa Rica (1940-41 to 1998-99).

Source: Prepared by the authors based on data from ICAFE.

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