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# International cocoa trading arrangements between industrialized and developing countries 1951-1999: a structural gravity analysis

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## Abstract

Using a state of the art structural gravity model, we investigate the impact of various (post-)colonial cocoa trading arrangements on the cocoa trade between developing cocoa producer countries and rich industrial cocoa consumer nations in the time period 1951 to 1999. We find that in particular the trading arrangements of the European (Economic) Community (EEC/EC), such as the Association, Yaoundé and Lomé Agreements, as well as the UNCTAD International Cocoa Agreement, had a measurable positive impact on cocoa trade flows, in contrast to the British Commonwealth partnership or the GATT Generalized System of Preferences. In particular, the Yaoundé Agreement did not only increase the trade between other EEC/EC members and the signatory cocoa producers, but also strengthened the trading relationship between the former colonizer countries and their cocoa producing former colonies, in fact more than offsetting the negative effect of independence.

**JEL Classification Codes:** F13, F14, F15, F54, F55, F63

**Keywords:** cocoa trade, developing country commodity trade, international trading arrangements, European (Economic) Community, gravity model

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# 1 Introduction

A large literature concerned with the impact of a colonial legacy on the development of lower-income countries has received important additions over the past two decades. Several authors have argued that colonial and post-colonial policies reinforced and perhaps distorted the patterns of north-south trade specialization that emerged during the Great Uncoupling (Findlay and O'Rourke, 2007; Odijie, 2021; Anderson and Norheim, 1993; de Sousa and Lochard, 2012). An important contribution by Head et al. (2010) based on total trade found that by 40 years after independence, trade between a former colony and its metropole had fallen by two thirds. They ascribe this decline to the “depreciation of trade-promoting capital” as knowledge of opportunities declined over time (Head et al., 2010, p. 12).

In this paper, we investigate how post World War II decolonization influenced cocoa trade flows over the period 1951 through 1999. We focus our analysis on policies that were designed to facilitate trade between industrialized countries and developing cocoa producing countries after former colonies became independent during the 1950s and 1960s. We analyze the impact of the preferential treatment that European (Economic) Community (EEC/EC) policy afforded current and then former colonies of its members in a series of agreements spanning the period 1957 through 1999. We also examine the influence of Commonwealth preferences, the Generalized System of Preferences (GSP) and the International Cocoa Agreement (ICCA). We find that some of these policies mitigated and even reversed the erosion of colonial trade connections identified in Head et al. (2010). The end of colonial relationships did lead to a gradual reduction of trade, but this study of the trade in cocoa—a product almost synonymous with colonial exports—suggests that the process did not take place evenly over time and space.

This study focuses on the trade in cocoa during the second half of the twentieth century. By the early 1950s, cocoa was established as a key export of Europe’s subtropical African and Caribbean colonies. In the early 1950s, polities under colonial rule accounted for two-thirds of global cocoa production and three quarters of exports (FAO, 1958, Tables 1 and 3). By the end of the study period, countries that became independent during the post-1950 decolonization accounted for 70 percent of production and 80 percent of exports. The focus on one commodity, cocoa, has several advantages. First, cocoa constituted a large share of the exports of many Caribbean and African colonies ca. 1950. Second, once western European currencies became convertible in the 1950s, cocoa imports into metropolises from non-colonial producers did not face the same quantitative restrictions or other nontariff barriers that confronted exports of commodities such as bananas, coffee or tropical timber.<sup>1</sup> Third, varieties of cocoa from colonized regions did not differ markedly from cocoa from other producers; that was not the case for many other key tropical com-

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<sup>1</sup>See Economic Commission for Africa (1960, Footnote 1 p. 39).

modities.<sup>2</sup> Fourth, the focus on cocoa allows us to include almost a decade of trade prior to decolonization for most producers and up to four decades of trade thereafter. Finally, the period of analysis permits a much closer look at the impact of trade policy, including various preferential arrangements accorded to developing countries over the period. In particular, trade policy of the European Economic Community (EEC) and later European Community (EC) meant that cocoa from former colonies gained preferential access to several high-income markets where preferences had not existed prior to decolonization. Originating in Central America and Mexico, cocoa's history as a traded good was from the onset intertwined with European colonialism. Spanish conquistadores introduced cocoa into Europe when they offered cocoa in the form of a Mexican-style chocolate drink to the Spanish king as a gift (Dand, 2011, pp. 1-3). Cocoa was a luxury consumed primarily as drinking chocolate until the mid-1800s, when new forms of processing resulted in the development of eating and confectioner's chocolate (Wickizer, 1951, pp. 305-306). Expansion of production faced geographical constraints. Cocoa plants require exacting conditions with respect to temperature, rainfall and elevation. As seen in Fig. 1a, this means that cocoa bean production is limited to a narrow belt 20 degrees on either side of the equator (Goldman, 1974; Wickizer, 1951).<sup>3</sup>

Initially, expanded cocoa cultivation was limited to the New World. Early on, the Spanish, Dutch and Portuguese provided various incentives to expand production into South America. Brazil became the first producer to dominate export markets in the early twentieth century. Although first grown in the Portuguese African colony of São Tome in the early 19<sup>th</sup> century, cocoa emerged as a quintessential product of colonial Africa after its introduction into the British colony of the Gold Coast (Ghana) in the late 19<sup>th</sup> century. The uptake by small farmers as a profitable export crop was dramatic. By the early 1920s, the Gold Coast had surpassed Brazil as the top exporter of cocoa. The colony accounted for over one-third of global production in 1950. Just prior to independence, cocoa accounted for three quarters of Ghana's export earnings (Goldman, 1974, Table 4). For the French colony of Côte d'Ivoire, the share of export earnings at independence was one-third (Stryke, 1972, Table 7). Producers in colonies in turn often depended on the colonizer as the primary or, in some cases, the secondary market. In 1949, French colonies exported 62 percent of their cocoa to the metropole. For British colonies, the share was 30 percent (FAO, 1958, Table K).

The period of our analysis (1951 to 1999) was quite turbulent. Experiencing significant upheaval during World War II, production only recovered to prewar levels by the mid-1950s (FAO, 1958). Cocoa prices were at that time relatively high (see Fig. 2). As the map in Fig. 1a illustrates, Latin America and the Caribbean accounted for about one-

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<sup>2</sup>See the GATT reports from 1958: GATT: Working Party (1958a,b,c).

<sup>3</sup>Behrman (1968, p. 703) notes that they require some shade, limited fluctuation in temperature, protection from the wind, year-round high humidity and an elevation between approximately 100 and 300 meters.

third of global production of cocoa beans during the period just prior to decolonization. European colonies in Africa produced another three-fifths, with the British colonies of the Gold Coast (now Ghana) and Nigeria responsible for three-quarters of African production and French colonies (primarily Cameroon and French West Africa) accounting for most of the remainder.

Over the next four decades, most additional production would take place outside of Ghana (see Fig. 1b). Production in Côte d'Ivoire took off after independence in 1960 with offers of forest land to small farmers and encouragement of labor in-migration from the central part of the country and Burkina Faso (Ongolo et al., 2018, pp. 6-9). By the mid-1970s, Côte d'Ivoire had become the world's largest exporter. Most domestic markets for cocoa beans were liberalized during the 1980s with the elimination of marketing boards. Finally, small farmers in countries such as Indonesia deployed technologies of the green revolution to achieve higher productivity and began to export to global markets. As Fig. 3 indicates, global cocoa bean production quadrupled from 700 thousand metric tons in 1950 to almost 3 million metric tons in 1999. Former European colonies continued to account for the lion's share of production and exports.

Countervailing objectives influenced trade policy towards the international market in cocoa during the period of this study. Signed by 23 countries in 1947, the General Agreement on Tariffs and Trade (GATT), initiated a slow process of multilateral trade liberalization based on the principle of non-discrimination. Decolonization, which peaked in the early 1960s, also had the potential for reinforcing the GATT vision of liberalizing trade. Almost all of the African and Caribbean cocoa producers that had been under colonial rule achieved independence and with it the freedom to conduct their own trade policy.

For several reasons, the principle of nondiscrimination in markets for subtropical goods faced strong headwinds. During the period of decolonization, business and other interests in the metropole favored policies that would ensure continued trade ties with former colonies. Potential benefits for former colonies included preferential treatment of their imports in the market of the (former) colonizer. The tariff preferences accorded British colonies from the prewar era under Imperial Preference were extended after the war with the creation of the Commonwealth Preference Area. The formation of the European Economic Community (EEC) with the signing of the Treaty of Rome in 1957 created another potential counterweight to the principle of nondiscrimination. The six EEC members included four colonial powers (France, Belgium, the Netherlands and Italy) with an interest in ensuring preferential access for exports of their colonies, including cocoa<sup>4</sup>. A series of EEC/EC agreements during the period 1957 through the late 1970s granted preferential access to a group of cocoa producers with former colonial ties that grew in

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<sup>4</sup>For the Netherlands and Italy, cocoa imports from their colonies were insignificant prior to and during the negotiations for the Treaty of Rome.

number as the EEC/EC expanded. Another arrangement concluded under the auspices of the GATT, the Generalized System of Preferences (GSP), offered industrialized countries the possibility of unilaterally lifting trade barriers on imports originating in developing countries. Finally, as one of several international agreements aimed at dampening price fluctuations of primary products, the first International Cocoa Agreement (ICCA) was signed in 1972; subsequent iterations of the agreement were in place through the end of our sample period.

In this paper, we use a state-of-the-art gravity model of trade to investigate whether the different trading arrangements (Association Agreement, Yaoundé Agreement, Lomé Convention, Commonwealth, GSP, and ICCA), which were engineered to foster trade between developed and developing countries, actually accomplished their goal. We focus on the period 1951 to 1999, which brackets the decolonization period of the late 1950s through the mid-1970s when most former colonial territories became independent. Whereas Newton developed the gravity model in the 17<sup>th</sup> century to explain the force attracting celestial bodies in physics, it has by now found its place in the economics literature to explain trade, investment or even migration flows between countries and regions. At first, the good fit that the gravity model provided for empirical trade data appeared rather mysterious, given that empirical tests of the neoclassical trade models, such as the Ricardian or the Heckscher-Ohlin model, typically gave poor results. However, Anderson (1979), Eaton and Kortum (2002), and Anderson and van Wincoop (2003) were able to prove that a gravity specification arises naturally from a wide class of trade-cost inclusive models. Moreover, the gravity model can be estimated for both total trade flows and for sectoral or commodity trade flows (Yotov et al., 2016). It is hence the ideal model to answer the question whether the trade arrangements presented above had a positive impact on cocoa trade. Some of these trading arrangements were targeted at preserving colonial trade ties into the post-colonial era. The gravity model allows an evaluation of the extent to which these efforts could mitigate or even reverse the marked, but uneven erosion of trade relationships between former colonies and their metropole found by Head et al. (2010) and Lavallée and Lochard (2015) for overall trade flows after decolonization. The international trade in cocoa has rarely been analyzed in a gravity framework. We are aware of two previous papers. The study by Yeboah et al. (2011) investigates US cocoa imports in the period 1970-2008 from ten cocoa producing countries and asks whether GATT/WTO membership and free trade agreements (FTAs) increased the import of cocoa into the United States. As a relatively early paper with limited trade data, the empirical approach does not meet today's standards for gravity estimation. For that reason, the finding that both FTAs and WTO membership increased cocoa trade flows should be interpreted with caution. A second paper, Grassnick and Brümmer (2021), employs a state-of-the art modern gravity model to investigate whether voluntary sustainability standards exemplified by UTZ certification increased the trade in cocoa-related commo-

ties: cocoa beans and intermediate products such as cocoa paste, cocoa butter, and cocoa powder. They find a positive effect of certification on trade in cocoa beans and paste in the period 2010-2016. The question of sustainability and fair trade certification is an important one in today's cocoa market, but it was not of major significance during the period that we consider in our analysis.

Our paper also fits into the gravity literature on the effects of developed countries' trade promotion programs for poor countries. Recent examples of this literature are Klasen et al. (2021), who investigate the effect of least developed country status on exports, and Ornelas and Ritel (2020), who find that non-reciprocal trade preferences for developing countries have heterogeneous effects. The effects are strong and positive for very poor WTO members; for other countries, such preferences seem only to boost exports for non-WTO members.

In our study, we ask how the agreements that were intended to maintain close trading relationships between cocoa producers and the rich consumer nations affected international cocoa trade. We find that the Commonwealth Preference Area had a mixed impact on cocoa trade and that the Generalized System of Preferences (GSP) did not have a measurable positive impact on cocoa trade. In contrast, both the EEC/EC agreements and the International Cocoa Agreement (ICCA) had a strong positive effect on imports of cocoa. In particular, the Yaoundé Agreement increased the cocoa trade between colonizers and their cocoa-producing former colonies and between other EEC members and the signatory cocoa producers. For the cocoa trade between metropolises and their respective former colonies, the estimated impact more than offset the negative effect of independence. Policies of the EEC/EC were thus successful not only at increasing the economic ties among its member states, but also between its member states and the developing countries that were granted preferential access.

Section 2 traces the evolution of the policies governing the trade in cocoa during the period of analysis. Section 3 defines the estimating equations for the gravity model, which is employed to answer our research question. Section 4 provides information on the dataset. Section 5 presents the estimation results and provides numerous robustness tests, which generally confirm our major findings. Section 6 concludes.

## **2 Cocoa and trading arrangements between developing and developed countries**

Three different perspectives governed trade policy during the post-war era up until the establishment of the World Trade Organization (WTO) in 1995. These differences also influenced the trade regime for cocoa throughout the period of this study. Shaped primarily by the interests of the industrialized signatories, GATT stressed the elimination of quantitative restrictions, reductions in tariffs and the principle of nondiscrimination

and reciprocity through Most Favored Nation clauses. Developing countries adopted a second perspective towards trade policy. The experience of the Great Depression years had prompted skepticism about relying upon commodity exports as engines of economic growth for developing countries. Many primary product exporters argued that the principles of non-discrimination and reciprocity were not appropriate for developing countries and that they should have the flexibility to impose quantitative restrictions on trade in the event of balance of payments crises.

When they signed the Treaty of Rome in 1957, the six members of the EEC—all signatories of the GATT—embarked on a third path.<sup>5</sup> The formation of the Common Market and the customs union embedded in it was at the minimum inconsistent with GATT principles (see Dos Santos et al. (2005) and McKenzie (2020)). Colonial ties prompted the EEC to depart further from the principle of non-discrimination in its trade policy towards tropical imports, including cocoa. As Fig. 1a suggests and was noted earlier, the colonies of European countries accounted for about three-quarters of cocoa bean exports, most of which were from African producers.

The postwar trade policies of the two main colonial powers—the United Kingdom and France—were legacies of the shift towards discriminating in favor of imports from colonial territories that took place as a response to trade imbalances during the Great Depression. Under the Ottawa agreements of 1932, the historically non-discriminatory policy of the United Kingdom gave way to a system of Imperial Preference. The United Kingdom and the dominions enacted tariff rates that granted preferential access to goods from the British Empire (MacDougall and Hutt, 1954). After World War II, this system became the Commonwealth Preference Area (CPA), which included the members of the Commonwealth that granted each other preferences (Robertson and Singleton, 2001). In the case of cocoa, the relative protection that the UK afforded cocoa beans from producers that were members of the CPA, such as the Gold Coast (Ghana), was modest. The specific tariff on cocoa was an ad valorem equivalent of 4.4 percent for cocoa from outside of the Commonwealth. The reduction granted to CPA members was only a modest 0.8 percentage points (Great Britain. H. M. Customs and Excise, 1941, 1959). Australia, New Zealand and Canada assessed tariffs on imported cocoa beans, but offered members of the CPA tariff-free access to their markets (GATT Committee III, 1962, pp. 9-15). The CPA came to an end in 1977 (Robertson and Singleton, 2001).

With the enactment of the tariff of 1928, France established a customs union between itself and most of its colonies outside of North Africa (known as the assimilated colonies). Balance of payments concerns during the Great Depression prompted further efforts to increase French reliance on the colonial empire as both a source of imports and a protected export market (France: Conseil national économique, 1934; August, 1978; Ravenhill,

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<sup>5</sup>The original six members of the EEC were France, Italy, West Germany, Belgium, the Netherlands and Luxembourg.

1985). Even as late as 1957, the official tariff on cocoa originating from outside of the French colonial empire was 25 percent, although at the time it was suspended (and thus effectively zero).<sup>6</sup> In response to a balance of payments crisis, France did impose import quotas on cocoa from outside of the empire in 1957. The French approach to its colonies also involved government credits for infrastructure development.

The other major EEC colonial power in Africa, Belgium, adhered to the principle of nondiscrimination. Along with its Benelux partners, it assessed a tariff of ten percent that was effectively zero by 1957. Italy's tariff on cocoa was also effectively zero. Only Germany assessed its legal MFN tariff of 10 percent on cocoa imports (GATT Working Party, 1958, Table A). The establishment of a customs union as an essential element of the EEC posed the challenge of developing a common tariff policy that accommodated both the interests of the Benelux and Germany, which favored low protection for all cocoa imports regardless of origin, and French demands for preferential treatment for its colonies.<sup>7</sup>

In the negotiations that led up to the signing of the Treaty of Rome, France was successful at establishing preferential tariff treatment for European colonial territories. With the expectation that colonial empires in sub-Saharan Africa would remain intact for the foreseeable future, Part IV and Annex IV of the Treaty spelled out the Association Agreement that effectively included Belgian, Dutch, Italian and the assimilated French colonial territories in the new customs union (Ravenhill, 1985, p. 48f.; Bartels, 2007, pp. 717-779). Effective for five years, the agreement designated thirteen colonial territories as Associated Overseas Territories (AOT) of the EEC. As Fig. 1a indicates, the AOT included all sub-Saharan French colonies, Belgian Africa, Somaliland and scattered Dutch and French territories in the Caribbean and Pacific. The AOT were granted duty-free access to the EEC market when the Common External Tariff (CET) came into effect.<sup>8</sup>

A separate set of negotiations over the CET for tropical products initially established a rate of nine percent for cocoa beans that would become effective with the rest of the CET after a transitional period of several years. Given that actual tariffs on cocoa beans were zero in 1957 (with the exception of Germany at 10 percent), agreeing on a tariff eventually as high as nine percent would have forced Benelux to turn away from their reliance on cocoa bean imports from territories outside of the AOT (Bartels, 2007, p. 718f.). As late as 1962, actual tariff rates on cocoa beans imported from outside of the AOT went from nine percent for Germany down to 2.7 percent for Italy and Benelux. German tariffs on cocoa from the AOT were still 6.5 percent, but zero for all other members of the Six

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<sup>6</sup>France's devaluation of the French franc by 20 percent in 1958 improved overnight the competitiveness of its colonial cocoa on world markets, including in France (Blancheton and Bordes, 2007).

<sup>7</sup>Bartels (2007) provides an excellent overview of EEC/EC trade and development policy.

<sup>8</sup>Davenport (1989) offers a good discussion. Guinea was not included in the AOT once it gained independence in 1958. Part IV of the Treaty of Rome also included provisions that would grant all EEC businesses equal access to the markets of the Associated Territories as well as reciprocity in granting access to AOT import markets to all EEC members.

(GATT Committee III, 1962, pp. 10-11).

In 1962, the provisions of the Treaty of Rome for the Associated Territories/Countries expired. By 1960, most of the French and all of the Belgian colonies that had been members of the AOT had gained independence. A new agreement, the Yaoundé Agreement of 1963, provided a framework for integrating the newly-independent countries into the EEC customs union; it was subject to revision after five years. The French price support system was phased out. Along with tariff reductions for other tropical products, the Yaoundé Agreement lowered the CET on cocoa beans to 5.4 percent effective June 1964 (Ouattara, 1973; Ravenhill 1985, p. 53f.). That rate was over twice the trade-weighted average of 2.4 percent for non-EEC countries in 1962.<sup>9</sup> As Fig. 1b indicates, Yaoundé also included the cocoa-producing countries of the AOT.

In other ways, the Yaoundé Agreement maintained continuity with the Association Agreement. It moved the date at which cocoa and some other tropical goods would gain duty-free access to the Common Market up to June, 1964 from the previous target date in 1966. In response to the concerns of West Germany and the Netherlands as major cocoa importers, the second Yaoundé Agreement of 1971 reduced the CET on cocoa to 4 percent (Ravenhill, 1985, p. 55f.).

The accession of the United Kingdom into the EEC in 1973 required another overhaul of the preferential trading system in order to integrate members of the Commonwealth Preference Area (CPA). The first Lomé Convention of 1975, concluded between the EEC and the ACP (Africa, Caribbean, Pacific) grouping of countries (see Fig. 1b), replaced Yaoundé II. The agreement required that the developing country signatories treat the exports of EEC members the same as those of other non-developing countries, but there were no longer expectations of reciprocity as in the Yaoundé agreement. As noted above, the CPA expired in 1977.

The Lomé Convention granted products imported from the ACP that were not covered by the Common Agricultural Policy (CAP) duty- and quota-free access (Bartels, 2007, p. 734). As signatories of Lomé, two major African cocoa producers—Ghana and Nigeria—could now compete with other major African cocoa producers in the EEC market on an equal footing. They also enjoyed the protection of the CET (see Fig. 1b). Emerging production centers in south and southeast Asia remained outside of the ACP. Figures 4 through 9 provide evidence on the pattern of cocoa imports into the countries of the original EEC and the United Kingdom over the fifty years covered by this study. The graphs show the ratio of imports from an identified group of source countries to total imports. The data are for imports in SITC category 072, which includes cocoa beans, cocoa paste/butter and cocoa powder. During the years up to 1957, almost all cocoa imports from Africa and the Caribbean were from European colonies. The late

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<sup>9</sup>The import-weighted rate for cocoa beans for the most important importers is based on GATT Committee III (1962, pp. 9-15) and export data from FAO (2023).

1950s through the early 1960s were the period of rapid decolonization and the EEC Association Agreement. The graphs also indicate the periods during which subsequent EEC preferential agreements were in effect.

The import ratio graphs suggest two distinct patterns: one for EEC/EC countries that imported cocoa from territories that had a historical colonial association and the other for the EEC/EC countries without colonial ties to cocoa-producers. Understanding the extent to which trade policy influenced those patterns is the focus of this study. The first group of countries are the leading colonial powers of the early 1950s: France, Belgium and the United Kingdom. For all three, the import ratios for countries with a historical colonial association presented in Figures 4 through 6 remain constant or even rise through the mid 1970s, well after decolonization. A key question is whether the subsequent declines that we observe are indicative of the erosion of postcolonial ties, as argued in Head et al. (2010), or some other cause.

The second group of countries, which includes the Netherlands, Germany and Italy, did not have ties to colonies or former colonies that were major cocoa-producing countries. As figures 7 through 9 suggest, some positive association may exist between the three EEC/EC preferential trade agreements and import ratios. The key issue for this group is whether and how much preferential trade agreements influenced exports from (former) colonial territories into EEC/EC countries for which there were never colonial ties.

Forty years of discriminatory EEC/EC trade preferences based on former colonial ties came to an end when the Cotonou Agreement of 2000 superseded Lomé IV. The foundation of the WTO in 1995 prompted this change. It had become increasingly clear that preferential tariffs based on former colonial relationships were in violation of the non-discrimination principle of GATT/WTO.

Preferential trade arrangements for developing countries also emerged outside of the European integration process. Hoekman and Özden (2005) document the ongoing efforts of developing countries since the late 1940s to modify the non-discriminatory and reciprocity principles of GATT. Their arguments that reliance on primary product exports and their status as developing countries required concessions from industrialized countries eventually bore fruit in the 1970s. Within the GATT, the Enabling Clause of 1979 established a permanent legal foundation for a Generalized System of Preferences (GSP) for imports from developing countries as a general exception to the non-discrimination principle of GATT. Although the EEC had actually been the first group of countries to introduce a GSP in 1971, the inherent contradiction between the preferential Lomé system for the ACP on the one hand and the GSP on the other hand would become increasingly apparent in the following years.

International commodity agreements (ICA), which were often supported by UNCTAD, were another policy initiative of developing countries that rejected the liberal market principles of GATT. ICAs for several primary product exports were signed by importers

and exporters throughout the sample period. The agreements relied on export controls, buffer stocks or both in order to reduce supply on global markets and/or stabilize prices (Gilbert, 1987, 1995). A latecomer to these efforts, the International Cocoa Agreement (ICCA) was concluded under the sponsorship of UNCTAD in 1972 after a decade of negotiations between producing and consuming countries. It went into effect in 1973 and was followed by a series of other agreements that renegotiated mechanisms and target price ranges.<sup>10</sup> All nine EC members were original signatories of the first ICCA of 1972. The major holdout was the largest importer, the United States, which abstained from signing and only agreed to cooperation on a limited basis (Goldman, 1974, p. 29). The five top cocoa producers at the time (Ghana, Brazil, Côte d'Ivoire, Nigeria and Cameroon) signed the first accord, but Côte d'Ivoire ended its participation in 1980 when the second ICCA of 1975 expired.

Stabilizing and increasing export earnings of cocoa producers with the aim of accelerating economic growth and social development were explicit goals of the ICCA. The first two ICCAs included export quotas to be used when the price of cocoa beans fell below the target range. In addition, the first four ICCA agreements (ICCA of 1972/73, 1975/76, 1980/81, 1986/87) called for buffer stocks that could be released if the market price exceeded the target range or restocked in the event of low market prices. The responsibility for financing buffer stocks was shared equally between producers and consumers of cocoa beans.<sup>11</sup> The International Cocoa Council, where consuming and producing countries had voting parity, administered the ICCA.

Some observers, notably Gilbert (1995, pp. 16-17), argue that it was unlikely that the ICCA had much influence on cocoa prices (and thus export earnings) during the fifteen years from its inception to the suspension of its economic clauses in 1988. As Fig. 2 suggests, during the 1970s, when the first two agreements were in force, the price of cocoa always exceeded the maximum of the agreed-upon price corridors. By the 1980s, the eventual supply response by farmers in Côte d'Ivoire and elsewhere to the commodity price boom of the 1970s may have prompted the opposite situation of over-supply. The third and fourth agreements, which were concluded in 1980 and then 1985, called for price corridors that were higher than prevailing market prices. By the 1980s, neither the largest importer (the USA) nor the largest exporter (Côte d'Ivoire) were members of the ICCA, which also meant that they did not provide financial support for accumulating buffer stocks in order to support the market price. The financial resources that were available in 1980 were quickly expended without any appreciable impact on the market price. The lack of financing thereafter meant that the economic provisions of the ICCA were potentially moot by the 1980s. However, since the ICCA was also designed to increase

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<sup>10</sup>Many of the ICAs, including the ICCA, had predecessor agreements in the interwar period and reflected efforts of individual countries or consumers to influence prices, but without the support of an international organization (Kofi, 1977).

<sup>11</sup>See Goldman (1974) for a thorough description of the original ICCA regulations of 1972.

cocoa export revenues for its producer countries and committed the signatories to trade cocoa primarily with each other, being a member of the ICCA, whether an importer or exporter, should have increased the value of the cocoa trade, *ceteris paribus*.

In the next section, we introduce the gravity model specification used to investigate the question of which trading arrangements were actually successful in influencing international trade in cocoa.

### 3 Framework for analysis

We investigate the impact of the main policies affecting international trade in cocoa using a modern style gravity setup. The gravity model of trade is one of the most successful empirical economic models. It has been used to account for trade, foreign direct investment and migration flows between countries or regions.

The core idea of the original gravity model originated in physics. Isaac Newton formulated his Law of Universal Gravitation in 1687 in his book *Philosophiae Naturalis Principia Mathematica* to explain the strength and pull of gravitational force between celestial bodies by their mass and the squared distance between them.

It took about 200 years for this model to find its way into the economic science literature. Newton's original idea that masses separated by distance may influence the direction and strength of flows of variables of interest between them still motivates applications in the economics literature. Researchers familiar with the historical literature now point to the geographer Ravenstein (1885) as the first person to use the gravity model on an economics-related subject: internal migration flows in the UK. Although Isard (1954) appears to be the first article in which the gravity model was used to account for trade flows, it is Jan Tinbergen, a Dutch physicist turned economist, who receives most of the credit for employing the gravity model in economic analysis. In an appendix to his 1962 book on the world economy, Tinbergen (1962) applied the gravity model to explain trade flows. His measure of mass was gross domestic product (GDP). Conditional on distance, the larger the GDP, the greater the pull of exports towards it.

Although the gravity model had for some time worked extremely well in empirical applications, it lacked a strong microeconomic foundation and was deemed "atheoretical." Anderson (1979) was the first to provide a microeconomic motivation for applying the gravity model to trade flows. He showed that the gravity model could actually be derived from a standard Armington trade model. The major breakthrough for the theoretical gravity model came at the beginning of the 2000s with the publication of two papers. Eaton and Kortum (2002) derived the gravity model from the supply side in a Ricardian framework with intermediate goods. Anderson and van Wincoop (2003) used an Armington framework with a CES utility function to build a demand-side model. Subsequent research that extends these two articles has shown that the gravity specification arises

naturally from a large class of models (Head and Mayer, 2014; Yotov et al., 2016).

Today, the gravity model is the leading empirical model to analyze trade flows. As our theoretical understanding has advanced, empirical applications have also yielded many insights into how to correctly specify and estimate the model. We incorporate these insights in our gravity estimation to analyze the impact of preferential trade agreements that emerged from historical colonial relationships between cocoa producers and consuming countries. Our focus is on a series of agreements between the EEC/EC and former colonies and among members of the Commonwealth participating in the Commonwealth Preference Area (CPA). Our analysis also incorporates information on other relevant trade policy arrangements for our period of analysis, including the Generalized System of Preferences (GSP) and the International Cocoa Agreement (ICCA).

Following Head and Mayer (2014, p. 138) and adding time subscripts, our empirical trade equation takes the following form:

$$X_{odt} = \frac{Y_{ot}}{\Omega_{ot}} \frac{E_{dt}}{\Phi_{dt}} \phi_{odt}, \quad (1)$$

in which the trade flow,  $X_{odt}$ , between country  $o$  (origin or exporter) and country  $d$  (destination or importer) during year  $t$  is the dependent variable. Country-pair specific factors and exporter-importer-time varying trade policy variables,  $\phi_{odt}$ , and a series of exporter-time and importer-time fixed effects explain  $X_{odt}$ . The two sets of fixed effects control for levels of income ( $Y_{ot}$ ) and expenditure ( $E_{dt}$ ) as well as the two multilateral resistance terms ( $\Omega_{ot}$  and  $\Phi_{dt}$ ). Multilateral resistance terms capture all trade barriers and costs that exist between a given importer and the rest of the world (inward multilateral resistance  $\Phi_{dt}$ ) or a given exporter and the rest of the world (outward multilateral resistance  $\Omega_{ot}$ ). A higher amount of multilateral resistance implies, *ceteris paribus*, lower import or export flows heading to or originating from the respective country. Hummels (2001) and Olivero and Yotov (2012) argue that inclusion of importer-time and exporter-time fixed effects in the estimation is essential in order to account for the multilateral resistance terms that appear in the standard theoretical gravity equation such as Anderson and van Wincoop (2003), but for which data are not available. Including GDP as a measure of income or expenditure while omitting the multilateral resistance terms, as was routinely done before the 2000s, leads to omitted variable bias. In modern gravity models, the inclusion of importer-time and exporter-time fixed effects accounts for multilateral resistance terms and for other variables such as exporter income and importer expenditure.

This study adheres to the best practice of estimating the gravity model with a nonlinear method; in this case, it is the Poisson Pseudo Maximum Likelihood (PPML) method as suggested by Santos Silva and Tenreyro (2006). PPML estimation solves several problems. First, the original, non-linear gravity model can be estimated directly. Second, it is superior to the alternative often used in the literature: estimating a log-linear transfor-

mation of the model appearing in eq. (1) with OLS, since the log linear transformation imparts a bias to the estimated coefficients. In addition, for those country pairs with zero trade flows, the log is not defined. Finally, as Santos Silva and Tenreyro (2006) and Yotov et al. (2016) point out, the PPML estimator handles heteroskedasticity in trade data well.

Although most applications of the gravity model in the empirical trade literature analyze aggregate trade flows, it is also possible and theoretically sound to estimate a gravity model at the sectoral or commodity level (Yotov et al., 2016, p. 23). Recent examples of such disaggregated gravity analysis include, among many others, Shahriar et al. (2019) for Chinese meat exports and Rallatou and Tzouvelekas (2016) for the olive oil trade among the countries of the European Union.

Our preferred “Base” case estimating equation for international trade in cocoa uses a nonlinear specification and is thus compatible with PPML estimation. The Base case includes regressors that account for country-pair specific influences on trade. The estimating equation is

$$\begin{aligned}
X_{odt} = & \exp[\omega_{ot} + \varphi_{dt} + \mu_1 \ln DIST_{od} + \mu_2 COMLANG_{od} + \mu_3 COMBOR_{od}] \times \\
& \exp[\mu_4 EVER\_COL_{od} + \beta_1 CUR\_COL_{odt} + \beta_2 CPA_{odt} + \beta_3 ASSOC_{odt}] \times \\
& \exp[\beta_4 YAOUNDE_{odt} + \beta_5 LOME_{odt} + \beta_6 GATT_{odt} + \beta_7 GSP_{odt}] \times \\
& \exp[\beta_8 PTA_{odt} + \beta_9 ICCA_{odt}] \times \epsilon_{odt}.
\end{aligned} \tag{2}$$

In this equation, the variable  $X_{odt}$  denotes the cif (cost insurance freight) import values of cocoa into country  $d$  from country  $o$  in year  $t$ .  $\omega_{ot}$  and  $\varphi_{dt}$  represent country-time fixed effects for origin and destination countries, respectively. They control for the income, expenditure and multilateral resistance terms in the gravity eq. (1).

Three groups of variables are the focus of our analysis of international trade in cocoa. As with Head et al. (2010), the first group focuses on colonial relationships that may have influenced the post-independence pattern of trade. The variable  $EVER\_COL_{od}$  indicates whether or not the exporter ( $o$ ) was at any time after 1945 a colony of the importing country ( $d$ ). It should capture long-lasting relationships with the former colonizer. The sign of the coefficient on  $EVER\_COL_{od}$  is not clear. It will be positive if the colonial relationship continued on average to influence the importation of cocoa over the five decades covered by the study. The time-varying variable  $CUR\_COL_{odt}$  takes on a value of 1 if the exporting entity and the importing country are in a direct colony-colonizer relationship in year  $t$  and zero otherwise. The variable is always equal to zero after  $o$  gained its independence from  $d$ . Based upon the results of Head et al. (2010), we expect the coefficient on  $CUR\_COL_{odt}$  to be positive given that independence allowed the exporter of cocoa more flexibility in its policy towards export markets. Consequently, during colonial years, exporters likely exported more to their colonizers relative to other destinations, as was also found by Mitchener and Weidenmier (2008) in the case of empire

membership. The inclusion of a decade or more of cocoa exports of colonial entities in the sample allows for a cleaner test of the impact of independence than the approach of Head et al. (2010), which lacked data on bilateral trade while an entity was still a colony.<sup>12</sup>

The second group of variables captures preferences that were granted colonies or countries with an existing or former colonial association, and include  $CPA_{odt}$ ,  $ASSOC_{odt}$ ,  $YAOUNDE_{odt}$  and  $LOME_{odt}$ .  $CPA_{odt}$  is a dummy variable equal to one if a exporter was a member of the Commonwealth Preference Area (CPA) and the importer is the United Kingdom, Canada, Australia or New Zealand. Once the United Kingdom adopted the CET, only those members of the Commonwealth that signed onto the Lomé Convention benefited from the preferential tariff treatment that was part of the agreement.<sup>13</sup>

Three variables characterize the agreements that the EEC/EC reached with former colonies of its members.  $ASSOC_{odt}$  is a dummy variable equal to one if the origin country  $o$  was an Associated Overseas Territory designated by the Treaty of Rome and the destination country  $d$  was a member of the EEC. The variables  $YAOUNDE_{odt}$  and  $LOME_{odt}$  take the value of one if country  $d$  was an EEC/EC country and the origin country  $o$  was a signatory of the Yaoundé or Lomé agreements. Although on the face of it, these three agreements could be interpreted as bilateral preferential trade agreements (PTA), they were in practice more similar to the GSP programs since they were asymmetric and non-reciprocal. The same can be said of the CPA. The corresponding coefficients  $\beta_2$  to  $\beta_5$  are expected to be positive.

The third group of variables captures agreements within the GATT framework. The variable  $GATT_{odt}$  takes on a value of one if the importer and exporter are both signatories of GATT in year  $t$  and zero otherwise.  $GSP_{odt}$  is a dummy variable equal to one in case country  $d$  granted Generalized System of Preferences (GSP) tariff reductions to cocoa imports from country  $o$ .<sup>14</sup> Finally,  $PTA_{odt}$  is a dummy variable that equals one if a bilateral PTA between countries  $o$  and  $d$  existed at time  $t$  and zero otherwise. It does not include the different EEC/EC preferential trade agreements with its members' former colonies.<sup>15</sup>

Finally, the  $ICCA_{odt}$  variable takes on a value of one if the exporter and importer were

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<sup>12</sup>Head et al. (2010) use the number of years from the date of independence as a proxy for the “independence” effect and estimate the trade impact year by year from independence onwards. Note that our focus on post-1945 decolonization of developing countries also differs from the Head et al. (2010, Table A4) classification of colonizers and colonized territories. Independence events in their view extend as far back as 1900 and include middle and upper income countries that emerged out of the ruins of empires after World War I and the breakup of the Soviet Union in 1991. We are most interested in the developing countries that became independent after 1945, which are also the focus of the literature on decolonization and its impacts (see the essays in Jansen and Osterhammel (2017)). More information about the independence dates of the exporter countries in our data can be found in Appendix Table A1.

<sup>13</sup>Robertson and Singleton (2001) note that the Commonwealth Preference Area was dissolved in 1977.

<sup>14</sup>We use information about the GSP of Australia, Canada, the EC, Japan, New Zealand, Norway, Switzerland, and the United States.

<sup>15</sup>For this reason, the PTA variable has only few non-zero observations and mainly switches on for a PTA between Yugoslavia and a few cocoa producing countries in the period 1973-1990.

both signatories to the International Cocoa Agreement then in effect and zero otherwise. Participation in the ICCA is expected to have, if any, a positive effect on cocoa trade flows from the exporter to the importer.<sup>16</sup>

A set of additional controls includes the country-pair specific variables that capture the influence of geographical distance ( $DIST_{od}$  with an expected negative effect), common language ( $COMLANG_{od}$  with expected positive effect), and common borders ( $COMBORD_{od}$  with expected positive effect). These variables drop out if country-pair specific fixed effects are introduced into the estimation equation.

We estimate another set of regressions (Pair) that account for time-invariant country-pair influences using country-pair specific fixed effects  $\mu_{od}$ . The fixed effects may also absorb other influences specific to an exporter-importer pair that are not accounted for in equation (2). Incorporating fixed effects into the regressions will also mitigate the effects of endogeneity in some of our variables, particularly those related to trade policy (Baier and Bergstrand, 2007; Yotov et al., 2016; Baier et al., 2018). For our analysis of cocoa trade flows, the countries included as importers and exporters in the various preferential agreements are not selected randomly. Instead, the existence of current or former colonial ties was a key determinant of membership. Given this, and in order to obtain estimates closer to reality, the inclusion of these fixed effects is justified. The new Pair estimation equation (corresponding to (2)) is then:

$$\begin{aligned} X_{odt} = & \exp[\omega_{ot} + \varphi_{dt} + \mu_{od} + \beta_1 CUR\_COL_{odt} + \beta_2 CPA_{odt} + \beta_3 ASSOC_{odt}] \times \\ & \exp[\beta_4 YAOUNDE_{odt} + \beta_5 LOME_{odt} + \beta_6 GSP_{odt} + \beta_7 GATT_{odt}] \times \\ & \exp[\beta_8 PTA_{odt} + \beta_9 ICCA_{odt}] \times \epsilon_{odt}. \end{aligned} \quad (3)$$

To probe more deeply into the importance of colonial ties for trade in cocoa, we estimate another set of equations that include the interaction of preferential trade agreements captured by the variables  $CPA_{odt}$ ,  $ASSOC_{odt}$ ,  $YAOUNDE_{odt}$  and  $LOME_{odt}$  with the colonial relationship dummy  $EVER\_COL_{od}$ . The coefficients on the interaction terms allow us to identify whether a former direct colonial relationship reinforces the advantage of Commonwealth and EEC/EC trade preferences (for example cocoa exports from Côte d'Ivoire to France after 1959), or whether it is the trade preferences alone that matter (for example cocoa exports from Côte d'Ivoire to Germany). This alternative specification augments both the Base and Pair specifications (eqs. (2) and (3)). We provide detail in the case of the Base specification (eq. (2)), but the specification would be equivalent for eq. (3), which includes pair fixed effects in place of time invariant country-pair variables.

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<sup>16</sup>The signatory countries of each International Cocoa Agreement were identified using the information from the UN Secretary General (1995) treaties collection.

$$\begin{aligned}
X_{odt} = & \exp[\omega_{ot} + \varphi_{dt} + \mu_1 \ln DIST_{od} + \mu_2 COMLANG_{od} + \mu_3 COMBOR_{od}] \times \\
& \exp[\mu_4 EVER\_COL_{od} + \beta_1 CUR\_COL_{odt} + \beta_2 CPA_{odt} + \beta_3 ASSOC_{odt}] \times \\
& \exp[\beta_4 YAOUNDE_{odt} + \beta_5 LOME_{odt} + \beta_6 GATT_{odt} + \beta_7 GSP_{odt}] \times \\
& \exp[\beta_8 PTA_{odt} + \beta_9 ICCA_{odt}] \times \\
& \exp[(\beta_{10} CPA_{odt} + \beta_{11} ASSOC_{odt}) \times EVER\_COL_{od}] \times \\
& \exp[(\beta_{12} YAOUNDE_{odt} + \beta_{13} LOME_{odt}) \times EVER\_COL_{od}] \times \epsilon_{odt}
\end{aligned} \tag{4}$$

Consider the case of the Yaoundé Agreement as an example. The estimated total effect of the agreement on cocoa imports from Côte d'Ivoire into France would be calculated as  $\exp(-\beta_1 + \beta_4 + \beta_{12}) - 1$ , whereas the effect on Germany's imports of cocoa from Côte d'Ivoire's would be simply  $\exp(\beta_4) - 1$ .

For comparison with other studies, we also estimate OLS versions of the Base and Pair specifications of the empirical models despite justified concerns about the validity of a log-linear specification. The reasons for this are given below. In its log-linear version, the Base specification (eq. (2)) is

$$\begin{aligned}
\ln(X_{odt} + 1) = & \omega_{ot} + \varphi_{dt} + \mu_1 \ln DIST_{od} + \mu_2 COMLANG_{od} + \mu_3 COMBOR_{od} + \\
& \mu_4 EVER\_COL_{od} + \beta_1 CUR\_COL_{odt} + \beta_2 CPA_{odt} + \beta_3 ASSOC_{odt} + \\
& \beta_4 YAOUNDE_{odt} + \beta_5 LOME_{odt} + \beta_6 GATT_{odt} + \beta_7 GSP_{odt} + \\
& \beta_8 PTA_{odt} + \beta_9 ICCA_{odt} + \epsilon_{odt}.
\end{aligned} \tag{5}$$

where the import value  $X_{odt}$  and the geographical distance  $DIST_{od}$  are in logs. Similarly, the Pair specification (eq. (3)) becomes

$$\begin{aligned}
\ln(X_{odt} + 1) = & \omega_{ot} + \varphi_{dt} + \mu_{od} + \beta_1 CUR\_COL_{odt} + \beta_2 CPA_{odt} + \beta_3 ASSOC_{odt} + \\
& \beta_4 YAOUNDE_{odt} + \beta_5 LOME_{odt} + \beta_6 GATT_{odt} + \beta_7 GSP_{odt} + \\
& \beta_8 PTA_{odt} + \beta_9 ICCA_{odt} + \epsilon_{odt}.
\end{aligned} \tag{6}$$

Note that for both the Base and the Pair specifications estimated using OLS, we add one to the import value of all observations, not just to the zero trade flows. This normalizes the dependent variable to 0 for zero trade flows. Although this approach permits inclusion of the zero trade observations in the regressions, it comes at the cost of generating some bias in the estimated coefficients (Santos Silva and Tenreiro, 2006). Reporting results using the OLS log-linear specification does allow for a straightforward interpretation of the results, which can be compared with older studies that used only a log-linear OLS specification. We also report the results for alternative versions of eq. (5) and eq. (6) that include the interactions with the variable  $EVER\_COL_{od}$  (as in eq. (4)).

The reader should note that we leave the notation for the different fixed effects, coefficients, and error terms in the different model specifications unchanged for ease of notation and comparison.

## 4 Data Description

This study draws on two main sources for the empirical analysis of the bilateral trade flows between cocoa producers and cocoa importers during the period of this study: 1951 to 1999. For the years 1951 through 1961, we digitized the bilateral trade data prepared by the Statistical Office of the United Nations (UN) (UN Statistical Office, 1961) that are found in the printed volumes of the *Commodity Trade Statistics*. For the period 1962-1999, we used the standard source for detailed bilateral trade data, the UN Comtrade database (UNDESA, 2023, 2025). Since data from the pre-1962 printed volumes are only reported at the three-digit level, we use the three-digit SITC 072 for the entire study period. This category includes cocoa beans (raw or roasted) and three intermediate products: cocoa powder (unsweetened), cocoa paste and cocoa butter. SITC 072 excludes all other chocolate products. We aggregate the data from Comtrade to the three-digit level to ensure comparability across the entire study period.<sup>17</sup>

In order to follow the theory closely, the measured annual trade flows of cocoa from the exporting country (origin  $o$ ) to the importing country (destination  $d$ ) during the year should also include bilateral trade costs. We mainly use trade data from the importer, which tends to be more accurate than data from the exporter. Imports are measured on a cost, insurance, and freight (cif) basis in current US dollars. However, we also include a limited number of freight on board (fob) trade flows in two instances. The first case is when the importer did not report any cif value after 1961 from a given exporter, but the exporter did report an export to the importer as fob values.<sup>18</sup> The second case is when the importer only reports its imports as fob values.<sup>19</sup> Despite the possible differences between the fob and cif values, we include fob trade flows in the dataset without any further transformation. They still provide relevant information and should not be assumed as zeroes or missing observations. Including country-year fixed effects in the estimating equations should mitigate any possible effects arising from the difference between cif and fob variables for the period 1951 to 1961. Robustness tests are also performed to check the impact of the inclusion of fob observations on the estimation results.

Inclusion of data from the printed volumes of the *Commodity Trade Statistics* allows us

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<sup>17</sup>For the years 1951 to 1959, the observations were reported using the original version of the SITC. In subsequent years, SITC Rev. 1 is used. Fortunately, the revision did not alter the composition of cocoa products included in SITC 072.

<sup>18</sup>This problem does not occur frequently in the UN Comtrade database (UNDESA, 2023, 2025), but affects some trade flows of a variety of importers and exporters throughout the entire period from 1962 onwards without any clear country or time pattern. During the period 1962 to 1999, the top-three importers with a considerable share of non-reported import flows are the Netherlands, Belgium and the United Kingdom, and the top-three exporters are Malaysia, Mexico and Saint Vincent and the Grenadines.

<sup>19</sup>The trade data in the printed volumes of the UN Statistical Office (1961) from the United States, Canada, Australia and New Zealand are all reported in fob terms.

to test more robustly the impact of decolonization on trade flows, since most exporters in Africa and the Caribbean were colonies prior to 1960. Expanding the period of analysis back to 1951 does have three potential drawbacks: coverage of importing countries expanded slowly through the 1950s, import values were left-censored through 1961, and aggregation of exports across groups of exporting countries was necessary to maintain a consistent panel.

The task of compiling trade data from member countries of the UN that consistently reported according to the SITC (rather than individual country rubrics) was a work in progress in the early 1950s. As Appendix Fig. A1 shows, the coverage of UN-compiled statistics gradually expanded through 1962, the first year covered by the Comtrade dataset. Separate data from FAO (1958, 1962, 2023) reveal that the importing countries that were included in the sample data through 1961 accounted for 86 to 89 percent of all imports. That is at or above the share covered by the Comtrade data. The exporting countries included in the pre-1962 sample accounted for 95 to 97 percent of cocoa bean exports, which is similar to the 96 percent in the first year for which Comtrade data are available (1962).<sup>20</sup>

The left-censoring of import values in the pre-1962 bilateral data raises a second concern. During the 1950s, bilateral imports of under \$(US)10 thousand were excluded from the detailed reporting of the origin of imports (although they were included in the total for a particular destination). That threshold was raised to \$100,000 for 1960 and 1961 and then apparently lowered to \$1,000 for 1962 and thereafter. The minimal censoring from 1962 onwards is likely a by-product of the shift to distributing the compiled data in machine-readable form. Appendix Fig. A1 illustrates the potential adverse impact of left-censoring practiced during 1960 and 1961 on the recording of imports (and exports). All imports were recorded during these years, but the substantial reporting threshold meant that data from origin countries would often be grouped together. Positive bilateral observations available for analysis dropped from about 210 in 1959 down to 130 during 1960/61. We calculated the proportion of total imports by value for which the origin was not identified for all of our destination countries. The median proportion rose only slightly from four percent in 1959 to six percent in 1960. The gap in coverage leads us to be more cautious about the results for the Association Agreement, which was in effect during the period of transition from printed to digital reporting. Robustness tests to control for the censoring are discussed below. They suggest that the coverage gap did not materially affect the results.<sup>21</sup>

Finally, extending the panel of bilateral trade data back to 1951 so that it included the

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<sup>20</sup>Importing countries missing in the early 1950s included Spain, Switzerland, Israel, Australia and New Zealand. The Spanish colony of Equatorial Guinea, which exported cocoa, is also missing through the early 1960s.

<sup>21</sup>Unfortunately, national trade statistics typically offer even less detail on bilateral trade by commodity and country of origin than the UN Commodity Trade data.

trade of European colonies required aggregating observations for some countries that became independent during the sample period. We follow the approach of Lavallée and Lochard (2015, p. 616) and group countries together into colonial-era polities, thus allowing for consistent reporting of imports by country of origin. Fig. 1a illustrates the main colonial territories ca. 1951 with the borders of the independent countries that they included. The most important colonies involved in the cocoa trade included French West Africa (8 independent countries), French Equatorial Africa (4 countries) and Belgian Africa (3 countries).<sup>22</sup>

Additional variables included in our data come from the gravity data set (version 2021-02) available from the Centre d'Études Prospectives et d'Informations Internationales (CEPII) website.<sup>23</sup> The CEPII data set provides the population-weighted distance between the exporter and the importer as of 2004:  $DIST_{od}$ . Measured in kilometers, this variable weighs the distance by the most populated cities of countries  $o$  and  $d$ .<sup>24</sup> Two dummy variables also capture geographic or linguistic proximity:  $COMBORD_{od}$  (for a common border) and  $COMLANG_{od}$  (for a common official language). The various trade and commodity agreements in force during the sample period have been discussed in detail in Section 3.

Aggregating independent countries into the boundaries of the predecessor colonial territories required a few modifications of some of the time-invariant variables. Not all countries of a colonial entity share the same date of independence, the same access to GSP treatment, or the same bilateral distance with a specific trade partner. To address this issue, we simply used the average value of each continuous variable of the countries that formed a colonial territory.<sup>25</sup> In the case of dummy variables, we followed a similar approach. If the average was greater than or equal to 0.5 within the group, we assigned the variable a value of one. Otherwise, it took on a value of zero.

We restricted our dataset in two ways. First, we excluded exports from developed countries, such as the Netherlands, which exported products in SITC 072 but did not actually produce cocoa beans. Their exports were semi-finished intermediate goods such as cocoa powder or cocoa butter, which would be used to manufacture chocolate for commercial or consumer use.<sup>26</sup>

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<sup>22</sup>See Appendix Table A2 for more detail on the countries that were included in colonial territories. The French West Indies and Windward Islands were also exporters of cocoa. In practice, the geographic concentration of cocoa production meant that at most two countries actually exported cocoa from each territory. For example, Côte d'Ivoire and Togo accounted for virtually all cocoa production in the colonial territory of French West Africa.

<sup>23</sup>See CEPII (2021), Head and Mayer (2014), and Mayer and Zignago (2011) for more details on these variables.

<sup>24</sup>For the small number of country pairs for which this measure was missing, we use the unweighted bilateral distance from the CEPII data set.

<sup>25</sup>For example, we have imputed a bilateral distance between Belgium-Luxembourg and the former Belgian Congo of 6,431.98 km. This is the average bilateral distance between Belgium and Burundi (6,495.07 km), the Democratic Republic of Congo (6,436.49 km) and Rwanda (6,364.38 km).

<sup>26</sup>FAO (2023), FAO (1958), and FAO (1962) provide comprehensive data on the production of cocoa

The other restriction on the sample aims to include only those exporter-importer pairs where there was evidence that trade was possible, even if it did not take place. For a given year, we identified potential exporters as those with exports to any destination. We included importers for whom at least one country of origin could be identified in the trade data. The country pairs in the intersection of these two sets were included for that year in the sample. From Appendix Fig. A1, we can see that about one-third of the annual observations include positive trade flows over the entire sample period. The alternative to our selective approach would expand the matrix of country pairs to all possible trading partners in all years and add only observations with zero trade flows. The fixed effect specification used in the “pair” regressions would likely lead to dropping many of the observations with zero trade in any event because of collinearity.

Our unbalanced panel dataset of international trade in cocoa includes 25 importing countries and 44 exporting countries and colonial polities for the period 1951-1999. Figures 1a and 1b identify the 44 producers of cocoa beans in our sample. Table 1 provides details on the properties of the dataset. As is typical for highly disaggregated trade flows at the commodity level, about 30% of the 43,258 observations are nonzero. The large share of zero trade flows is one of several reasons why the literature has moved away from log-linearization and linear regression estimation of the gravity model and turned instead to Poisson Pseudo Maximum Likelihood (PPML) estimation (Santos Silva and Tenreyro, 2006).

## 5 Empirical results

### 5.1 Main specifications

In this section, we present and discuss the main results from the estimation of equations (2) through (6). The estimated coefficients measure the impact of the unilateral and preferential trade arrangements that influenced the trade in cocoa between developing country producers and industrialized consumers during the sample period of 1951 through 1999. The results from the two sets of specifications suggest that trade preferences that the EEC/EC and Commonwealth countries accorded cocoa-producing colonies that subsequently became independent had two distinct impacts. The first specification, for which results are presented in Table 2, focuses on the overall impact of the agreements on the cocoa trade of the two trading blocs: the CPA and the EEC/EC. The results suggest that some agreements had a strong positive impact on trade. The second set of results, which are presented in Table 3, address the question of whether preferential agreements could offset the negative impact of independence on trade between the former

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beans by country for the study period. Imports from countries that at some point exported cocoa products under SITC 072, but do not appear in FAO data as producers of cocoa beans, are included in some of our robustness tests.

colony and the colonizer. In most cases, but not all, the agreements offset the adverse impact of independence on trade between the former colony and its colonizer. Maybe surprisingly, preferential agreements enhanced the trade between the colonized territories and third countries that were subject to the agreements. We note that the standard errors shown in this section are clustered by country pair to account for the panel structure of our data, as recommended in Egger and Tarlea (2015).

### 5.1.1 Base specification

The findings in column (1) of Table 2, which are based on equation (2), reveal a statistically significant and substantial impact of preferential agreements on exports of cocoa to the EEC/EC from signatories of the three agreements in place between 1957 to 1999: the Association Agreement (1957-1963), the Yaoundé Agreement (1964-1974), and the Lomé Convention (1975-1999). The average treatment effects of the agreements on exports towards the EEC/EC found in column (1) of the table imply that they boosted exports from signatory territories/countries by factors of  $\exp(1.033) = 2.8$  (Association),  $\exp(2.227) = 9.3$  (Yaoundé), and  $\exp(1.341) = 3.8$  (Lomé). In contrast, the coefficient on the variable  $CPA_{odt}$  is positive, but markedly smaller and insignificant. The preferences granted to Commonwealth members exporting cocoa to the United Kingdom, Canada, Australia and New Zealand apparently had little average impact on cocoa bean exports. The estimated impact of being an exporter that is a signatory of the ICCA ( $ICCA_{odt}$ ) is positive and significant. The increase is about  $\exp(0.595) - 1 = 0.81$ , which we note is much smaller than the impact of the EEC/EC agreements. As will be seen below, alternative specifications and robustness tests confirm these initial results, but usually with a reduction in the size of the effects.

Surprisingly, other trade policy instruments employed to grant better access to importers' markets apparently had little impact. Variables for inclusion in the Generalized System of Preferences (GSP) list of importers ( $GSP_{odt}$ ), signing the GATT ( $GATT_{odt}$ ) or signing a bilateral preferential trade agreement ( $PTA_{odt}$ ) are not statistically significant. One explanation for this result would be that GSP, GATT and PTAs during the study period typically focused on the liberalization of trade in industrial goods. Moreover, some countries, such as the United States, routinely excluded commodities from the eligibility list if the respective exporting country contributed a significant amount of exports in this commodity (competitive need limitation, see Devault (1996)).

As expected from the literature on trade and decolonization, colonial ties and their rupture play an important role in explaining cocoa trade flows. The significant coefficient on the variable  $EVER\_COL_{od}$  implies a fourfold increase in imports from a current or former colony to the metropole.<sup>27</sup> As argued by Mitchener and Weidenmier (2008), one

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<sup>27</sup>We note  $EVER\_COL_{od}$  only applies to exporting countries that achieved independence after 1945.

would expect that an ongoing colonial relationship would imply even larger exports from a country sharing a colonial experience with the importer. The positive and statistically significant coefficient on the  $CUR\_COL_{odt}$  confirms this perspective. The direct impact of  $CUR\_COL_{odt}$  implies that cocoa bean exports from a colony to its own colonizer were  $\exp(1.113) = 3$  times higher than would be the case after independence. That finding is consistent with Head et al. (2010) in their analysis of post-independence trade. It is also clear from a comparison of the coefficients on  $EVERCOL_{od}$  and the (negative of the) coefficient on  $CUR\_COL_{odt}$  that independence does not entirely offset the positive impact of historical colonial ties [ $\{\exp(1.404 - 1.113) - 1\} \times 100\% = 34\% > 0$ ]. We also note that the estimated coefficients on the different EEC/EC trade arrangements (Association, Yaoundé, and Lomé) all more than offset the negative independence effect.<sup>28</sup>

The coefficients on the other covariates presented in column (1) of Table 2 generally have the expected sign, but not all are statistically significant. An increase of 10% in bilateral distance reduces exports by 7.5%, which is below the unit elasticity predicted by the more naive version of the gravity model; that value is also below the mean value found in the meta-analysis of Head and Mayer (2014, p. 160). The coefficients on a common official language or a common border are positive, but not statistically significant. Because of the geography of producing and consuming countries, only the country pair Mexico and the United States shares a common border.

Results from using the log-linear OLS specification of equation (5), which are presented in column (3) of Table 2, mirror those found using the PPML specification. One difference is that the absolute value of the statistically significant coefficients is larger in the OLS specification.<sup>29</sup> The other is that some variables capturing preferential trade agreements, including those for the CPA and the GSP, are now positive and significant.

As already mentioned, one of the objectives of reporting the OLS estimates is to serve as a point of comparison with older studies. Therefore, we will not spend much time commenting on the OLS results.

### 5.1.2 Pair-fixed effect specification

We now add the country-pair fixed effects to equation (2) to control for any time-invariant factors between trading partners that may affect trade flows. As discussed previously, these fixed effects also mitigate the effects of endogeneity in some of our variables, particularly those related to trade policy (Baier and Bergstrand, 2007; Yotov et al., 2016;

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<sup>28</sup>Here we are defining the independence effect only as the *negative* value of the  $CUR\_COL_{odt}$  coefficient.

<sup>29</sup>That the OLS specification yields larger coefficients is not unusual although in principle, the interpretation of the coefficients in the PPML model and the log-linear OLS model is the same. For example, in case of an explanatory dummy variable  $x$  with coefficient  $\beta$ , the effect of  $x = 1$  vs.  $x = 0$  on the dependent variable  $y$  equals  $e^\beta - 1$  in both models. However, the dependent variable  $y$  was altered in the log-linear model by adding 1, which could influence the size of the estimated coefficients (Santos Silva and Tenreyro, 2006).

Baier et al., 2018). The disadvantage is that the time-invariant variables in the Base specification such as  $EVER\_COL_{od}$  are dropped because of collinearity.

The estimated coefficients for the model with pair-fixed effects are shown in columns (2) (PPML) and (4) (OLS) of Table 2. The inclusion of country-pair fixed effects yields smaller coefficients on the three EEC/EC agreements when compared with the results in column (1), but the coefficients on the Yaoundé and Lomé agreements are still sizable and statistically significant. The positive and significant impact of the Association Agreement disappears, which points to a strong country-pair specific effect of this agreement. For the signatory countries, the estimated coefficient for the Yaoundé Agreement implies an almost quadrupling of exports ( $\exp(1.331) = 3.8$ ) and the coefficient on the Lomé Convention implies a tripling of exports ( $\exp(1.092) = 3$ ). The coefficient on the International Cocoa Agreement variable is smaller in comparison to the result in column (1); it is positive, but not significant. The impact of an ongoing colonial relationship resembles the result reported in column (1). The story is similar for the estimation of equation (6) in column (4). Preferences granted by the Yaoundé and Lomé agreements increase cocoa exports to EEC/EC members.

Although the effects of Yaoundé and Lomé are very large and significant in statistical and economic terms, they cannot be interpreted without considering the effects of the independence of the EEC/EC colonies. Taking the effects shown in column (2) of Table 2 as a baseline, the Yaoundé and Lomé agreements would have more than tripled cocoa exports to EEC/EC members. That might make sense for country pairs that had no direct colonial ties, but it would be counterintuitive for those with direct colonial ties, especially given the empirical evidence in the literature on the negative effect of independence on bilateral trade flows and even our own results for the  $CUR\_COL_{odt}$  variable. To reconcile these results with those in the literature, it is useful to look at the combined impact of decolonization and trade preferences. The predicted impact from the regression results suggests that the first two EEC/EC preferential agreements more than offset the impact of decolonization. We see that result by simply adding the negative value of the coefficient on  $CUR\_COL_{odt}$  and e.g. the  $YAOUNDE_{odt}$  coefficient and then taking the exponential value. The result is about 17 percent *more* trade ( $\exp(-1.176 + 1.331) - 1 = 16.8\%$ ). Figures 4 and 5, which provide information on the import ratios for France and Belgium, provide some support for such an offsetting effect. The relative share of imports from their former colonies remained unchanged from their independence in 1960 through the end of the Yaoundé agreement in 1974. Despite the insignificant coefficient on the CPA variable, Figure 6 for the United Kingdom suggests that there was similarly little change in the dominance of cocoa imports from its former African colonies of Ghana and Nigeria after they became independent in 1957 (Ghana) and 1960 (Nigeria).

For the remaining EEC/EC members without post World War II colonial ties, the effect implied by the coefficient of  $YAOUNDE_{odt}$  would be a tripling of exports. For Germany,

the Netherlands and Italy, Figures 7 through 9 suggest that the surge of imports from the former African colonies of France and Belgium began when both the Common External Tariff (CET) and the Yaoundé agreement became fully effective in 1964. To the extent that metropolitan interests continued to be involved in the trade of former colonies, they would benefit further from the extension of preferential treatment to all EEC/EC members. This will be discussed in more detail below.

### 5.1.3 Allowing for differential impacts of preferential agreements

The specification used in Table 2 has one drawback. The impact of tariff preferences provided to the exports of a former colony may have depended upon whether the importing country was the former colonizer or another developed country. The regressions in Table 3, which include all four base and pair specifications used in Table 2, address this issue with the addition of interaction terms between the dummy variable *EVER\_COL* and each of the four preferential regimes (Association, Yaoundé, Lomé, and the CPA).<sup>30</sup> Table 3 provides the results of including these interaction terms. Striking differences emerge between the impact of preferential agreements on exports to a country's former colonizer and exports to other signatories. The interaction term for each EEC/EC agreement is highly significant and positive in the PPML base results reported in column (1) and in itself more than offsets the measured impact of independence, except in the Lomé case. Once we add on the impact of the coefficients that measure the direct impact of the EEC/EC agreements, it becomes clear that all three EEC/EC agreements more than offset the negative effects of independence. The coefficients from the baseline pair specification reported in column (2) for the interaction with the Association and Yaoundé agreements mirror those in column (1). In contrast, the coefficient on the Lomé interaction is now statistically zero. The benefit to former colonial powers was the same as to all members of the EC/EEC.

The PPML results for the Commonwealth Preference Area (CPA) tell a different tale than those for the EEC/EC. In the pair specification, the interaction term is significantly negative. The preferences granted by the former dominions of Canada, New Zealand and Australia prompted more imports from CPA members, but preferences granted by the UK did not increase imports from countries with a historical colonial tie. In fact, the aggregate effect for the UK appears negative, at least in the pair FE specification of column (2).

The signs on the significant coefficients in the OLS specifications presented in columns (3) and (4) of Table 3 are mainly similar to the PPML results. In all, in column (4) (OLS pair FE), fewer coefficients are significant than in column (2) (PPML pair FE).

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<sup>30</sup>The interaction term  $EVER\_COL_{od} \times CPA_{odt}$  is applied to imports into the United Kingdom, Canada, Australia and New Zealand.

Table 4 summarizes the evidence on whether preferential trade agreements were sufficient to offset the impact of decolonization on cocoa exports to the former colonizer. Drawing on the results in Table 3, the coefficients in each column provide the joint influence of the (negative) coefficient on *CUR\_COL*, the coefficients on the respective preferential agreement, and the interaction terms. Standard errors for coefficients are estimated using the delta method. The first post-independence accord, the Yaoundé Agreement, has a large positive and significant effect in both the PPML base and pair specifications (columns (1) and (2)). The Yaoundé Agreement thus increased cocoa exports to France and Belgium from their former colonies. The EEC Association Agreement, which spanned the period of decolonization, and the Lomé Convention have a positive and significant impact in the base specification, but no impact in the pair specification. The joint impact of a colonial relationship, independence, and the CPA on cocoa imports into the United Kingdom is negative and significant in the PPML pair FE specification.

Overall, the PPML results indicate that the EEC/EC preferential agreements enacted after decolonization increased cocoa exports for countries not linked via a former colonial relationship. They were only effective at increasing cocoa trade between former EEC/EC colonizers and their former colonies during the first decade that the Common External Tariff was in place. At the same time, the results for the period of the Lomé Convention (1975 through 1999) suggest that this agreement was successful in canceling the predicted sharp reduction in exports that would have resulted from decolonization.

The results for exporters that were members of the Commonwealth offer a notable contrast. The estimated coefficients indicate that the preferences granted to cocoa exporters that were members of the CPA did not offset the negative impact of decolonization on cocoa exports to the UK. However, the positive and significant coefficient on *CPA* reported in Table 3 suggests that the CPA did promote cocoa trade between importers not involved in a metropole-colony relationship.<sup>31</sup>

Reported in column (3) of Table 4, the signs and significance for the EEC/EC agreements are qualitatively similar in the base specification using OLS compared to the PPML result, but the effects are typically less precisely estimated. And finally, none of the coefficients in column (4), which presents the OLS pair specification, is significant. This result is not all that surprising since the pair-fixed effects presumably absorb much of the impact of developments for which the time dimension is rather weak.

## 5.2 Robustness tests

This section reports the results of a battery of robustness checks for the main finding that EEC/EC trade agreements substantially boosted imports from the signatory cocoa

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<sup>31</sup>The interaction between the variables *EVER\_COL* and *CPA* also includes Australia and Papua New Guinea as a metropolis-colony pair. However, the total effects of *CPA* are likely to be driven by the relationship between the UK and its former colonies.

producing countries. The various tests use the PPML specification with pair fixed effects in equation (3) as a baseline. The original results for the “pair” version are reported in column (2) of Table 2.<sup>32</sup> Robustness test results are presented in Tables 5 and 6. The first six tests address issues of sample composition that arise from the imputation of zeroes and some differences in reporting between the two data sources. The remaining four tests focus on parameter stability, an alternative specification of the dependent variable and expanding the sample to include all countries that appear as exporters in SITC 072.

We first compare the effect of imputing zeros for country pairs with non-positive reported trade values during years when trade between them was possible. We thus re-estimate equation (3) using only bilateral observations with strictly positive trade values. The results presented in column (1) of Table 5 qualitatively confirm our main results for the Yaoundé and Lomé preferential agreements. The estimated coefficients are similar to the main estimates of equation (3). The estimated impact of the contemporaneous colonial relationship effect is still very significant, but smaller in absolute size.

About eight percent of the positive observations in the data set use fob (free on board) values rather than the cif values standard for import data. In a direct comparison between cif and fob values for the same pair of trading countries and trade direction, cif values are expected to be larger than fob values for the importer.<sup>33</sup> The fob values are included in our data for two main reasons. First, we do not want to exclude data in cases where countries consistently reported a substantial share of trade flows in fob values. This was the case for the USA, Australia and Canada prior to 1962. In principle, the year-country pair fixed effects should absorb the impact of fob values during this time period. We also thought it advisable to fill in the missing trade observations when cif values are not available in the Comtrade data for 1962 and thereafter, instead of assuming that they are equal to zero. The absence of cif values in the Comtrade data lack a consistent pair time-invariant or exporter-time or importer-time structure, so that the included fixed effects in our estimation equations may not take care of the measurement issue.<sup>34</sup> Using the baseline specification, we included a dummy variable  $FOB_{odt}$  equal to one (and zero otherwise) for the observations measured with fob rather than cif values to test for the impact of differences in measurement. Found in column (2) of Table 5, the positive and statistically significant coefficient on  $FOB_{odt}$  offers evidence that the measure of trade flows matters.<sup>35</sup> The other estimated coefficients are close to the baseline results. Given

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<sup>32</sup>Results of the robustness tests for the log-linear specification with fixed effects (eq. (6)) are available upon request.

<sup>33</sup>On some occasions, this is not the case. For example, there may be errors in customs valuations. This can also happen in cases of undervaluation of imports, as examined in Bhagwati (1974) for the case of Turkey.

<sup>34</sup>It is beyond the scope of this research to explain the nature of these missing values, whether cif or fob. In principle, both the exporting and importing countries should have records of the same transaction. This is not always the case, however. More on these differences and the reliability of trade statistics can be found in the works of Morgenstern (1974) and Bhagwati (1974).

<sup>35</sup>We remain agnostic about the proper interpretation of the coefficient, since its effect is calculated

this outcome, subsequent robustness tests will include the  $FOB_{odt}$  dummy variable.

As discussed in Section 4, the data set is based on two different sources: printed volumes through 1961 and the Comtrade dataset thereafter. Although the structure of the data is consistent between both sources, the number of reporting and partner countries and the extent to which the data were left censored differs between the two sources. Three robustness tests explore the sensitivity of the results to these differences. Appendix Fig. A1 illustrates the gradual expansion of coverage prior to 1962, when the Comtrade database becomes available. To rule out the possibility that the main results arise from differences between the two data sources, the next robustness test restricts the sample period to 1962-1999. The coefficients on the Yaoundé and Lomé agreements found in column (3) of Table 5 are very close to the baseline estimates. Other forms of trade agreements now also have a positive impact. If both trading partners were signatories of GATT, the estimated impact is an increase in trade by  $\exp(0.851) = 2.3$  times. In sum, the difference between the sources and the two periods used does not seem to drive our results for the Yaoundé and Lomé agreements. Although differences in the size of the estimates compared to the full sample exist, the results for the trading arrangements of interest are still qualitatively the same.

The last two columns in Table 5 address the left-censoring of the bilateral data on trade flows. For 1960 and 1961, the source identified bilateral trade partners only when imports exceeded 100,000 US dollars; the percentage of positive trade flows fell by one-fifth. To assess the impact of this censoring, we excluded the two problematic years from the regression. The results are presented in column (4) of Table 5. As an alternative robustness test, we applied the same censoring rule to all of the observations by setting all values less than 100,000 dollars to zero. Column (5) of Table 5 reports the results of that test. The coefficient estimates in both columns are close to the baseline estimates. Overall, these robustness tests seem to indicate that variations in the left-censoring of trade values do not affect our main results with respect to the Yaoundé and Lomé agreements.

A final concern that arises from combining data from the printed volumes with the standard Comtrade dataset is that the coverage of countries changed during the years 1951 through 1967. As Fig. A1 indicates, the left-censoring of 1960 and 1961 prompted a drop in the number of exporting countries by one third. The number of national statistical offices reporting trade data to the UN using the SITC classification grew slowly and only reached its maximum of 25 in 1967. To test for the importance of compositional issues, we estimate a panel that is restricted to importers and exporters for which trade data are available for all of the years 1951 through 1999.<sup>36</sup> The major drawback of this test is that the number of observations is only about one-fifth of the baseline specification. With

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with respect to the cif values and also against the zeros in the data. In any case, any prior expectation that the fob coefficient should be negative since fob values are by construction smaller than cif values does not turn out to be correct in our sample.

<sup>36</sup>Table A3 provides more information about this subsample.

fixed country-pair effects, the GATT variable needs to be omitted because of collinearity. As column (1) of Table 6 suggests, the main results remain intact; the Yaoundé and Lomé agreements, and now also the ICCA all prompted increased trade in cocoa for the signatories. A colonial relationship causes an increase in trade similar to that reported in Table 2, column (2).

Each of the three agreements that influenced the trade in cocoa during the period of this study was time-limited (typically five years) and thus subject to renegotiation. In fact, there were two Yaoundé Agreements, four Lomé Conventions and five ICCAs during our sample period. The baseline specification assumes parameter stability for the duration of each group of agreements. The coefficients thus represent average affects. The next test is to account for any “heterogeneous” effects by allowing for coefficients on the agreement variables to vary for each iteration of the respective agreement.<sup>37</sup> The results in column (2) of Table 6 show that the effects of the Yaoundé and Lomé agreements are positive and statistically significant. The coefficients on the other variables remain relatively unchanged in magnitude and significance. It is noteworthy that each version of the three agreements influences the trade in cocoa differently. For Yaoundé and Lomé, the coefficients on all versions are positive and significant. For the cocoa agreements (ICCA), the effects are heterogeneous. The coefficients on the second, third and fifth International Cocoa Agreements are positive and statistically significant.

The Wald tests in Table 7 offer another approach to testing parameter stability. They test pairwise hypotheses that the estimated coefficients of the different versions of each agreement are equal. In about three-quarters of the cases, the null hypothesis of equality is rejected. The coefficients on each version of the respective agreement are not statistically equal in size. For ease of exposition, we decided to continue with our original specification and thus the more parsimonious model. The qualitative results of the two versions of the model are virtually identical. In addition, our understanding of the agreements does not suggest a compelling reason to treat them separately.

The next robustness test (column 3 in Table 6) focuses on the likelihood that trade costs and other factors that affect bilateral trade flows were not constant over the fifty years covered by the study. Jacks et al. (2008) and Fouquin and Hugot (2016) have provided empirical evidence for this conjecture using the gravity model. A “globalization effect”, or the tendency of countries, in general, to trade more with each other over time, could account for some of the changes in trade flows. Bergstrand et al. (2015) show that when these effects are not taken into account, the estimated impact of trade agreements, and probably other variables, may be overstated. In this test, we allow the coefficient on the bilateral distance between trading partners to vary by year. This is one of the three methods used in Bergstrand et al. (2015) to capture the effects of globalization over

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<sup>37</sup>Using a single variable for each agreement would be equivalent to assuming that they were identical or that they had homogeneous effects on trade.

time in a gravity model framework.<sup>38</sup> The estimation results that include time-varying coefficients on distance are found in column (3) of Table 6. The coefficients on the Yaoundé and Lomé agreements and *CUR\_COL* are very close to the baseline results. Figure 10 graphs the estimated coefficients on distance with their confidence intervals; 1999 is the reference year. Yearly effects of distance on cocoa trade exhibit no significant time trend until the 1990s. Whether this result is due to the lack of intra-national trade flows in our data (Bergstrand et al., 2015) or whether cocoa trade costs really did not markedly decrease is not clear.

The final robustness tests address two specification issues. The dataset includes a large proportion of zero trade flows, potential censoring issues, and wide dispersion between the extreme (positive) values. Head and Mayer (2014, p. 179) and Feenstra (2016, pp. 176-177) suggest an alternative specification of the dependent variable that deals with zero trade flows: the import ratio. This measure is simply the ratio of bilateral imports over total imports in a year and is illustrated in Fig. 4 through Fig. 9.<sup>39</sup> Using the import ratio as the dependent variable should also mitigate the effects of large trade flows, since the dependent variable is now a share between 0 and 1. The results of this estimation, shown in column (4) of Table 6, are similar to our baseline results. The impacts of the Yaoundé and Lomé agreements are positive and significant. Also, now the ICCA variable is positive and significant at the 5% level.

The final test focuses on the composition of the sample. As described in section 4, only the forty countries that were at one time or another producers of cocoa beans are included as potential cocoa exporters in the sample used for analysis. This approach excludes the exports of about fifty non-producing countries that were exporting intermediate products of cocoa under SIC 072 during the sample period.<sup>40</sup> One example of this kind of exporter that unambiguously did not produce cocoa beans is Hungary. Adding these exporters increases the number of observations from 32,442 to 40,457. As can be seen from column (5) of Table 6, the expansion of the sample to include all exporters of products in SIC 072 does not lead to significant differences in the results.

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<sup>38</sup>One difference between the work of Bergstrand et al. (2015) and our analysis is that our data do not include intra-national trade flows / domestic consumption. Therefore, we cannot control for the decrease in bilateral trade costs with respect to domestic trade flows that may have occurred over time, as in their work. We do note that for most cocoa producers, intra-national trade flows would be on average small since most cocoa producers produce mainly for export. In any event, one should still be able to control for the relative evolution of international trade costs (measured by the bilateral distance) relative to a reference year, as we have done here.

<sup>39</sup>Head and Mayer (2014) and Feenstra (2016) use the market share (aggregate trade flow over importer GDP), not the import shares. We rely on the import shares because we do not have observations on the total cocoa production of our importers. However, this difference should be irrelevant, since the vast majority of cocoa importers in our sample do not produce cocoa. Therefore, the total expenditure on cocoa would be equal, or very close, to total cocoa imports.

<sup>40</sup>The third panel of Appendix Table A3 lists the "non-producer exporters."

## 6 Conclusion

This study investigates how the wave of decolonization in the second half of the 20<sup>th</sup> century and policy initiatives during that period influenced cocoa trade flows. We have focused on the question of whether trading arrangements meant to stabilize trade between industrialized countries on the one hand and developing cocoa producing countries on the other, such as the EEC/EC Association, Yaoundé and Lomé agreements, the Commonwealth Preference Area, the Generalized System of Preferences and the International Cocoa Agreements, were successful in reducing or even reversing the erosion of colonial trade ties brought about by independence (Head et al., 2010).

We have found that two key EEC/EC agreements of the post-colonial era—the Yaoundé Agreement and its successor, the Lomé Convention concluded with the ACP countries—were indeed successful in increasing cocoa trade between cocoa producing countries and their customers within the EEC/EC. The results for the EEC Association Agreement of 1957/58 were mixed. The British-led Commonwealth Preference Area was only successful at increasing exports from cocoa producing members of the Commonwealth into the former dominions, but not the United Kingdom. Surprisingly, the Yaoundé Agreement (1965-1974) more than offset the negative impact of independence on cocoa trade between former colonies and their colonizers and the Lomé Convention (1975-1999) just offset the negative impact of independence. For the other EEC/EC members, both post-independence agreements (Yaoundé and Lomé) raised cocoa imports from the signatory cocoa producing countries. The estimated effect of the International Cocoa Agreements, an UNCTAD initiative to foster and stabilize the cocoa trade, is smaller, less stable and depends on the individual agreement. When a significant impact is found, it is positive. We do not take a stance on whether maintaining the pattern of cocoa trade established under colonialism in the post-independence period would be good or bad per se. On the one hand, cocoa is, for many of its producers, an important cash crop with returns generally higher than growing food. Moreover, it offers job prospects for the rural population and prevents out-migration into urban areas that are often ill-equipped to cope with migrant inflows. On the other hand, a country’s continued reliance on cocoa production and cocoa exports often mainly benefits the big cocoa trading companies and not the local people working as cocoa smallholder entrepreneurs in e.g. West Africa, where employment conditions often do not meet even the most basic labor and environmental standards. The widespread use of child labor often constitutes a problem despite many initiatives to improve the lot of cocoa farmers, such as local cocoa farming cooperatives that focus on improving both productivity and working conditions. Moreover, it is also possible that the labor dedicated to cocoa production could potentially be used elsewhere more productively. And last but not least, as is true for most agricultural crops, income from cocoa production is intrinsically unstable due to its dependence on the weather and

the risk that disease or pest outbreaks could devastate crop yields.

Our results suggest that European trade policy following decolonization stabilized or even strengthened patterns of trade inherited from the colonial period and extended them to other European nations during the European integration process. Whether this outcome was beneficial for cocoa producing countries is a question beyond the scope of this analysis.

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## 7 Tables

Table 1: Summary statistics of the variables

|                          | Mean      | SD        | Min      | Max        | N      |
|--------------------------|-----------|-----------|----------|------------|--------|
| $X_{odt}^c$ <sup>1</sup> | 1,995.352 | 13,622.06 | 0.00     | 527,913.75 | 43,258 |
| $\ln X_{odt}^c$          | 12.927    | 2.58      | 6.22     | 20.08      | 13,409 |
| $\ln(X_{odt}^c + 1)$     | 4.007     | 6.15      | 0.00     | 20.08      | 43,258 |
| $DIST_{od}^2$            | 8,731.948 | 3,116.73  | 2,437.90 | 17,981.98  | 43,258 |
| $\ln DIST_{od}$          | 9.007     | 0.38      | 7.80     | 9.80       | 43,258 |
| $COMLANG_{od}^3$         | 0.145     | 0.35      | 0.00     | 1.00       | 43,258 |
| $COMBOR_{od}^3$          | 0.001     | 0.03      | 0.00     | 1.00       | 43,258 |
| $EVER\_COL_{od}^3$       | 0.026     | 0.16      | 0.00     | 1.00       | 43,258 |
| $CUR\_COL_{odt}^3$       | 0.006     | 0.08      | 0.00     | 1.00       | 43,258 |
| $CPA_{odt}^3$            | 0.023     | 0.15      | 0.00     | 1.00       | 43,258 |
| $ASSOC_{odt}^3$          | 0.004     | 0.07      | 0.00     | 1.00       | 43,258 |
| $YAOUNDE_{odt}^3$        | 0.010     | 0.10      | 0.00     | 1.00       | 43,258 |
| $LOME_{odt}^3$           | 0.112     | 0.31      | 0.00     | 1.00       | 43,258 |
| $GSP_{odt}^3$            | 0.434     | 0.50      | 0.00     | 1.00       | 43,258 |
| $GATT_{odt}^3$           | 0.568     | 0.50      | 0.00     | 1.00       | 43,258 |
| $PTA_{odt}^3$            | 0.009     | 0.10      | 0.00     | 1.00       | 43,258 |
| $COCOA_{odt}^3$          | 0.148     | 0.36      | 0.00     | 1.00       | 43,258 |
| $FOB_{odt}^3$            | 0.024     | 0.15      | 0.00     | 1.00       | 43,258 |
| $CIF_{odt}^3$            | 0.286     | 0.45      | 0.00     | 1.00       | 43,258 |

<sup>1</sup> in thousands of US dollars;

<sup>2</sup> population-weighted kilometers;

<sup>3</sup> dummy variable.

Table 2: Regression results for cocoa imports (SITC 072)

| VARIABLES        | (1)                  | (2)                 | (3)                  | (4)                 |
|------------------|----------------------|---------------------|----------------------|---------------------|
|                  | Base-PPML            | Pair FE-PPML        | Base-OLS             | Pair FE-OLS         |
| $\ln DIST_{od}$  | -0.745***<br>(0.186) |                     | -2.403***<br>(0.287) |                     |
| $COMLANG_{od}$   | 0.040<br>(0.207)     |                     | 0.357<br>(0.271)     |                     |
| $COMBOR_{od}$    | 0.292<br>(0.324)     |                     | 3.835***<br>(0.681)  |                     |
| $EVER\_COL_{od}$ | 1.404***<br>(0.250)  |                     | 4.748***<br>(0.768)  |                     |
| $CUR\_COL_{odt}$ | 1.113***<br>(0.267)  | 1.176***<br>(0.227) | 0.894<br>(0.831)     | 2.001**<br>(0.789)  |
| $CPA_{odt}$      | 0.499<br>(0.597)     | -0.033<br>(0.573)   | 1.310***<br>(0.473)  | 1.002**<br>(0.471)  |
| $ASSOC_{odt}$    | 1.033**<br>(0.473)   | -0.095<br>(0.295)   | 3.180***<br>(0.726)  | 0.862<br>(0.641)    |
| $YAOUNDE_{odt}$  | 2.227***<br>(0.382)  | 1.331***<br>(0.215) | 3.162***<br>(0.574)  | 1.660***<br>(0.421) |
| $LOME_{odt}$     | 1.341***<br>(0.232)  | 1.092***<br>(0.172) | 1.824***<br>(0.333)  | 0.901***<br>(0.273) |
| $GSP_{odt}$      | 0.124<br>(0.238)     | -0.011<br>(0.163)   | 1.990**<br>(0.985)   | 0.955*<br>(0.531)   |
| $GATT_{odt}$     | -0.042<br>(0.528)    | -0.315<br>(0.660)   | -0.069<br>(0.354)    | -0.149<br>(0.306)   |
| $PTA_{odt}$      | -0.468<br>(0.461)    | 0.200<br>(0.338)    | 0.506<br>(0.589)     | 0.793<br>(0.863)    |
| $ICCA_{odt}$     | 0.595***<br>(0.217)  | 0.140<br>(0.188)    | 0.759**<br>(0.335)   | 0.209<br>(0.264)    |
| Observations     | 43,258               | 32,442              | 43,258               | 43,258              |
| Exp-Year FE      | YES                  | YES                 | YES                  | YES                 |
| Imp-Year FE      | YES                  | YES                 | YES                  | YES                 |
| Exp-Imp FE       | NO                   | YES                 | NO                   | YES                 |
| R <sup>2</sup>   | 0.872                | 0.957               | 0.615                | 0.739               |

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

*Source:* Results of PPML and OLS estimation.*Notes:* The dependent variable in the PPML regressions is the current dollar value of imports (in thousands). The dependent variable in the OLS regressions is the the log of current dollar imports. Standard errors are clustered by country pair.

Table 3: Regression results for cocoa imports with interactions (SITC 072)

| VARIABLES                             | (1)<br>Base-PPML     | (2)<br>Pair FE-PPML | (3)<br>Base-OLS      | (4)<br>Pair FE-OLS  |
|---------------------------------------|----------------------|---------------------|----------------------|---------------------|
| $\ln DIST_{od}$                       | -0.725***<br>(0.189) |                     | -2.404***<br>(0.286) |                     |
| $COMLANG_{od}$                        | -0.221<br>(0.209)    |                     | 0.288<br>(0.267)     |                     |
| $COMBOR_{od}$                         | 0.243<br>(0.316)     |                     | 3.798***<br>(0.680)  |                     |
| $EVER\_COL_{od}$                      | 0.452<br>(0.288)     |                     | 3.805***<br>(1.212)  |                     |
| $CUR\_COL_{odt}$                      | 1.674***<br>(0.265)  | 1.239***<br>(0.164) | 1.507*<br>(0.910)    | 2.141***<br>(0.764) |
| $CPA_{odt}$                           | 1.041**<br>(0.508)   | 0.730**<br>(0.309)  | 1.562***<br>(0.545)  | 1.028**<br>(0.517)  |
| $EVER\_COL_{od} \times CPA_{odt}$     | 0.121<br>(0.607)     | -1.304**<br>(0.585) | -0.084<br>(1.303)    | 0.427<br>(1.081)    |
| $ASSOC_{odt}$                         | 0.927*<br>(0.486)    | -0.443**<br>(0.210) | 2.757***<br>(0.827)  | 0.433<br>(0.715)    |
| $EVER\_COL_{od} \times ASSOC_{odt}$   | 2.168***<br>(0.393)  | 1.776***<br>(0.367) | 2.888**<br>(1.389)   | 2.688***<br>(0.942) |
| $YAOUNDE_{odt}$                       | 2.164***<br>(0.378)  | 1.138***<br>(0.205) | 3.097***<br>(0.642)  | 1.645***<br>(0.467) |
| $EVER\_COL_{od} \times YAOUNDE_{odt}$ | 2.415***<br>(0.429)  | 1.640***<br>(0.383) | 1.216<br>(1.508)     | 0.639<br>(0.971)    |
| $LOME_{odt}$                          | 1.072***<br>(0.208)  | 1.044***<br>(0.144) | 1.713***<br>(0.337)  | 0.862***<br>(0.275) |
| $EVER\_COL_{od} \times LOME_{odt}$    | 1.525***<br>(0.352)  | -0.047<br>(0.390)   | 1.952<br>(1.283)     | 0.845<br>(0.887)    |
| $GSP_{odt}$                           | 0.108<br>(0.245)     | -0.035<br>(0.157)   | 1.989**<br>(0.988)   | 0.958*<br>(0.531)   |
| $GATT_{odt}$                          | 0.052<br>(0.548)     | -0.292<br>(0.611)   | -0.059<br>(0.354)    | -0.153<br>(0.306)   |
| $PTA_{odt}$                           | 0.011<br>(0.319)     | -0.247<br>(0.350)   | 0.567<br>(0.586)     | 0.831<br>(0.869)    |
| $ICCA_{odt}$                          | 0.386*<br>(0.209)    | 0.134<br>(0.184)    | 0.739**<br>(0.334)   | 0.206<br>(0.265)    |
| Observations                          | 43,258               | 32,442              | 43,258               | 43,258              |
| Exp-Year FE                           | YES                  | YES                 | YES                  | YES                 |
| Imp-Year FE                           | YES                  | YES                 | YES                  | YES                 |
| Exp-Imp FE                            | NO                   | YES                 | NO                   | YES                 |
| R <sup>2</sup>                        | 0.883                | 0.957               | 0.615                | 0.739               |

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Source: Results of PPML and OLS estimation.

Notes: The dependent variable in the PPML regressions is the current dollar value of imports (in thousands). The dependent variable in the OLS regressions is the the log of current dollar imports. Standard errors are clustered by country pair. Fixed effects omitted for brevity.

Table 4: Total effect of decolonization by preferential agreement

| VARIABLES              | (1)<br>Base-PPML    | (2)<br>Pair FE-PPML  | (3)<br>Base-OLS     | (4)<br>Pair FE-OLS |
|------------------------|---------------------|----------------------|---------------------|--------------------|
| <b>Trade agreement</b> |                     |                      |                     |                    |
| $CPA_{odt}$            | -0.512<br>(0.687)   | -1.813***<br>(0.636) | -0.0295<br>(1.393)  | -0.687<br>(1.361)  |
| $ASSOC_{odt}$          | 1.421***<br>(0.531) | 0.0938<br>(0.384)    | 4.138***<br>(1.311) | 0.980<br>(1.160)   |
| $YAOUNDE_{odt}$        | 2.905***<br>(0.486) | 1.538***<br>(0.363)  | 2.805*<br>(1.368)   | 0.143<br>(1.200)   |
| $LOME_{odt}$           | 0.923**<br>(0.420)  | -0.243<br>(0.422)    | 2.158<br>(1.316)    | -0.435<br>(1.154)  |

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

Source: Results of estimation in Table 3.

Notes: The total effect of decolonization is equal to the sum of the coefficients of  $\mathbf{agreement}_{odt}$  and  $EVER\_COL_{odt} \times \mathbf{agreement}_{odt}$  minus  $CUR\_COL_{odt}$ , where **agreement** refers to one of the four preferential trade agreements. The standard error is calculated using the delta method.

Table 5: Robustness tests for Cocoa - PPML, part 1

| VARIABLES                    | (1)<br>No zeros     | (2)<br>FOB          | (3)<br>62-99        | (4)<br>No 60-61     | (5)<br>Censoring    |
|------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| <i>CUR_COL<sub>odt</sub></i> | 0.779***<br>(0.158) | 1.174***<br>(0.226) | 1.258***<br>(0.386) | 1.211***<br>(0.250) | 1.217***<br>(0.255) |
| <i>CPA<sub>odt</sub></i>     | -0.086<br>(0.546)   | -0.044<br>(0.571)   | 0.396<br>(0.606)    | 0.022<br>(0.577)    | 0.033<br>(0.591)    |
| <i>ASSOC<sub>odt</sub></i>   | -0.267<br>(0.280)   | -0.037<br>(0.290)   | -0.070<br>(0.322)   | -0.261<br>(0.259)   | -0.243<br>(0.262)   |
| <i>YAOUNDE<sub>odt</sub></i> | 1.292***<br>(0.222) | 1.348***<br>(0.215) | 1.390***<br>(0.233) | 1.345***<br>(0.215) | 1.370***<br>(0.217) |
| <i>LOME<sub>odt</sub></i>    | 1.057***<br>(0.164) | 1.096***<br>(0.171) | 1.073***<br>(0.188) | 1.090***<br>(0.172) | 1.097***<br>(0.173) |
| <i>GSP<sub>odt</sub></i>     | -0.003<br>(0.161)   | -0.004<br>(0.163)   | -0.107<br>(0.182)   | -0.008<br>(0.165)   | -0.011<br>(0.165)   |
| <i>GATT<sub>odt</sub></i>    | 0.171<br>(0.434)    | -0.294<br>(0.659)   | 0.851***<br>(0.279) | -0.578<br>(0.892)   | -0.599<br>(0.949)   |
| <i>PTA<sub>odt</sub></i>     | 0.066<br>(0.302)    | 0.168<br>(0.349)    | 0.417<br>(0.423)    | 0.222<br>(0.355)    | 0.216<br>(0.362)    |
| <i>ICCA<sub>odt</sub></i>    | 0.110<br>(0.189)    | 0.129<br>(0.193)    | 0.045<br>(0.201)    | 0.126<br>(0.193)    | 0.122<br>(0.194)    |
| <i>FOB<sub>odt</sub></i>     |                     | 0.576**<br>(0.265)  | 0.509*<br>(0.290)   | 0.520*<br>(0.281)   | 0.503*<br>(0.293)   |
| Observations                 | 12,991              | 32,442              | 26,720              | 31,521              | 20,432              |
| Exp-Year FE                  | YES                 | YES                 | YES                 | YES                 | YES                 |
| Imp-Year FE                  | YES                 | YES                 | YES                 | YES                 | YES                 |
| Exp-Imp FE                   | YES                 | YES                 | YES                 | YES                 | YES                 |
| R <sup>2</sup>               | 0.956               | 0.957               | 0.958               | 0.957               | 0.956               |

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Source: Results of PPML estimation of the baseline regression.

Notes: Standard errors are clustered by country pair. Fixed effects coefficient estimates are omitted for brevity.

Table 6: Robustness tests for Cocoa - PPML, part 2

| VARIABLES                         | (1)<br>Sample       | (2)<br>Timing       | (3)<br>Yearly-Dist  | (4)<br>Imp-ratio    | (5)<br>Non-producers |
|-----------------------------------|---------------------|---------------------|---------------------|---------------------|----------------------|
| <i>CUR_COL</i> <sub>odt</sub>     | 1.194***<br>(0.238) | 1.117***<br>(0.217) | 1.169***<br>(0.231) | 0.825***<br>(0.315) | 1.189***<br>(0.223)  |
| <i>CPA</i> <sub>odt</sub>         | -0.243<br>(0.562)   | -0.079<br>(0.561)   | -0.067<br>(0.575)   | 0.523<br>(0.320)    | -0.099<br>(0.541)    |
| <i>ASSOC</i> <sub>odt</sub>       | -0.208<br>(0.268)   | -0.112<br>(0.286)   | -0.025<br>(0.304)   | 0.340<br>(0.327)    | -0.045<br>(0.286)    |
| <i>YAOUNDE</i> <sub>odt</sub>     | 1.269***<br>(0.241) |                     | 1.405***<br>(0.221) | 1.587***<br>(0.273) | 1.333***<br>(0.211)  |
| <i>LOME</i> <sub>odt</sub>        | 1.274***<br>(0.238) |                     | 1.038***<br>(0.187) | 0.786***<br>(0.303) | 1.113***<br>(0.168)  |
| <i>GSP</i> <sub>odt</sub>         | 0.137<br>(0.211)    | -0.051<br>(0.127)   | -0.062<br>(0.160)   | 0.166<br>(0.197)    | -0.088<br>(0.156)    |
| <i>GATT</i> <sub>odt</sub>        |                     | -0.244<br>(0.612)   | -0.266<br>(0.620)   | -0.724<br>(0.471)   | -0.289<br>(0.634)    |
| <i>PTA</i> <sub>odt</sub>         | 0.256<br>(1.062)    | -0.265<br>(0.374)   | -0.187<br>(0.392)   | -0.725<br>(0.454)   | 0.102<br>(0.337)     |
| <i>ICCA</i> <sub>odt</sub>        | 0.617***<br>(0.181) |                     | 0.093<br>(0.195)    | 0.429**<br>(0.199)  | 0.157<br>(0.189)     |
| <i>FOB</i> <sub>odt</sub>         | 1.229***<br>(0.295) | 0.622**<br>(0.254)  | 0.589**<br>(0.262)  | 1.148***<br>(0.179) | 0.573**<br>(0.254)   |
| <i>YAOUNDE</i> (1) <sub>odt</sub> |                     | 0.977***<br>(0.284) |                     |                     |                      |
| <i>YAOUNDE</i> (2) <sub>odt</sub> |                     | 1.387***<br>(0.180) |                     |                     |                      |
| <i>LOME</i> (1) <sub>odt</sub>    |                     | 0.592***<br>(0.177) |                     |                     |                      |
| <i>LOME</i> (2) <sub>odt</sub>    |                     | 0.776***<br>(0.187) |                     |                     |                      |
| <i>LOME</i> (3) <sub>odt</sub>    |                     | 0.962***<br>(0.220) |                     |                     |                      |
| <i>LOME</i> (4) <sub>odt</sub>    |                     | 1.738***<br>(0.219) |                     |                     |                      |
| <i>LOME</i> (Rev) <sub>odt</sub>  |                     | 2.349***<br>(0.273) |                     |                     |                      |
| <i>ICCA</i> (1) <sub>odt</sub>    |                     | -0.082<br>(0.168)   |                     |                     |                      |
| <i>ICCA</i> (2) <sub>odt</sub>    |                     | 0.388*<br>(0.199)   |                     |                     |                      |
| <i>ICCA</i> (3) <sub>odt</sub>    |                     | 0.462***<br>(0.171) |                     |                     |                      |
| <i>ICCA</i> (4) <sub>odt</sub>    |                     | -0.070<br>(0.166)   |                     |                     |                      |
| <i>ICCA</i> (5) <sub>odt</sub>    |                     | 0.735***<br>(0.224) |                     |                     |                      |
| Observations                      | 7,764               | 32,442              | 32,442              | 32,442              | 40,457               |
| Exp-Year FE                       | YES                 | YES                 | YES                 | YES                 | YES                  |
| Imp-Year FE                       | YES                 | YES                 | YES                 | YES                 | YES                  |
| Exp-Imp FE                        | YES                 | YES                 | YES                 | YES                 | YES                  |
| Yearly-Dist.                      | NO                  | NO                  | YES                 | NO                  | NO                   |
| R <sup>2</sup>                    | 0.965               | 0.968               | 0.962               | 0.799               | 0.957                |

\*\*\* p&lt;0.01, \*\* p&lt;0.05, \* p&lt;0.1

Source: Results of PPML estimation of the baseline regression.

Notes: Standard errors are clustered by country pair. Fixed effects coefficient estimates are omitted for brevity. Estimated yearly coefficients on distance are illustrated in Figure 10.

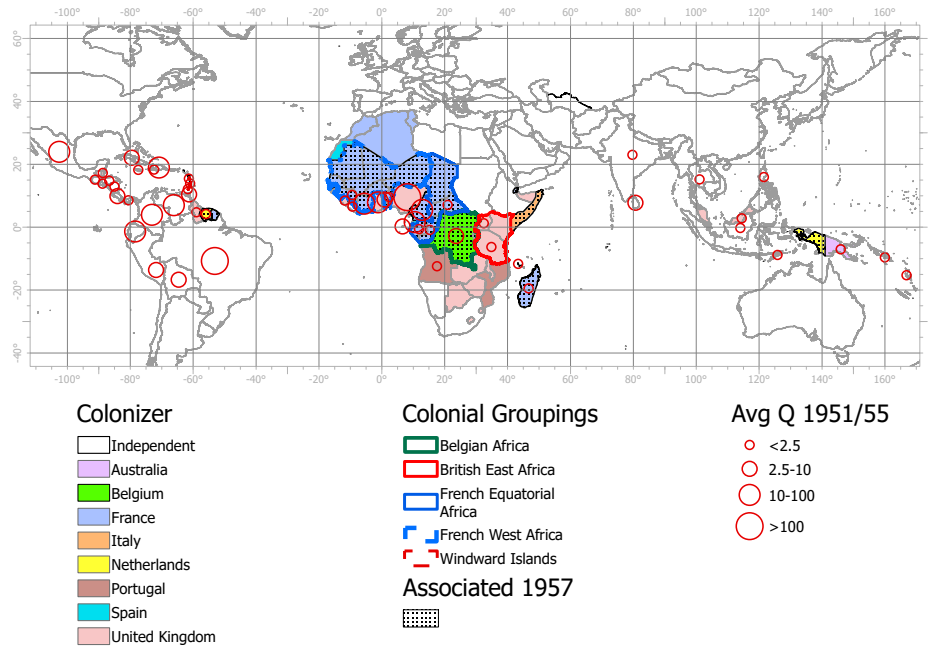
Table 7: Wald test on coefficient equality

| Null hypothesis ( $H_0$ ) | $\chi^2$ | p-value | Test result           |
|---------------------------|----------|---------|-----------------------|
| Yaoundé I = Yaoundé II    | 3.95     | 0.0470  | $H_0$ is rejected     |
| Lomé I = Lomé II          | 1.44     | 0.2304  | $H_0$ is not rejected |
| Lomé I = Lomé III         | 4.31     | 0.0379  | $H_0$ is rejected     |
| Lomé I = Lomé IV          | 33.51    | 0.0000  | $H_0$ is rejected     |
| Lomé I = Lomé IV rev      | 40.53    | 0.0000  | $H_0$ is rejected     |
| Lomé II = Lomé III        | 1.62     | 0.2037  | $H_0$ is not rejected |
| Lomé II = Lomé IV         | 19.75    | 0.0000  | $H_0$ is rejected     |
| Lomé II = Lomé IV rev     | 32.18    | 0.0000  | $H_0$ is rejected     |
| Lomé III = Lomé IV        | 15.47    | 0.0001  | $H_0$ is rejected     |
| Lomé III = Lomé IV rev    | 27.33    | 0.0000  | $H_0$ is rejected     |
| Lomé IV = Lomé IV rev     | 12.57    | 0.0004  | $H_0$ is rejected     |
| ICCA I = ICCA II          | 11.85    | 0.0006  | $H_0$ is rejected     |
| ICCA I = ICCA III         | 9.70     | 0.0018  | $H_0$ is rejected     |
| ICCA I = ICCA IV          | 0.01     | 0.9389  | $H_0$ is not rejected |
| ICCA I = ICCA V           | 17.09    | 0.0000  | $H_0$ is rejected     |
| ICCA II = ICCA III        | 0.26     | 0.6132  | $H_0$ is not rejected |
| ICCA II = ICCA IV         | 8.94     | 0.0028  | $H_0$ is rejected     |
| ICCA II = ICCA V          | 2.86     | 0.0909  | $H_0$ is rejected     |
| ICCA III = ICCA IV        | 18.07    | 0.0000  | $H_0$ is rejected     |
| ICCA III = ICCA V         | 2.10     | 0.1471  | $H_0$ is not rejected |
| ICCA IV = ICCA V          | 20.98    | 0.0000  | $H_0$ is rejected     |

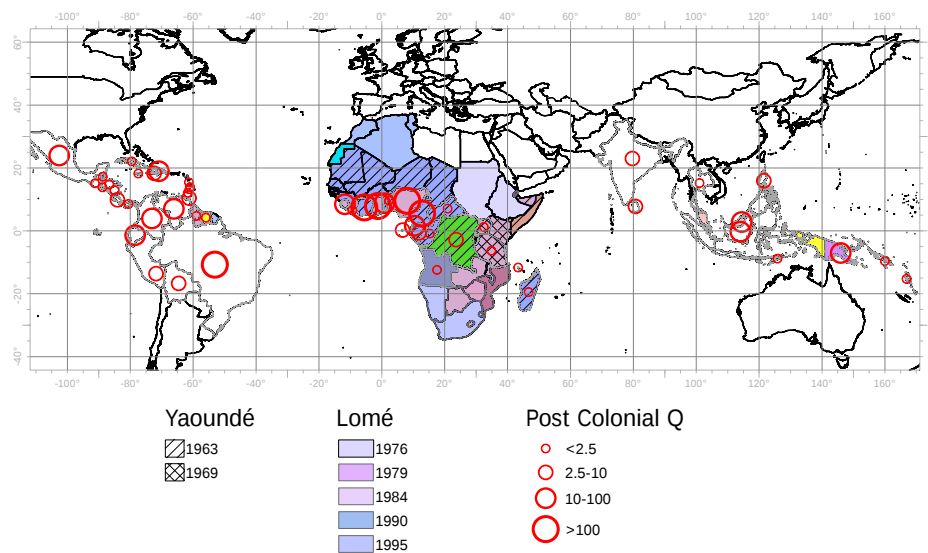
*Note:* Individual Wald tests correspond to the coefficients shown in column (2) of Table 6.

## 8 Figures

Figure 1: Colonial Past and EEC/EC Preferential Agreements



(a) Colonies and Cocoa Bean Production ca. 1955

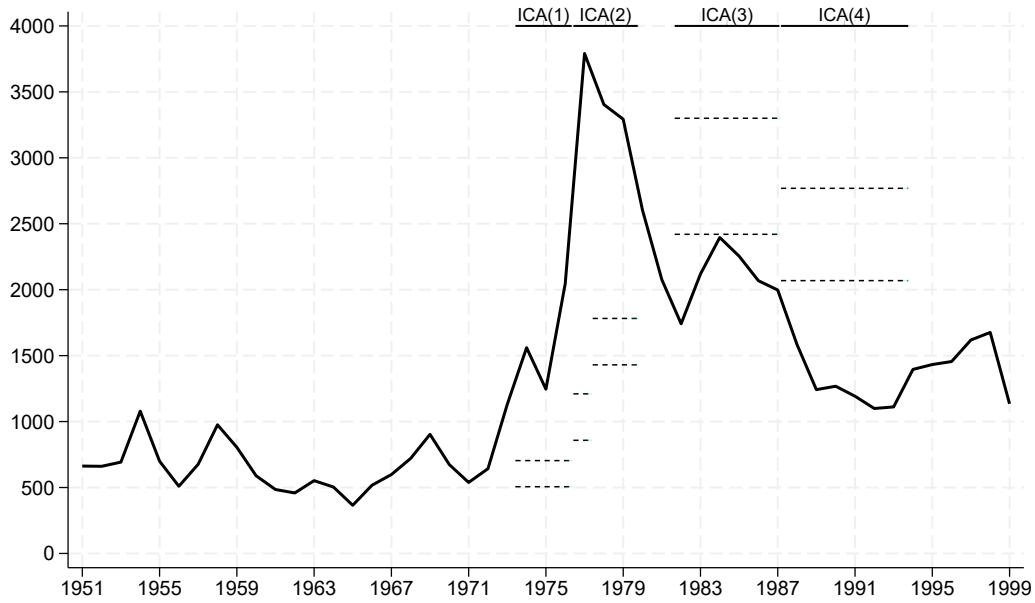


(b) EEC/EC Preferential Agreements and Cocoa Bean Production

*Sources:* FAO (2023), FAO (1958) and FAO (1962).

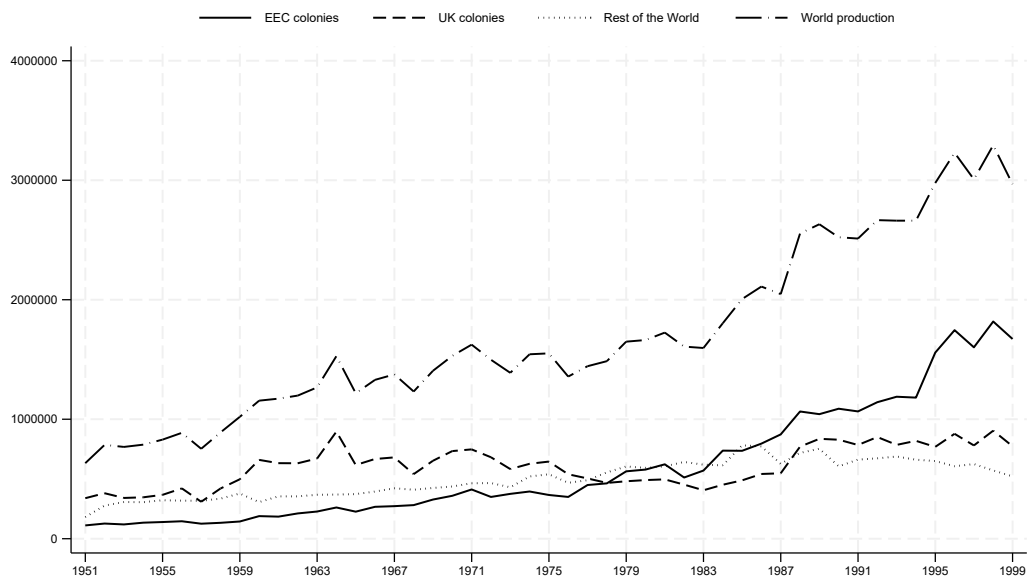
*Notes:* The year indicated is the year the country signed the respective agreement. Avg Q 1951/55 refers to annual average production of cocoa beans over the period 1951 through 1955. Post Colonial Q refers to the annual average during the period 1960-1999. Both are measured in thousands of metric tons.

Figure 2: The Price of Cocoa: 1951-1999



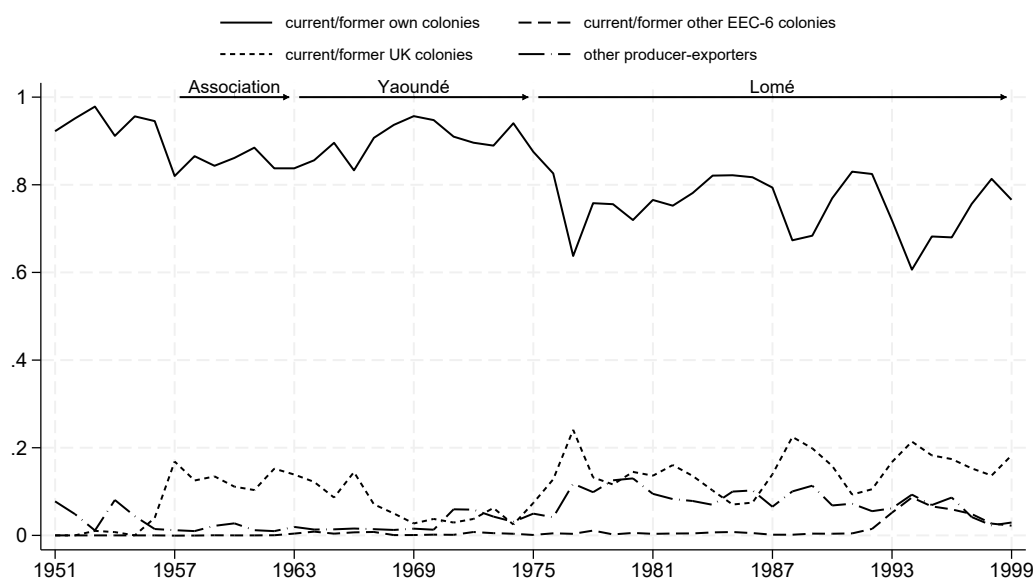
*Sources:* Gilbert (2016, Table 16A.1) for the price of cocoa in New York in dollars per metric ton. Kofi (1977), Finlayson and Zacher (1983) and Gilbert (1995) provide details on the ICCA price corridor (ceiling and floor). *Notes:* The solid, dashed lines and captions (ICA(1), etc.) illustrate the period during which the various International Cocoa Agreements were in force and the price ranges contemplated in each agreement.

Figure 3: Cocoa Production: 1951-1999



*Sources:* FAO (2023), FAO (1958, Table 1) and FAO (1962, Table 1). *Notes:* The quantities are in metric tons. EEC colonies refers to current and then former colonies of the EEC6. EEC6 countries with cocoa-producing (former) colonies are France, Belgium and the Netherlands.

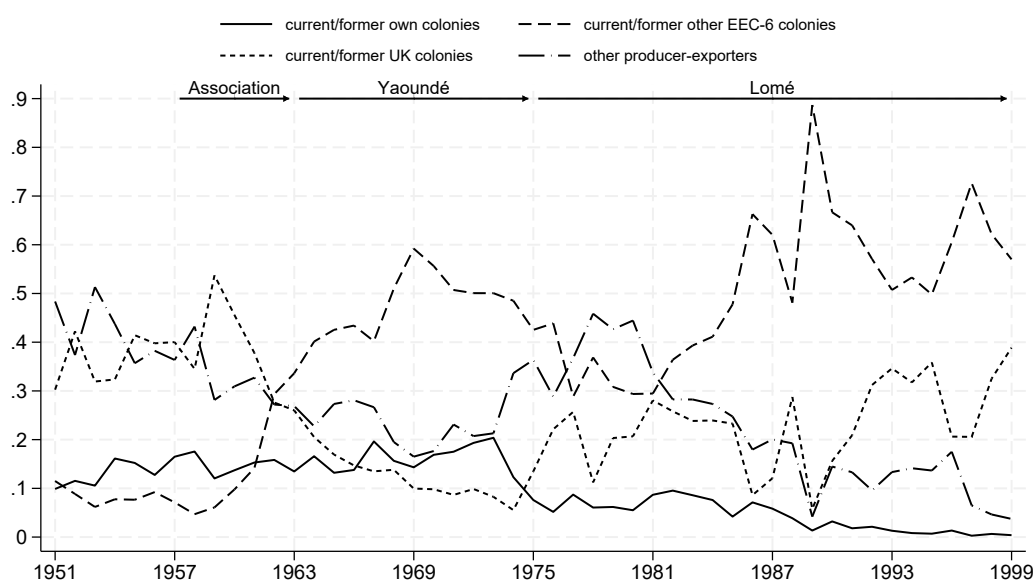
Figure 4: Cocoa import ratios of France and EEC/EC Preferential Agreements



Sources: UN Statistical Office (1961) for 1951-1961, UNDESA (2023) for 1962-1989, and UNDESA (2025) for 1990-1999.

Note: Current/former colonies only includes imports from colonies gaining independence after 1945.

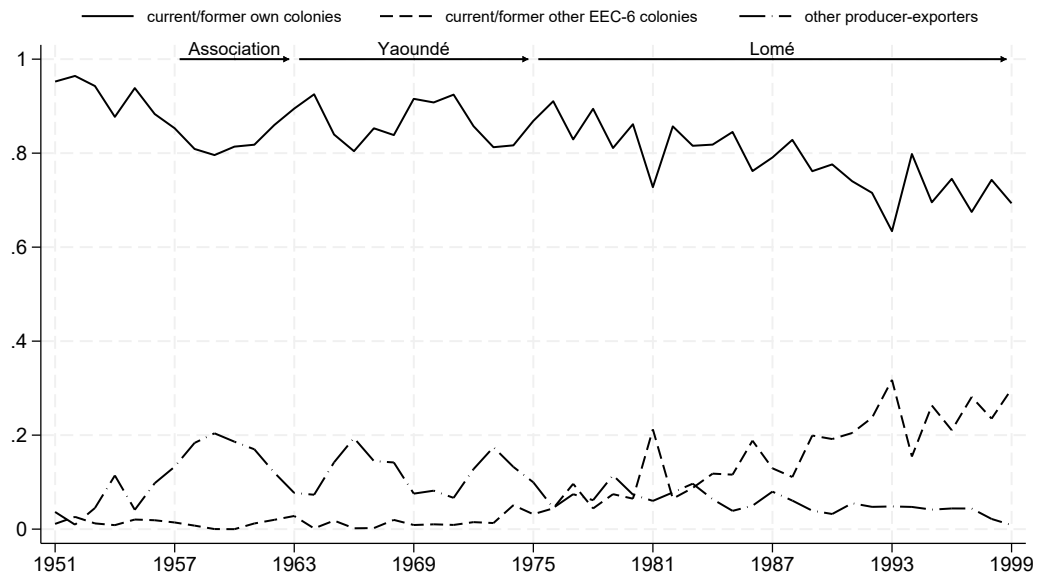
Figure 5: Cocoa import ratios of Belgium-Luxembourg and EEC/EC Preferential Agreements



Sources: UN Statistical Office (1961) for 1951-1961, UNDESA (2023) for 1962-1989, and UNDESA (2025) for 1990-1999.

Note: Current/former colonies only includes imports from colonies gaining independence after 1945.

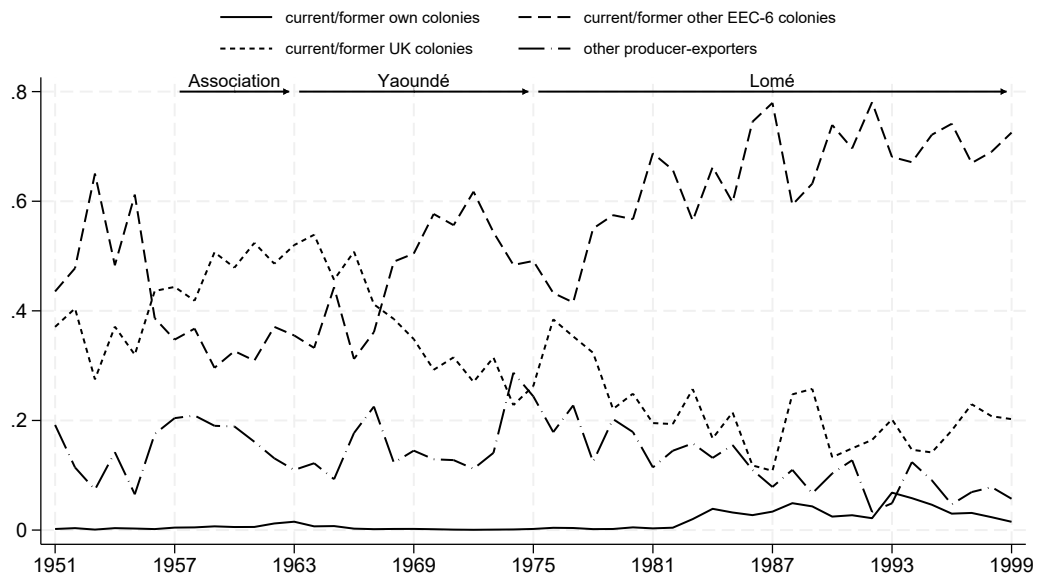
Figure 6: Cocoa import ratios of the United Kingdom and EEC/EC Preferential Agreements



*Sources:* UN Statistical Office (1961) for 1951-1961, UNDESA (2023) for 1962-1989, and UNDESA (2025) for 1990-1999.

*Note:* Current/former colonies only includes imports from colonies gaining independence after 1945.

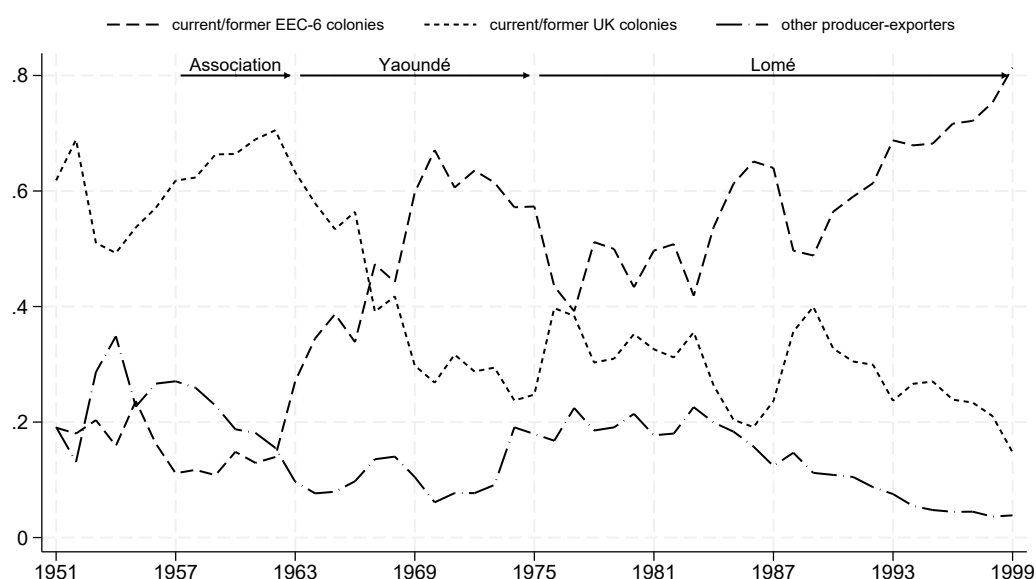
Figure 7: Cocoa import ratios of the Netherlands and EEC/EC Preferential Agreements



*Sources:* UN Statistical Office (1961) for 1951-1961, UNDESA (2023) for 1962-1989, and UNDESA (2025) for 1990-1999.

*Note:* Current/former colonies only includes imports from colonies gaining independence after 1945.

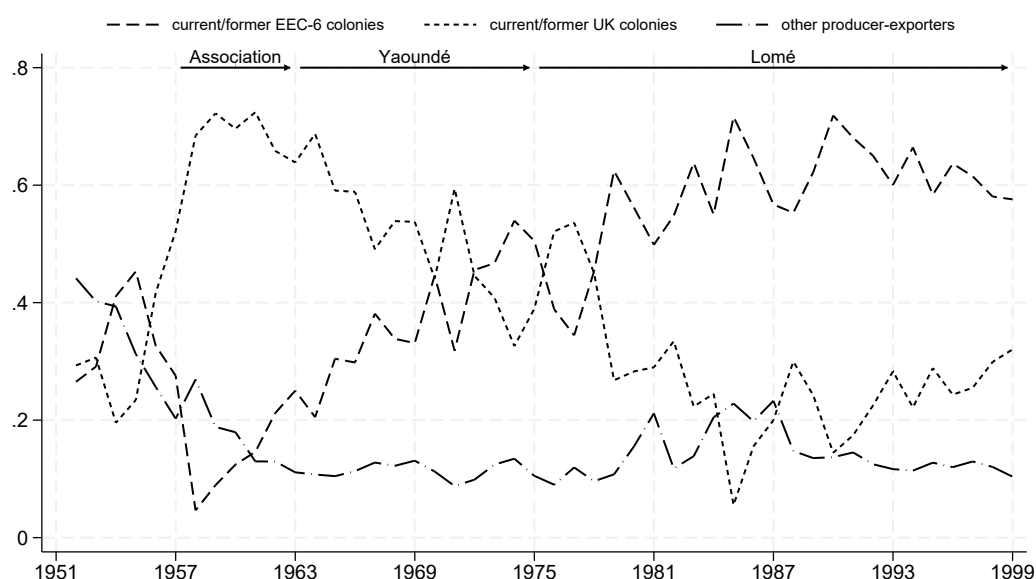
Figure 8: Cocoa import ratios of (West) Germany and EEC/EC Preferential Agreements



*Sources:* UN Statistical Office (1961) for 1951-1961, UNDESA (2023) for 1962-1989, and UNDESA (2025) for 1990-1999.

*Note:* Germany did not possess any colonies after World War II. The administrative rights to its colonies were transferred to other European colonial powers after World War I.

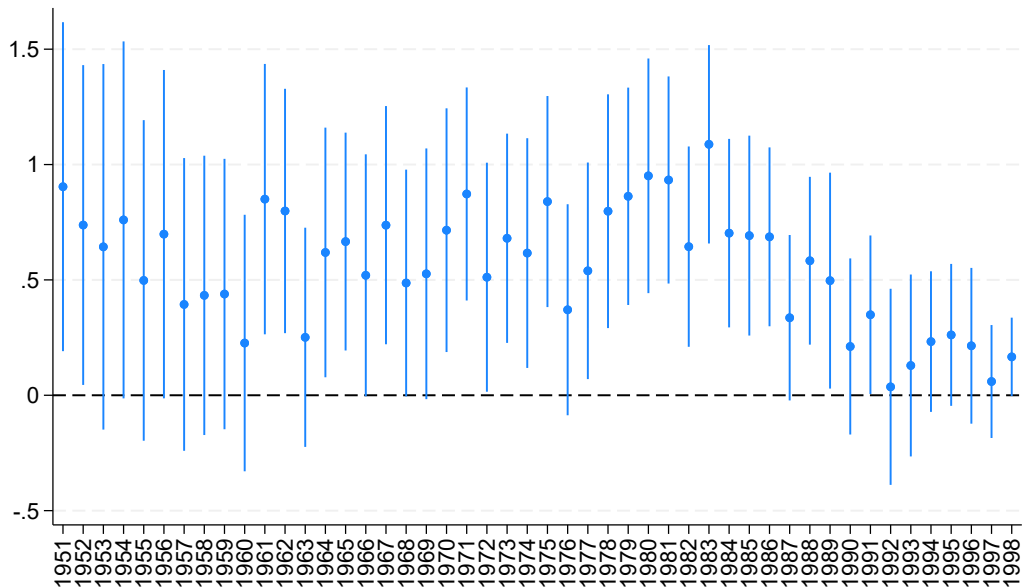
Figure 9: Cocoa import ratios of Italy and EEC/EC Preferential Agreements



*Sources:* UN Statistical Office (1961) for 1951-1961, UNDESA (2023) for 1962-1989, and UNDESA (2025) for 1990-1999.

*Note:* Current/former colonies only includes imports from colonies gaining independence after 1945.

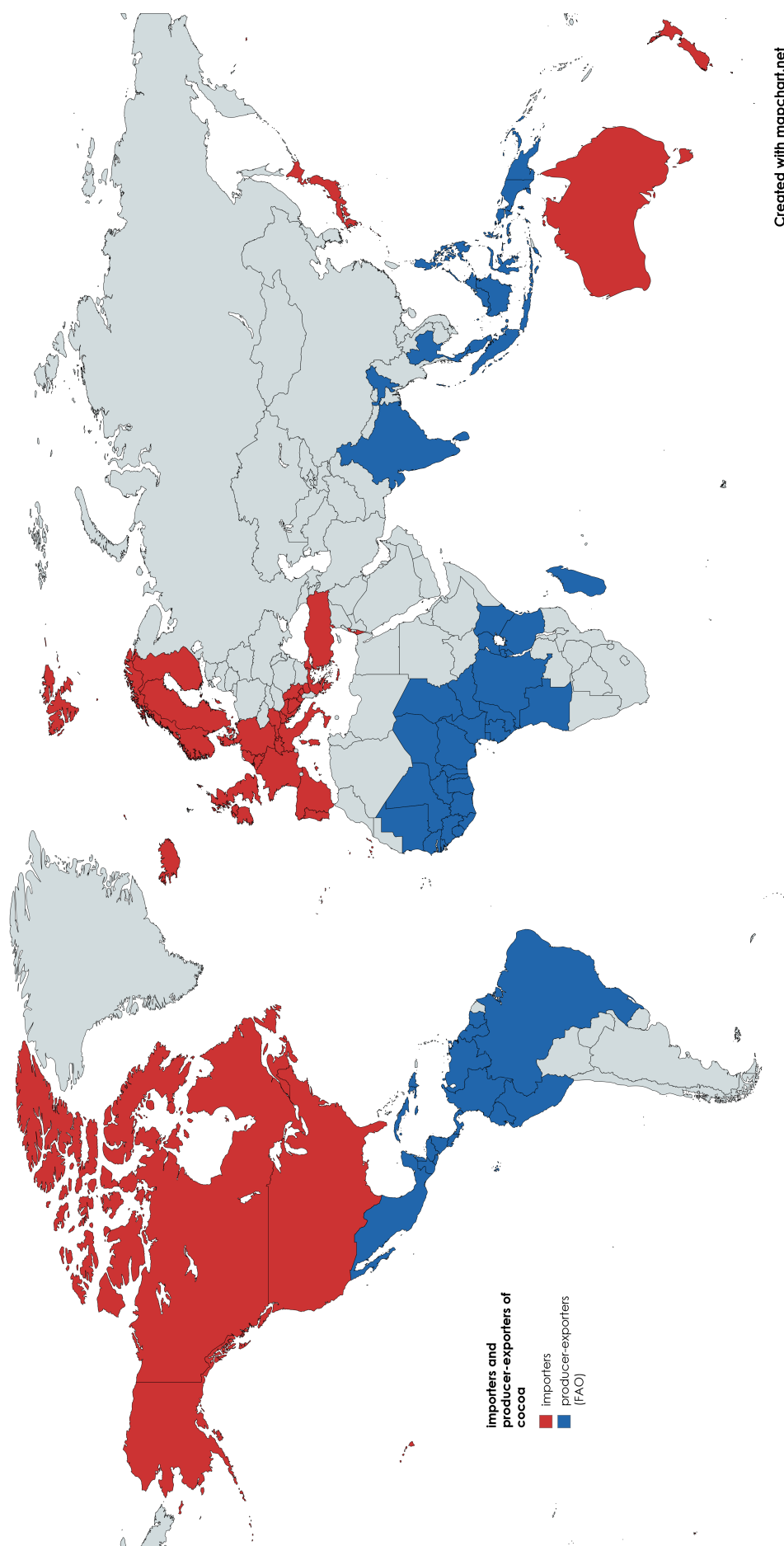
Figure 10: Coefficients on distance estimated for each year



*Source:* Results of estimation in Table 6 column (3).

*Note:* The 95% confidence intervals for distance effects are calculated with respect to the reference year 1999.

Figure 11: Importers and producers of cocoa beans



Created with mapchart.net

Sources: FAO (2023), FAO (1958) and FAO (1962) for producers and UN Comtrade for importers included in the dataset.

## Appendix: Countries used in the analysis

Table A1: List of countries, colonizer, and participation in trade agreements

| iso3 | Country                                | Colonizer | Ind. Date | CPA <sup>1</sup> | Ass. Conv. | Yaoundé              | Lomé    |
|------|----------------------------------------|-----------|-----------|------------------|------------|----------------------|---------|
| AGO  | Angola                                 | PRT       | 1975      | -                | -          | -                    | 1990-99 |
| BEN* | Benin                                  | FRA       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| BHS  | Bahamas (the)                          | GBR       | 1973      | 1932-74          | -          | -                    | 1975-99 |
| BLZ  | Belize                                 | GBR       | 1981      | 1932-74          | -          | -                    | 1984-99 |
| BOL  | Bolivia                                | ESP       | -         | -                | -          | -                    | -       |
| BRA  | Brazil                                 | PRT       | -         | -                | -          | -                    | -       |
| CAF* | Central African Republic               | FRA       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| CIV* | Côte d'Ivoire                          | FRA       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| CMR  | Cameroon                               | FRA       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| COD* | Congo (the Democratic Republic of the) | BEL       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| COG* | Congo (the)                            | FRA       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| COL  | Colombia                               | ESP       | -         | -                | -          | -                    | -       |
| COM* | Comoros                                | FRA       | 1975      | -                | 1958-63    | 1964-74              | 1979-99 |
| CRI  | Costa Rica                             | ESP       | -         | -                | -          | -                    | -       |
| CUB  | Cuba                                   | ESP       | -         | -                | -          | -                    | -       |
| DMA* | Dominica                               | GBR       | 1978      | 1932-74          | -          | -                    | 1979-99 |
| DOM  | Dominican Republic                     | ESP       | -         | -                | -          | -                    | 1990-99 |
| ECU  | Ecuador                                | ESP       | -         | -                | -          | -                    | -       |
| GAB* | Gabon                                  | FRA       | 1960      | -                | 1958-63    | 1964-74              | 1975-99 |
| GIN* | Guinea                                 | FRA       | 1958      | -                | 1958-63    | -                    | 1975-99 |
| GLP* | Guadeloupe                             | FRA       | -         | -                | -          | -                    | -       |
| GNB  | Guinea-Bissau                          | PRT       | 1973      | -                | -          | -                    | 1975-99 |
| GNQ  | Equatorial Guinea                      | ESP       | 1968      | -                | -          | -                    | 1975-99 |
| GRD* | Grenada                                | GBR       | 1974      | 1932-74          | -          | -                    | 1975-99 |
| GTM  | Guatemala                              | ESP       | -         | -                | -          | -                    | -       |
| GUF  | French Guiana                          | FRA       | -         | -                | -          | -                    | -       |
| GUY  | Guyana                                 | GBR       | 1966      | 1932-74          | -          | -                    | 1975-99 |
| HND  | Honduras                               | ESP       | -         | -                | -          | -                    | -       |
| HTI  | Haiti                                  | FRA       | -         | -                | -          | -                    | 1990-99 |
| IDN* | Indonesia                              | NLD       | 1949      | -                | -          | -                    | -       |
| IND  | India                                  | GBR       | 1947      | 1932-74          | -          | -                    | -       |
| JAM  | Jamaica                                | GBR       | 1962      | 1932-74          | -          | -                    | 1975-99 |
| KEN* | Kenya                                  | GBR       | 1963      | 1932-74          | -          | 1971-74 <sup>2</sup> | 1975-99 |
| LBR  | Liberia                                | USA       | -         | -                | -          | -                    | 1975-99 |
| LCA* | Saint Lucia                            | GBR       | 1979      | -                | -          | -                    | 1979-99 |
| LKA  | Sri Lanka                              | GBR       | 1948      | 1932-74          | -          | -                    | -       |
| MEX  | Mexico                                 | ESP       | -         | -                | -          | -                    | -       |
| MTQ* | Martinique                             | FRA       | -         | -                | -          | -                    | -       |
| MYS* | Malaysia                               | GBR       | 1957      | 1932-74          | -          | -                    | -       |
| NAM* | Namibia                                | ZAF       | 1990      | -                | -          | -                    | 1995-99 |
| NGA  | Nigeria                                | GBR       | 1960      | 1932-74          | -          | -                    | 1975-99 |
| NIC  | Nicaragua                              | ESP       | -         | -                | -          | -                    | -       |
| PAN  | Panama                                 | COL       | -         | -                | -          | -                    | -       |
| PER  | Peru                                   | ESP       | -         | -                | -          | -                    | -       |
| PHL  | Philippines                            | ESP,USA   | -,1946    | -                | -          | -                    | -       |
| PNG  | Papua New Guinea                       | AUS       | 1975      | 1932-74          | -          | -                    | 1979-99 |
| SGP* | Singapore                              | GBR,MYS   | 1957,1965 | 1932-74          | -          | -                    | -       |
| SLE  | Sierra Leone                           | GBR       | 1961      | 1932-74          | -          | -                    | 1975-99 |
| SLV  | El Salvador                            | ESP       | -         | -                | -          | -                    | -       |
| SUR  | Suriname                               | NLD       | 1975      | -                | 1958-63    | 1964-74              | 1979-99 |

|      |                                     |         |           |         |         |                      |         |
|------|-------------------------------------|---------|-----------|---------|---------|----------------------|---------|
| TGO* | Togo                                | FRA     | 1960      | -       | 1958-63 | 1964-74              | 1975-99 |
| THA  | Thailand                            | -       | -         | -       | -       | -                    | -       |
| TLS* | Timor-Leste                         | PRT,IDN | 1975,2002 | -       | -       | -                    | -       |
| TTO  | Trinidad and Tobago                 | GBR     | 1962      | 1932-74 | -       | -                    | 1975-99 |
| TZA* | Tanzania                            | GBR     | 1961      | 1932-74 | -       | 1971-74 <sup>2</sup> | 1975-99 |
| UGA* | Uganda                              | GBR     | 1962      | 1932-74 | -       | 1971-74 <sup>2</sup> | 1975-99 |
| VCT* | Saint Vincent and the<br>Grenadines | GBR     | 1979      | 1932-74 | -       | -                    | 1984-99 |
| VEN  | Venezuela                           | ESP     | -         | -       | -       | -                    | -       |

\*: Member of a colonial entity - group of countries (See Table A2).

1: CPA = Commonwealth Preferential Area. The United Kingdom suspended preferences for importers in 1974, while Australia, Canada and New Zealand did so in 1977.

2: Correspond to the Arusha Agreement of 1969.

Table A2: List of colonial entities or country groups and their members

| Colonial entity                    | Members                                                                                                                                                                                                         |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Belgian Africa                     | Burundi <sup>2</sup> , Democratic Rep. of the Congo <sup>1</sup> , Rwanda <sup>2</sup>                                                                                                                          |
| British East Africa                | Kenya <sup>2</sup> , Tanzania <sup>1</sup> , Uganda <sup>1</sup>                                                                                                                                                |
| Comoros & Mayotte                  | Comoros <sup>1</sup> , Mayotte                                                                                                                                                                                  |
| Federation of Ethiopia & Eritrea   | Ethiopia <sup>2</sup> , Eritrea                                                                                                                                                                                 |
| Federation of Rhodesia & Nyasaland | Malawi <sup>2</sup> , Zambia <sup>2</sup> , Zimbabwe <sup>2</sup>                                                                                                                                               |
| French Equatorial Africa           | Central African Republic <sup>1</sup> , Rep. of the Congo <sup>1</sup> , Gabon <sup>1</sup> , Chad <sup>2</sup>                                                                                                 |
| French Indochina                   | Cambodia <sup>2</sup> , Laos <sup>2</sup> , North Viet-Nam <sup>2</sup> , Viet-Nam <sup>2</sup>                                                                                                                 |
| French West Africa                 | Benin <sup>1</sup> , Burkina Faso <sup>2</sup> , Côte d'Ivoire <sup>1</sup> , Guinea <sup>1</sup> , Mali <sup>2</sup> , Mauritania <sup>2</sup> , Niger <sup>2</sup> , Senegal <sup>2</sup> , Togo <sup>1</sup> |
| French West Indies                 | Guadeloupe <sup>1</sup> , Martinique <sup>1</sup>                                                                                                                                                               |
| Indonesia & Timor-Leste            | Indonesia <sup>1</sup> , Timor-Leste <sup>1</sup>                                                                                                                                                               |
| Leeward Islands                    | Antigua and Barbuda <sup>2</sup> , British Virgin Islands <sup>2</sup> , Montserrat <sup>2</sup> , Saint Kitts and Nevis <sup>2</sup>                                                                           |
| Malaysia & Singapore               | Malaysia <sup>1</sup> , North Borneo, Sarawak, Singapore <sup>2</sup>                                                                                                                                           |
| Netherlands Antilles               | Aruba <sup>2</sup> , Netherlands Antilles (as a whole) <sup>2</sup> , Curaçao, Sint Marteen                                                                                                                     |
| Southern African Customs Union     | Botswana, Eswatini, Lesotho, Namibia, South Africa <sup>2</sup>                                                                                                                                                 |
| Windward Islands                   | Dominica <sup>1</sup> , Grenada <sup>1</sup> , Saint Lucia <sup>1</sup> , Saint Vincent and the Grenadines <sup>1</sup>                                                                                         |

<sup>1</sup> Producer of coca beans according to the FAO and exporter of cocoa under SITC-1 072.

<sup>2</sup> Exporter of cocoa under SITC-1 072, but not a producer of cocoa beans

Table A3: List of importer and exporter countries

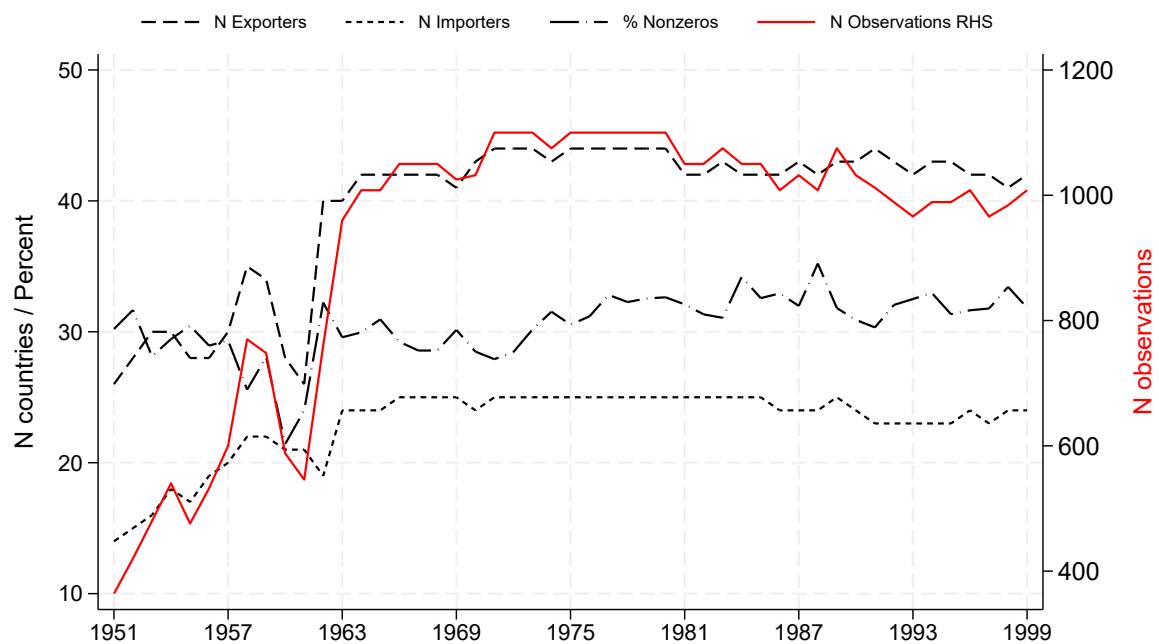
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Importers - destination (25):</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Australia, Austria, Belgium-Luxembourg*, Canada*, Denmark*, Finland, France*, (West) Germany*, Greece, Iceland, Ireland, Israel, Italy, Japan, the Netherlands*, New Zealand, Norway, Portugal, Spain, Sweden*, Switzerland, Turkey, the United Kingdom*, the United States of America*, and Yugoslavia.                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Producer-exporters - origin (44)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>In the main sample:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Angola, <b>Belgian Africa*</b> , Belize, Bolivia, Brazil*, <b>British East Africa</b> , Cameroon*, Colombia, <b>Comoros and Mayotte</b> , Costa Rica*, Cuba, Dominican Republic*, Ecuador*, El Salvador, Equatorial Guinea, Fiji, <b>French Equatorial Africa*</b> , <b>French West Africa*</b> , <b>French West Indies*</b> , Ghana*, Guatemala*, Guyana, Haiti*, Honduras, India, <b>Indonesia and Timor-Leste*</b> , Jamaica*, Liberia, Madagascar, <b>Malaysia and Singapore</b> , Mexico*, Nicaragua, Nigeria*, Panama*, Papua New Guinea, Peru, Philippines, Sierra Leone, Sri Lanka*, Suriname, Thailand, Trinidad and Tobago*, Venezuela*, <b>Windward Islands</b> .          |
| <b>Non-producer-exporters - origin (50)</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Only in the extended sample:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Algeria, Argentina, Bahamas, Bangladesh, Brunei Darussalam, Bulgaria, Chile, China, Cyprus, Czechoslovakia, Djibouti, East Germany, Egypt, <b>Federation of Ethiopia and Eritrea</b> , <b>Federation of Rhodesia &amp; Nyasaland</b> , French Guiana, <b>French Indochina</b> , Gambia, Guinea-Bissau, Hong Kong, Hungary, Iran, Iraq, Kuwait, Lebanon, <b>Leeward Islands</b> , Libya, Mauritius, Morocco, Mozambique, Myanmar, <b>Netherlands Antilles</b> , New Caledonia, North Yemen, Pakistan, Paraguay, Poland, Qatar, Réunion, Romania, Saudi Arabia, South Korea, South Yemen, <b>Southern African Customs Union</b> , Sudan, Syria, Taiwan, Tunisia, Uruguay, Soviet Union. |

\*In the subsample of countries that consistently exported and imported over the period 1951-1999.

<sup>1</sup> Colonial entities and country groups in **bold** (See Table A2).

<sup>2</sup> Producer-exporters of cocoa beans according to the FAO data.

Figure A1: Cocoa Trade Sample Coverage: 1951-1999



*Source:* Bilateral trade sample for cocoa (SITC 072) for 1951-1989.

*Note:* The decrease in the number of observations, number exporting and percent of nonzero observations in 1960 and 1961 resulted from a change in the UN Commodity Trade series reporting, which only included the country of origin for imports exceeding \$10,000.