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How Brazil Transferred Billions to Foreign Coffee Importers: The International Coffee Agreement, Rent Seeking and Export Tax Rebates

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Abstract

Rent seeking is well known, but empirical evidence of its effects is relatively rare. This paper analyzes the how domestic and international rent seeking caused Brazil to provide coffee export tax rebates that transferred foreign exchange to coffee importers. Although Brazil was the world's largest exporter, it began to pay export tax rebates to selected coffee importers in 1965 and, by 1988, had paid rebates totaling $8 billion. Brazil explained these rebates as a mechanism to price discriminate among importers and expand exports within the context of the export quota imposed by the International Coffee Agreement. We show this explanation was invalid during most of the period. The net price fell for those who received rebates, causing Brazil to effectively transfer approximately $3 billion to foreign importers. The effects of the rebate policy were never recognized in Brazil, hidden largely by the complex nature of government intervention in the coffee sector.

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Lovell S. Jarvis

Introduction. To raise the price of coffee, the International Coffee Agreement (ICA) imposed a global quota on the amount of coffee that producing countries could export during most of the period 1963-1989. Brazil, the world's largest coffee producer, received the largest share of the quota. Although the quota may have increased the international price and thus improved Brazil's gross terms of trade[1], the quota also created large quota rents within Brazil and these rents motivated considerable rent seeking activity. Much has been written about rent seeking, e.g., Krueger, 1973, but there are few detailed empirical studies because the effects of rent seeking are often hard to document.

Rent seeking in Brazil occurred in many of the traditional forms (Jarvis 2001). However, an exceptional, but previously unidentified example of how rent seeking affected the coffee sector involves Brazil's use of coffee export tax rebates. These rebates were introduced soon after the ICA quota was implemented. The amount of these rebates was initially small, averaging $21million per year during 1965-69, but grew rapidly and reached a peak of nearly $2 billion in 1981. In total, between 1965 and 1989, Brazil emitted more than $8 billion in coffee export tax rebates, thereby reducing Brazil's net export taxes. The export tax rebates stimulated international demand for Brazilian coffee, causing the nominal price of Brazil's coffee to rise relative to those of its competitors. However, the net export price declined, causing Brazil to transfer billions of dollars to foreign coffee importers and other rebate recipients.[2] The latter

[1] Akiyama and Verangis (1990) present credible estimates suggesting that the ICA may not have increased the international price when an average is calculated over the coffee cycle.

[2] This rent transfer is distinct in type from the rent transfers identified by Krishna and Tan (1992) and by Krishna et

effects appear to have been wholly unintended and were misunderstood aspects of the use of rebates.

The rebates were initially justified as a means to price discriminate and increase Brazil's coffee revenues (Delfim Netto and Andrade Pinto, 1965). Once this policy had come under fire, rebates were justified as necessary to maintain the competitiveness of Brazilian coffee, given that Brazil required exporters to pay export taxes and turn over foreign exchange reserves based on a government-imposed Minimum Registration Price that sometimes exceeded the prices of Brazil's competitors (Bacha 1992). While the first justification for the rebates was theoretically plausible, the number of rebates issued quickly grew to exceed the amount that could have been economically justified as price discrimination, given known parameters of the coffee market. The second justification was invalid since the Minimum Registration Price had little effect on the price at which coffee was actually sold. Brazilian coffee was fully competitive without the export tax rebates. The best explanation for the abundant emission of export tax rebates is that they provided benefits to recipients, who engaged in rent-seeking activity to obtain more rebates.

Subsequent sections: 1) provide background information, 2) develop and apply a model to test whether using the export tax rebates to price discriminate could have benefited Brazil, 3) develop and econometrically estimate a model measuring the effect of the export tax rebates on the export price of Brazil's coffee and thus determine the incidence of the tax rebates, and 4) present conclusions.

Background. Following a similar study in Indonesia (Bohman, et al. 1996), Bohman and I interviewed a number of Brazilian coffee sector participants in June-July 1994, to obtain information that would allow us to determine who had captured the ICA domestic quota rents in Brazil. During these interviews, Brazilian coffee exporters frequently mentioned their dealings

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al., 1993, as having occurred within the context of the Multi-Fibre Arrangement.

in *Avisos de Garantia* (hereafter *avisos*), a negotiable, dollar-denominated export tax rebate paid by the Brazilian Institute of Coffee (IBC) to foreign importers that purchased Brazilian coffee during most of the period that the ICA was in effect. Though these *avisos* seemed important, we were consistently told that they had only a neutral role, simply offsetting another policy-induced market distortion. It nonetheless became clear to me that the *avisos*' effect might not have been neutral and, without so determining, it was impossible to understand the disposition of Brazil's domestic coffee quota rent (Jarvis, 2001). Thus, I began to analyze the effect of the *avisos*.

Though the Brazilian coffee industry was mainly in private hands, the IBC strongly affected the coffee sector's operation. Created in 1953 to formulate and implement Brazilian coffee policy, domestically and internationally, the IBC was given great power. This power reflected coffee's importance in the Brazilian economy and the widespread national view that manipulating coffee production and exports was key to Brazilian economic success. The IBC influenced export prices through numerous policies, especially the export tax (t_{cq}, known as the contribution quota) and the minimum export registration price (P_{MR}). Technically, exporters were not allowed to sell Brazilian coffee for less than P_{MR}, though they could and often did so.[3] After 1965, the IBC also provided export tax rebates to many importers. In addition, the IBC established a Guaranteed Minimum Price (P_{GM}) at which it stood ready to purchase all coffee offered by producers. Nonetheless, producers, mainly small and medium-sized farmers, usually sold coffee to private exporters at the open market producer price, P_D. P_D usually exceeded $P_{GM,}$ because the IBC purchased coffee only for storage. Throughout the period studied, Brazil's coffee producing states levied an additional coffee tax, t_s, on all sales, domestic and foreign.

[3] The IBC used P_{MR} as the basis for determining the amount of foreign exchange that exporters had to deliver to the Central Bank and, after 1985, as the basis for levying the *ad valorem* export tax. Producers had to declare that they had sold coffee for at least that amount. However, producers sold at whatever was the world price, purchased foreign exchange in the black market if needed and then adjusted the price they were willing to pay to farmers for coffee.

A large domestic quota rent existed whenever the ICA quota was in effect (Bohman and Jarvis, 1990; Bohman et al., 1996). The IBC effectively determined the disposition of the domestic quota rent insofar as it allocated the quota among exporters and set the export tax and the export tax rebate. Although the government captured part of the domestic quota rent through the export tax, Jarvis (2001) estimates that an important residual rent remained and was captured by exporters to whom quota was allocated. Foreign coffee importers captured a larger part of the rent, however, as a result of Brazil's payment of export tax rebates. These effects are briefly modeled below.[4]

The government allocated the quota among exporters, who received it free of charge, subject to the need to pay the export tax. Exporters purchased coffee at P_D, measured inclusive of exporters' marketing and processing costs, and sold coffee on the member market at $P_{A'}$. See Figure 1. The demand curve for Brazilian coffee, D_B, intersected q_A, Brazil's quota for exports to the ICA member market, at P_A, the counterfactual member market price that I assume would have prevailed in the absence of export tax rebates. $P_{A'}$ was higher than P_A if the stimulus provided by export tax rebates caused importers to bid up Brazil's nominal export price.

The observed unit quota rent (per bag sold) on sales to the member market, gross of export and sales taxes, was $r_g = P_{A'} - P_D$. [5] After paying the taxes, exporters that received export quota earned the residual or net rent, r_n, with $r_n = r_g - t_{cq}$, where t_{cq} is the per bag export tax. The IBC collected the export tax and issued export tax rebates (*avisos*) to foreign importers.

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[4] Producers captured rents only to the extent that they individually or collectively received a quota allocation and this happened very little in Brazil. Indeed, producers probably suffered from a reduced producer price as a result of the ICA quota. Bohman and Jarvis (1996) develop a theoretical model to explain why, given likely policies in coffee-producing countries, the producer price of coffee should decline whenever ICA quotas are imposed. Their econometric results suggest that the producer price of coffee did fall in most countries, including Brazil.

[5] Trade among ICA-member nations, importers and exporters, accounted for 80-85% of coffee traded internationally. Coffee was also sold by to importers in the non-member market, but at a large discount, usually about 50%, whenever the ICA quota was imposed. Brazil sold about 10% of its coffee on the non-member market. It appears that Brazil usually sold to the non-member market at a price that approximated P_D.

Although little is known about the amounts rebated to individual importers, the aggregate annual value of export tax rebates, *A*, is known. The average annual unit rebate paid per bag of coffee exported to the member market, α, can be determined by dividing *A* by q_A, where q_A is the number of bags exported to the member market, i.e. $\alpha = A/q_A$. The government's net export tax revenue per bag was $t_{cq} - \alpha$.

Although the government paid a unit tax rebate, α, to foreign importers, I hypothesize that these importers did not benefit in like amount because the rebates reduced the net price of Brazilian coffee and thus stimulated importers to purchase more coffee, resulting in a higher market price. In the extreme case, the export tax rebate could have increased the nominal Brazilian export price by α, leaving the net export price faced by importers unchanged. It is generally understood in Brazil that this is what happened. However, if Brazil's nominal export price rose by less than α, foreign roasters enjoyed some net gain, α', where $\alpha' = \alpha - (P_{A'} - P_A)$. Again, see Figure 1.

The economic gains enjoyed by exporters, foreign roasters and the federal government given their participation in the domestic quota rent was their unit gain multiplied by quota exports. These gains can be expressed as:

1) Exporters: $R_E = (r_g - t_{cq})\, q_A$

2) Foreign roasters: $A' = [\alpha - (P_{A'} - P_A)]\, q_A$

3) Federal Government, including the IBC: $T = (t_{cq} - \alpha)\, q_A$

IBC officials participated privately in the rent if they received side payments that were linked to exporters' or roasters' gains. Since there is no way to measure such clandestine payments, if they occurred, their magnitude is included in the estimated gains of exporters and foreign

importers. The aggregate gain of the participants, achieved by summing equations 1) through 3), equals the total potential rent, R:

$$R = R_E + A' + T = q_A[(r_g - t_{cq}) + \alpha - (P_{A'} - P_A) + (t_{cq} - \alpha)]$$

$$= q_A[r_g - (P_{A'} - P_A)] = q_A[P_A' - P_D - P_{A'} + P_A] = q_A (P_A - P_D)$$

Note that R is independent of α and the degree to which the international price was bid up as a result of the export tax rebates. However, the distribution of R among the different actors is dependent on α and on how α affected the international price.

Export Tax Rebates. When Brazil first received an ICA country export quota in 1963, the IBC imposed a large export tax that restricted exports to less than them amount of the quota that Brazil had been awarded. The IBC did so believing that Brazil had market power even within the quota amount (Bacha 1992). However, the IBC changed it policy in 1965 to ensure that it fulfilled its quota. It began to sign secret discriminatory contracts with a few large importers, paying them export tax rebates in exchange for their commitment to purchase a larger amount of coffee each year and to spread their purchases evenly throughout the year. The IBC argued that although world coffee demand was inelastic, the demand for coffee from individual countries (roasters) was highly price elastic, implying that Brazilian exports could be profitably increased via a price discount (Delfim Netto 1959, Delfim Netto and Pinto 1965). Internationally, the coffee importing and roasting industry was highly concentrated.[6] Brazil therefore thought that it could "exert its capacity to discriminate among buyers according to their respective bargaining power" (Bacha, 1992).[7]

[6] The three largest foreign importers, Nestle, General Foods and Procter and Gamble accounted for about 20% of total world imports in the 1960s and about 30% in the 1980s.

[7] The prices of different types and grades of coffee are highly correlated, but relative prices vary somewhat over time and such variations induce changes in consumption.

Because private firms handled all coffee exports, to achieve the desired price discrimination the IBC had to develop some mechanism like the export tax rebates. This mechanism had to ensure that any importer that signed a long-term contract could purchase coffee from any exporter and pay only the agreed discounted price, while also ensuring that the exporter received the actual market price. The mechanism adopted was a negotiable, U.S. dollar-denominated certificate called an *Aviso de Garantia* that was issued by the IBC to a roaster on completion of a purchase. Importers could redeem the certificate when making their next purchase.[8] Thus, assuming repeated purchases, the rebate reduced the net price of coffee to the purchaser, but not to the exporter or farmer. While the formulas that determined the specific export tax rebates to individual importers were secret, it is known that the magnitude of the rebates was tied to the difference between Brazil's export price and an average of its main competitors' prices, as listed on the New York and London markets.

The Use of Export Tax Rebates to Price Discriminate. The hypothesis that the rapid rise in export tax rebates was a response to rent seeking can be tested using the model of price discrimination shown in Figure 2. Demand for Brazilian coffee is divided into two components, one from the largest foreign importers, D_{II}, who are assumed to have purchased about 40% of Brazil's member market exports prior to initiation of the export tax rebates, and the other from all other exporters, D_I. See Figure 2a. When the price is P_A, total member market exports equal $q_I^0 + q_{II}^0$, which is assumed less than the Brazilian quota. Provision of a unit export tax rebate, α, to the largest importers is assumed to expand sales to these importers from q_{II}^0 to q_{II}^1, and thus expand total member market exports by the same amount.[9] For the scheme to work as intended,

[8] The *aviso* certificates were traded on an informal New York market throughout the period that was maintained among coffee trading companies. In general, *aviso* certificates traded at only a small discount to their face value.
[9] Since the export tax rebates were provided only to the largest importers, these contracts were referred to in Brazil as "special deals."

the (negotiated) demand of the largest importers had to be more price elastic than the demand of the other importers. For simplicity, the demand curve for other importers is assumed perfectly inelastic.

P_A is the initial price at which Brazil exported coffee to the member market and P_N is taken as the opportunity cost of coffee exports. Brazil's benefit from exporting an additional bag of coffee to the member market, where P_A is assumed constant, was $P_A - \alpha - P_N$. Brazil gained from issuing rebates only so long as the increased rent (area E) from expanding member market exports (q^0_{II} to q^1_{II}) was larger than the export revenue sacrificed on previous exports as a result of the tax rebate (area A).[10] If the value of the rebates issued greatly exceeded a reasonable estimate of area E-A, the use of export tax rebates must have reduced Brazilian welfare. If so, it follows that tax rebates were probably used for reasons other than simply to price discriminate.

According to Bacha (Statistical Appendix, 1992), Brazil exported 15.7 million 60 kg. bags from 1959-1964, systematically underselling its member market quota (which averaged 17.5 million bags) by about 12%, or 1.8 million bags. Since private agents carried out trade, Brazil must have imposed an export tax greater than $P_A - P_D$, thus keeping the export price above the level that would have allowed the export quota to be filled. Accordingly, an export tax rebate could effectively lower the international price to favored importers. If the rebate allowed Brazil to achieve its quota, these favored importers must have increased their purchases from 6.28 million bags (assumed to have been 40% of the 15.7 million bags exported), prior to the rebates, to 8.08 million bags. The net gain to Brazil depended on the unit export tax rebate that was required to achieve this increase.

Knowing α, Brazil's estimated economic gain from *aviso* use can be calculated as:

[10] Revenue was lost only on exports to the favored large foreign importers; other importers did not receive rebates.

4) $E - A = (q_{II}^1 - q_{II}^0)(P_A - \alpha - P_N) - \alpha q_{II}^o = (q_{II}^1 - q_{II}^0)(P_A - P_N) - \alpha q_{II}^1$,

where the quantities exported refer to the aggregate amount purchased by the favored foreign roasters who received the "special deals" from the IBC. Utilizing the actual parameter values prevailing in 1964 [11], the increase in exports is assumed to be 1.8 million bags, the amount by which Brazil was previously underselling its quota. The difference between P_A and P_N was $23.33. E, the potential gain from expanding exports, is 1.8 million bags multiplied by $23.33/bag, or $42 million. A, the revenue sacrificed to achieve E, was approximately the value of the *avisos* emitted, which averaged $21 million during 1966-69.[12] If my estimate is correct, Brazil and the favored foreign importers roughly split the benefits to Brazil from expanding member market exports ($42 million). Thus, the amount of rebates initially emitted was consistent with the use of tax rebates to achieve a profitable "price discrimination," as argued by Delfim Netto and Andrade Pinto (1965).

Note that these calculations underestimate the profitability of the export tax rebate scheme if the rebates caused exporters to bid up the price of Brazilian coffee, as I subsequently show did occur. If the rebates caused a nominal price increase, the net cost of any nominal rebate was lower, since the higher price increased revenues to Brazil (Figure 2b). For example, assuming that the export price rose by about half the unit export tax rebate, where the unit export tax rebate is calculated by dividing the total value of rebates by total quota exports, the net cost of the rebates was about half the nominal cost. On this basis, Brazil could have issued about $84 million in *avisos* before exhausting the benefits that the higher exports achieved under the assumed initial conditions.

[11] P_A = $46.66, P_N = $23.33, q_{II}^0 = 6.28 million bags, and $q_{II}1$= 8.08 million bags.
[12] Rebates were initiated in late 1965; 1966 is the first whole year during which rebates were paid.

Nonetheless, the value of export tax rebates increased rapidly after 1969 and soon exceeded even this higher level, e.g., the value of the *avisos* emitted averaged $86 million annually in 1971-72.[13] Then, even though the ICA lapsed between 1972 and 1979, the amount of export tax rebates to the same few favored international roasters rose further, averaging $277 million per year (see Table 1) during this period. Note that the size of area E in Figure 2 depends importantly on the existence of a large difference between the export price of coffee and the marginal cost of production, a difference that depends importantly on the existence of an export quota and a quota rent. Since there was no quota from 1972 to 1979, and thus no such price differential between the export price and the marginal cost of production, the rebates could not play any role in price discrimination. They simply reduced the net export tax.

Widespread allegations of corruption associated with the "special deals" caused the IBC to abandon the secret discriminatory contracts in 1979 (Bacha, 1992). The government considered proposals to abandon the use of a Minimum Registration Price and other aspects of the government's coffee management policy, including export rebates, and move instead toward a free market system. This recommendation was rejected "at the highest level of government" (Bacha, 1992) and a decision was instead made to continue use of the Minimum Registration Price, along with the export tax rebates. The IBC then initiated new "standard contracts" under which all importers were to be provided a rebate whenever the Minimum Registration Price exceeded a weighted average of the international prices of Brazil's competitors (Other Milds and Robusta).

This standard contract was justified as being necessary to ensure that Brazilian exports remained competitive even when the Minimum Registration Price was set above the world price.

[13] The annual estimates are adjusted to account for changes in international prices, though these were small throughout this period. The volume of exports also showed little year to year variation.

This was an important policy change. Export export tax rebates were no longer justified as being an instrument to achieve price discrimination, but instead to offset the distortion caused by the Minimum Registration Price.[14] That is, the IBC justified the use of the Minimum Registration Price to ensure a reliable basis for taxing coffee exports and ensuring delivery of adequate foreign exchange. Then, since the administratively determined Minimum Registration Price (P_{MR}) was said to be intermittently higher than the international price of coffee from competitors, the IBC argued that export tax rebates were needed to ensure that private exporters could remain competitive with exporters from other countries during such periods. This argument was widely accepted and was still thought valid throughout much of private industry in Brazil in 1994 when I interviewed many coffee exporters.

In fact, the argument seems to have had no validity. Private private exporters did not sell coffee at P_{MR}, but instead at whatever was the going international price for Brazilian coffee ($P_{A\cdot}$). The government had no control over the price at which coffee was sold internationally and did not even collect data on actual transactions. Exporters indicate that if they sold coffee at a price below P_{MR}, they paid an export tax based on the higher P_{MR} and purchased foreign exchange on the black market at a less favorable rate in order to deliver the requisite foreign exchange to the Central Bank. The Minimum Registration Price thus influenced the residual rent received by exporters, but so long as that rent was positive, the Minimum Registration Price did not impede exports. Export tax rebates were thus not essential to Brazilian competitiveness even within the prevailing distorted policy context. Instead, it seems likely that export tax rebates were maintained after the 1972 IBC "reforms" because the rebates were privately profitable and called forth rent seeking activity to preserve them.

[14] Indeed, throughout the 1980s, the export tax was regularly lower than the difference between PA and PD and thus never restricted exports. As a result, the export tax rebates could no longer be justified as an instrument of price

The shift to standardized contracts was expected to reduce the potential for irregularities that had been inherent in the creation of special deals for favored large foreign importers. However, the shift resulted in the payment of rebates to a much wider set of importers and thus probably facilitated and expanded rent-seeking activity. The value of *avisos* issued did expand and there is ample anecdotal evidence of continued rent-seeking activity during the 1980s.[15]

Indeed, Brazil introduced a new type of *aviso* rebate in 1979, as part of another effort to increase its market share. Brazil was then expecting a return to an ICA quota that had been suspended since 1972, and was negotiating its future quota share once the ICA quota was again imposed. Bacha (1992) notes that Brazil hurriedly introduced new export contracts, offering strong concessions to the big roasting houses in order to guarantee that Brazil's 1979 shipments would not be lower than Colombia's 11 million bags. Brazil was concerned that its negotiating position within the ICA would be harmed if its own exports were lower than those of Colombia.[16] One concession in the new contracts was a "Price-Fall-Guarantee," essentially a cost-free, unilateral hedge covering the period between the date of sale and delivery of the coffee. This hedge ensured importers that signing a contract would not penalize them if the international price subsequently fell. For each sack purchased, importers were to receive a rebate equal to the difference between the purchase price and the lowest price occurring (using a 10-day moving average) between the date of purchase and the expected transit time from Brazil to the purchaser's port of delivery.

Unfortunately for Brazil, the international coffee market collapsed thereafter, obligating

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discrimination.

[15] Several respondents mentioned a Brazilian saying that "only two agencies in the world can issue US dollars, the Federal Reserve Bank and the IBC." Data are not available regarding the amount of *avisos* received by specific importing firms, or how these amounts were determined. That so little information is available regarding the use of *avisos* suggests the possibility of administrative irregularities. See also Jarvis (2000).

[16] Brazil's shipments turned out to be 12 million bags, with a full 3 million being shipped in December.

the IBC to pay out US$1.3 billion and US$2.0 billion in *avisos* in 1980 and 1981, respectively. Together, the amounts rebated significantly exceeded the gross export tax revenue collected during this period. Since coffee quotas had been reimposed in October 1980, Brazil effectively found itself implementing a net export subsidy when exports were quota constrained.

A coffee quota remained in effect through July 1989, except for a brief period in 1986/87.[17] Throughout this period, Brazil maintained a large export tax rebate of the initial type. The early 1980s are the period when major rent transfers appear to have taken place. Brazil paid out large amounts of *avisos*, a coffee quota was in force and the export tax did not constrain exports.

The Effect of Export Tax Rebates on Brazil's Coffee Export Price. Because different policies were followed in different periods when export tax rebates were utilized, it seemed likely that the effect of the export tax rebates should have differed from one subperiod to another. I identified three subperiods for comparison: 1965-71, 1972-79, and 1980-88. During 1965-71, an export quota was in effect, the export tax was greater than the unit quota rent—thus constraining exports to the quota market, and export tax rebates were paid to only a few large importers in exchange for an agreement by these importers to purchase additional coffee. Delfim Netto's theory assumed that the export tax rebate would reduce the constraining export tax, allowing a profitable export expansion with no significant effect on the export price (See Figure 2). However, if the export tax rebate for the favored importers was set too high, it could have induced importers to increase purchasers of Brazilian coffee beyond the quota limit, causing an increase in the nominal export price.

During 1980-88, an export quota was in place, but the export tax was smaller than the

[17] Jorio Dauster was appointed President of the IBC in January 1987. He says he was unaware that *avisos* were causing income transfers to foreign importers, but quickly reduced their use because he thought they were

unit quota rent and did not constrain exports to the member market. Export tax rebates were provided to "all" importers of Brazilian coffee. Assuming that the market was perfectly competitive, Brazil's nominal export price should have risen by the amount of the unit export tax rebate, leaving the net export price unchanged. For example, let there be an initial situation in which there is no export tax and no export tax rebate, where demand is set equal to a fixed supply (the export quota), i.e., $D(p) = x - \beta p = q_A$, with $-\beta$ the slope of the demand curve. This yields the initial equilibrium price, $p_0 = (x - q_A)/\beta$. Then assume that an export tax rebate is paid to importers so that it appears as a net reduction in the export price (as the avisos were paid): $D(p_1 - \alpha) = x - \beta(p_1 - \alpha) = q_A$. The new equilibrium price is $p_1 = (x - q_A)/\beta + \alpha$, i.e., in a competitive market the payment of the aviso reduces the price of Brazilian coffee relative to that of other coffees and induces importers to increase the nominal amount paid for Brazilian coffee. Since the export price rises by the amount of the export tax rebate, the importer enjoys no net gain and Brazil suffers no real loss. However, if the market is not perfectly competitive, importers may not bid up the nominal price by the full amount of the unit export tax rebate, in which case importers enjoy a net gain and Brazil suffer a net loss.

During 1972-79, a somewhat different situation held since no export quota was in effect. Brazil nonetheless imposed a substantial export tax. Since the export tax rebate was always paid to the importer following the purchase, the world market price remained the purchase price from the exporter's viewpoint. The domestic producer price was determined in keeping with the price received by the exporter, net of the gross coffee export tax. However, the foreign purchaser effectively paid a price net of the export tax rebate, with the cost of the rebate being paid from the Brazilian government's coffee export tax revenues. Implementing an export tax rebate

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associated with irregular activities among exporting firms.

reduced the net export tax, should have led to an increase in exports and, as foreign importers moved down their demand curve, a slight decrease in Brazil's nominal export price.[18] Without specific analysis, it is impossible to determine whether the coffee export tax was set at the economically optimal level, though casual analysis suggests that Brazil's coffee export tax was generally set too high as there has been a large erosion of its market share over time. Assuming that the export tax was too high, the use of the export tax rebate may have been welfare improving. However, it would have been more efficient to simply reduce the export tax.

If these broad characterizations are correct, Brazil's payment of an export tax rebate is likely to have had a significantly negative welfare impact only during the 1980-88 period. During 1965-71, the export tax rebates probably led to an expansion of exports to the member market and this expansion may have achieved benefits that exceeded the cost of the *avisos* issued. Regardless, the export tax rebates issued totaled only $220 million and any transfer of rents would have been small. Assuming benefits from expanded exports of about $40 million per year, Brazil's welfare was probably not significantly affected during this period of time. During 1972-79, Brazil issued $1.8 billion in *avisos*. These export tax rebates reduced Brazil's tax revenues (assuming that the export tax was not adjusted), but according to theory the tax rebates should not have significantly affected Brazil's nominal coffee export price and could even have improved its economic welfare. During 1980-88, however, I believe the harmful effect of the export tax rebates was large. Brazil issued more than $6 billion in *avisos* during this short period and, since the export tax did not constrain exports during this period, the *avisos* had no effect on member market export volume. Brazil thus lost heavily unless importers bid up the nominal export price by the full amount of the unit export tax rebate.

Econometric Model. Brazil's domestic coffee export price data are considered

[18] The primary effect of the rebates in this situation is to increase the price paid to farmers and thus expand exports.

unreliable, but Brazilian and other coffees are traded on international markets, e.g., New York. If the use of export tax rebates caused a bidding up of the Brazilian export price, the effect should be evident in the New York market since the price there should reflect the export price plus a reasonably constant amount for shipping and insurance. A simple model of the relationship to be tested is:

5) $P_{SANTOS4} = \beta_0 + \beta_1 Alpha + \beta_2 P_{COMPETITOR} + \beta_3 RS + \varepsilon.$

The dependent variable is the New York price per pound of Santos 4, a major Brazilian Arabica coffee traded on the New York market. $P_{COMPETITOR}$ is the price of a similar Arabica coffee sold by a competitor, e.g., Colombia (MAMS) or Central America (Other Milds). The model assumes that the prices of similar coffees move together over time since they are close substitutes in consumption, save for substantial variations in relative supply (RS) and the potential market distortion created by Brazil's use of a unit export tax rebate (Alpha). Although each of the independent variables in Equation 5) is almost certainly endogenous, I thought Ordinary Least Squares likely to provide more robust estimates than Three Stage Least Squares because of the limited availability of truly exogenous instruments and thus used both. I report estimates for OLS regressions of Equation 5), an analogous model using first differences and also for a system estimated using 3SLS. The approaches provide similar estimates of β and all estimates are highly statistically significant.

I ran two regressions for each specification, one using the price of MAMS and the other using the price of Other Milds as the competitor's price. The supply variable attempted to capture the effect of unexpected changes in relative supply on the assumption that prices are more affected by unexpected rather than expected changes. To form this variable, the ratio of Brazilian to other Latin American exports was regressed on a constant, a time trend, and an

autoregressive term, and the residuals from this regression were used as a measure of the unexpected annual changes in relative supply (RS).[19] Alpha was calculated as the total tax rebates redeemed in year t divided by the total pounds of coffee exported in year t.[20] Alpha measures the average unit rebate in US$ per pound. Monetary values were deflated using the US PPI. Annual data were used for 1960-1991, 5 years prior to implementation of the rebates and 3 years after their end.

In early regressions, the coefficients on relative supply were insignificant and there were unusually large residuals in 1977 (positive) and 1979 (negative). In 1977, Brazil had a year of unusually low Brazilian rainfall and the measure of relative supply apparently did not fully capture the effect of the resulting supply decline. I was uncertain what caused the residual in 1979, but applied dummies to each year. Their inclusion improved the significance of the relative supply variable and did not substantially change the magnitude or significance of any other coefficient. Further, since I expected that the effect of the export tax rebates would differ by period, I utilized dummies for the years 1965-71 and 1972-79 interacting with Alpha to test whether this was true. Thus, the OLS regression utilized was Equation 6).

6) $P_{SANTOS4} = \beta_0 + \beta_1 Alpha + \beta_2 Alpha*D_{1965\text{-}71} + \beta_3 Alpha*D_{1972\text{-}79} + \beta_4 P_{COMPETITOR} + \beta_5 RS + D_{1977} + D_{1979} + \varepsilon.$

The coefficient β_1 thus refers to the effect of export tax rebates during the period that is not covered by the interactive dummies, i.e., 1980-88.[21] The null hypothesis is $0 < \beta_1 < 1$. By the

[19] The same relative supply variable was used in both regressions. I tried forming alternative relative supply variables linking MAMS to exports of Colombia only and OMILDS to exports of other Latin American countries only. These specifications produced highly similar results for the estimates of β_2.

[20] The denominator is the exports of coffee to the member market when a quota was in effect and total exports when a quota was not in effect. Non-member importers may also have received *avisos*, but it is thought that these were few. Exports to non-member importers accounted for about 10% of total exports when the quota was in effect.

[21] The quota lapsed from late 1986 to late 1987. I included an interactive dummy for 1987; its estimated coefficient was negative, as expected, but not significant. Since a relatively small number of *avisos* were issued in 1988 and

theory advanced, β_2 could be positive or negative and β_3 should be negative.

Ordinary Least Squares for Equation 6) results are reported as Equations 6.1 and 6.2 in Table 2. All of the estimated coefficients except that on Alpha*$D_{1965\text{-}71}$ are significant in the regression using MAMS as the competitor coffee. The estimate for β_1 is equal to 0.45, while the estimate for β_3 is -0.40, both as expected. In the regression using Other Milds as the competitor coffee, neither of the interactive dummies is significant, though they have the same signs as before. The estimate for β_1 is 0.5. It appears that Brazil's use of *avisos* caused Brazil's coffee export price to rise relative to those of its competitors, but by only about half as much as the unit export tax rebate itself. As a result, the net export price fell and importers (or their customers) gained greatly during 1980-1986. Brazil effectively transferred a large share of its domestic quota rents from the Federal Treasury to recipients of export tax rebates.

The results from the OLS regressions are biased and inconsistent since the price of Brazilian coffee and those of its competitors are simultaneously determined in world markets. Further, the emission of Brazil's export tax rebates was contractually tied to the difference between the prices of Brazilian coffee and a weighted-average of the prices of Other Milds and Robusta coffees. Thus, the emission of *avisos* was also endogenous. Indeed, if the amounts exported from different countries were a function of the prevailing relative coffee prices, even the relative supply variable was endogenous. I thus estimated the effect of the export tax rebates on the international price of Brazilian coffee using Three Stage Least Squares. The system estimated contained four equations, Equations 7), 8), 9), and 10), one each for the price of Brazilian coffee, the price of a competitor's coffee, the unexpected changes in the supply of Brazilian coffee relative to that of its competitors, and the number of *avisos* emitted by the IBC.

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their use then terminated, the results reported utilize 1980-88 as the omitted period.

7) $P_{SANTOS4} = \beta_0 + \beta_1 Alpha + \beta_2 Alpha*D_{1965\text{-}71} + \beta_3 Alpha*D_{1972\text{-}79} + \beta_4 P_{COMPETITOR} + \beta_5 RS + D_{1977} + D_{1979} + \varepsilon.$

8) $P_{COMPETITOR} = \gamma_0 + \gamma_1 Alpha + \gamma_2 Alpha*D_{1965\text{-}71} + \gamma_3 Alpha*D_{1972\text{-}79} + \gamma_4 P_{COMPETITOR} + \gamma_5 RS + D_{1977} + D_{1979} + \varepsilon.$

9) $Alpha = \varphi_0 + \varphi_1 P_{SANTOS4} + \varphi_2 P_{Competitor} + \varphi_3 RS + D_{1965\text{-}71} + D_{1972\text{-}79} + D_{AVISOS} + AR(1) + \mu$

10) $RS = \lambda_0 + \lambda_1 P_{SANTOS4} + \lambda_2 P_{COMPETITOR} + \nu$

Equation 7) is identical to equation 6). The specification of the other equations is explained when the results are discussed. The system was again estimated once using MAMS and once using Other Milds as the competitor coffee. The results are shown as Equations 7.1 and 7.2 to 10.1 and 10.2 in Table 3. Each of the estimated equations performs well. Nearly all of the estimated coefficients have the expected sign, where a sign is indicated, and most coefficients are statistically significant. The Durbin Watson coefficients showed no sign of serial correlation after an autoregressive transformation was used in the equation explaining the level of the unit export tax rebate, Alpha.

In each of the two equations estimating the price of Brazilian coffee, $P_{SANTOS4}$, the coefficient on Alpha is again highly significant and less than 1. Using a Wald Test, the null hypotheses that the coefficient on Alpha is either zero or 1 are both rejected at the 1% level. Thus, the results again suggest that Brazil's use of export tax rebates increased the export price of Brazilian coffee, but only by about half the amount of the unit tax rebate. Equally important, the coefficients on the interactive dummy for Alpha in the period 1972-79 are negative, as expected, and also highly significant when MAMS is used as the competitor coffee. Using the latter equation, a Wald Test indicates that the hypothesis that the export tax rebates had no effect on Brazil's export price during 1972-79 cannot be rejected at the 1% level, again as

hypothesized. The coefficient on the dummy for Alpha during the period 1965-71 was always insignificant, suggesting that the effect of the export tax rebates during this period could not be distinguished from 1980-88, when an export quota was also in effect. The 1965-71 dummy was not included in the final regression. Each of the coefficients on the competitor's price is positive and significant, as expected, and the coefficients on the relative supply variable are negative, again as expected, and significant when MAMS is used as the competitor coffee. The dummies for supply disturbances in 1977 and 1979 are always significant.

In the equation for the price of competitor's coffee, $P_{COMPETITOR}$, the coefficient on Alpha is positive in the MAMS equation and negative in the Other Milds equation. Although the coefficient is not statistically significant in either equation, the result suggests the possibility that Brazil's use of export tax rebates could have caused a decrease in the prices of its competitors' coffees by improving Brazil's competitive position. The coefficient on $P_{SANTOS4}$ is positive and highly significant, as expected. The coefficient on relative supply is negative and significant when both MAMS and Other Milds are used as the competitor coffee. A negative coefficient was unexpected, but plausible if the increase in Brazilian supply was sufficient to cause the prices of all coffee to decline. The supply of Brazilian coffee was highly variable from year to year and this variation was the main determinant of price variability in all coffees traded internationally during the period studied.

Little information is available regarding the determinants of Brazil's export tax rebates except that these were contractually tied to the difference between the international price of Brazil's coffee and those of its competitors. Each of these prices was therefore included as an independent variable in the equation explaining the level of Alpha.[22] A dummy was also

[22] Because export tax rebates increased the international price of Brazilian coffee and perhaps reduced those of its competitors, any rebate should have been self-reinforcing, increasing future rebates and thereby transferring

included for 1966-1988, since rebates were only issued in this period. Other dummies were included for the periods 1965-71 and 1972-79.[23] The coefficients on $P_{SANTOS4}$ and $P_{COMPETITOR}$ are positive and negative, respectively, and highly significant, as expected. None of the dummies are significant, though all are positive. The equation for Alpha was estimated using a first-order autoregressive transformation since the initial regression had a high DW statistic. The autoregressive term is highly significant.

In the equation for relative coffee supply, the dependent variable is again specified as the unexpected difference in Brazilian supply relative to that of its competitors. In this equation, the estimated coefficients on $P_{SANTOS4}$ and $P_{COMPETITOR}$ are positive and negative, as expected, and highly significant, suggesting that a higher price of coffee brought forth (primarily from storage) a higher supply of coffee of each type. Although hardly any of the variation in the supply variable is explained, it is worth repeating that the coefficients on relative supply in the equations explaining the price of Brazilian coffee and those of its competitors are significant and have the expected signs.[24]

Given some uncertainty whether the supply variable was appropriately specified, I also estimated a three-equation system, excluding the equation for relative coffee supply. The results for these three equations, not shown, were largely the same as those in Table 3. The coefficients on Alpha in the equation for $P_{SANTOS4}$ were about 20% smaller, while the coefficients on Alpha in the equations for $P_{COMPETITOR}$ were somewhat larger in absolute magnitude, but still negative in sign, and their t statistics were higher. These results suggested a greater possibility that

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additional resources to foreign importers at higher fiscal cost.

[23] I tried a dummy for the period 1980-81, but its inclusion caused the coefficients on P_{SANTOS} and $P_{COMPETITOR}$ to become insignificant.

[24] I also tried using the amount of Brazilian coffee exported relative to the aggregate amount of coffee exported by its Latin American competitors. A larger amount of the variance in the dependent variable was explained when this supply variable was used, but the coefficients on the relative supply variable were generally insignificant in the

Brazilian coffee export tax rebates reduced the prices of their competitors' coffees, though it seems likely that the system including the relative supply variable provides better estimates.

It is worth emphasizing that the econometric results are wholly consistent with the hypotheses of the paper. The OLS estimates and the Three Stage Least Squares estimates are highly consistent. Both indicate that the provision of export tax rebates caused an increase in the gross price of Brazilian coffee on the New York market when an export quota was in effect, in 1965-71 and 1980-86, but had no effect on this price in 1972-79, when no export quota existed.

The Incidence of Export Tax Rebates. If the results presented here are broadly accurate, foreign roasters gained greatly from Brazil's emission of export tax rebates. Using the 3SLQ results, the rebates raised the gross export price by about \$0.50/lb for each \$1.00/lb unit export tax rebate during the period 1980-88, providing a reduction in the net price of about \$0.50/lb. The same effect appears to have occurred during 1965-71, but this result is less important since a relatively small amount of rebates were issued in this period. If we consider only the effect of the \$5.9 billion in export tax rebates issued in 1980-88, Brazil transferred \$2.95 billion of its domestic quota rents to foreign importers.[25] Roasters' profits must have increased and foreign consumers probably also benefited as a result of competition among roasters. The rebates significantly reduced Brazil's net export tax revenue. Indeed, Brazil's net export tax revenue was negative in 1980 and 1981.

Brazil's use of export tax rebates also significantly distorted international coffee prices. The rebates increased the gross New York price of Brazilian coffee absolutely and relatively and may have reduced, in absolute terms, the international coffee prices of Brazil's competitors. As an approximate indicator of this effect, Figure 3 shows the estimated absolute increase in the

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equations explaining P_{SANTOS} and $P_{COMPETITOR}$. The coefficients on Alpha were essentially unchanged.

[25] I exclude 1987 since a quota was not in effect during most of the year and 1988 since the amount of rebates

price of Santos 4 in New York caused by the rebates, assuming that the gross price rose $0.47 for each $1increase in the unit export tax rebate during the periods 1965-71 and 1980-86. The effect was small during 1965-71, but large during 1980-86. The maximum effect occurred in 1981, when the export tax rebates increased the New York price of Santos 4 by more than $0.60/lb. This increase implies that the New York price of Santos 4 was 49% higher than it would have been had no export tax rebates been paid. Assuming that the prices of its competitor coffees were similar and unchanged, the price of Brazilian coffee also rose proportionately relative to their prices. On average, rebates increased the New York price during 1980-86 by about $0.21/lb., or about 18% of the counterfactual price.[26]

The use of the export tax rebates is one of several policies used by Brazil that caused the international price of Brazilian coffee to vary sharply and unpredictably relative to that of other coffees. These unpredictable variations were the principle reason that the New York market decided to delist the Brazilian "B" futures contract. The delisting of this futures contract has, even until today, made it much more difficult for Brazilian traders to hedge against risk.

A sense of the overall effects of the export tax rebates is provided in Figure 4, which presents a) the actual New York price of Santos 4, which reflects the effect of the rebates b) the counterfactual New York price that would have occurred had no export tax rebates been emitted, c) the net price paid for Santos 4 by foreign importers who received export tax rebates and d) the percentage change in the New York price of Santos 4 caused by the export tax rebates. As can be seen, the rebates greatly distorted both the gross and the net price of Brazilian coffee and thus significantly affected the international coffee market.

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issued was small.

[26] Although the New York price rose, the net price fell to importers that received rebates.

Given the magnitude of the price effects, it may seem strange that the issue did not come forcefully to light at the time. However, although the price effects of the rebates were large, particularly in 1980 and 1981, they were probably not easily discernible. The coffee market normally exhibits large price fluctuations and these may have masked the price effects of the export tax rebates, as shown in Figure 4. The net price was never publicized. Those who received the rebates had no reason to protest. The change in prices had little effect on country market shares since these were essentially determined by the existence of country export quotas. Thus, Brazil's competitors were probably not greatly affected by the rebates. The main question is why Brazil's federal government did not respond to the growing fiscal cost of the export tax rebates. In large part, it seems that these were hidden within the IBC, which had long been a very powerful and largely autonomous institution that controlled and utilized coffee revenues as it desired (Jarvis, 2001). Greater analysis of this issue is warranted.

Conclusions. The International Coffee Agreement (ICA) restricted world coffee exports from 1965 to 1989 in an effort to increase world coffee prices. The ICA imposed a global export quota that was divided among producing countries, thereby creating significant domestic rents. In Brazil, the largest exporting country, these rents led to significant rent seeking and, ultimately, to significant welfare loss. The greatest component of this loss was associated with the issue of export tax rebates that systematically transferred income from Brazil to foreign importers, though this effect was never recognized.

The Brazilian Coffee Institute (IBC) captured a significant fraction of the domestic coffee quota rent through imposition of an export tax. However, when the coffee export quota was implemented in 1965, Brazil was underselling its quota. As this situation suggested that the export tax was too high, Brazil decided to provide export tax rebates to qualifying purchasers of

its coffee. These rebates were designed to achieve a "price discriminating" reduction in the export tax paid by some importers, thereby increasing Brazil's exports and net export revenues. However, since the rebates conveyed substantial income to recipients, coffee importers avidly sought them. Brazilian policy makers/bureaucrats were apparently persuaded to issue growing amounts of rebates even after the export quota was filled, presumably by rent seeking activity. There is also evidence of significant irregularities in the rebates' use that seems to have benefited domestic exporters as well as some policy makers and/or bureaucrats (Jarvis 2001).

I show econometrically that the export tax rebates stimulated foreign demand for Brazilian coffee, increasing its price relative to those of its competitors. However, Brazil's export price rose less than the amount of the export tax rebate so that the net price fell. This caused a large real transfer of domestic coffee quota rents to foreign importers and/or consumers. Indeed, as a result of the export tax rebates, foreign roasters may have gained more from the ICA quota than did Brazil.

The ICA export quota created a market context within which the export tax rebates appeared attractive to Brazil, i.e., the export quota encouraged further government intervention in the market and, though the rents created, provided the tax revenues that facilitated payment of the rebates. Nonetheless, it is surprising that Brazil used coffee export tax rebates to effectively transfer a large share of its domestic ICA quota rent to foreign roasters. The ICA was designed to increase coffee export revenues for the benefit of coffee exporting countries, not foreign roasters, and foreign roasters had no political muscle in Brazil. Brazilians with whom I talked at the beginning of this study, both in the private and the public sector, consistently expressed a belief that foreign roasters had not received any transfer of rents. Certainly none of the Brazilians that I have talked with believed that such a transfer was warranted. I conclude that

had policy making been informed and rational from a national viewpoint, the use of rebates would have remained small and/or their use would have quickly ceased.

It is still somewhat unclear why Brazil initiated the use of coffee export tax rebates. Perhaps they were only intended as a mechanism to allow price discrimination, though Bates (personal communication) has suggested that the rebates were implemented to share the benefits of the ICA global quota with the large international coffee roasters in at least tacit exchange for their political support within the United States during the negotiation of the ICA (see also Bates 1997). Others, including Jorio Dauster, one of Brazil's chief negotiators in the ICA in a later period, believe that the rebates were initiated only to achieve price discrimination (personal communication). It may be that the roasters perceived a benefit and supported the ICA at least partly on this basis, without Brazil having intended the benefit.

Whatever the origin of the export tax rebate policy, the continuous and expanded use of the rebates over a long period, despite reducing net IBC revenue and worsening Brazil's net terms of trade, points to the insidious nature of rent seeking. Any transfer was strikingly at odds with the Brazilian government's often stated objective that it wanted to use the IBC to offset the roasters' perceived market power and thus achieve better prices and higher revenues from coffee. It appears likely that relatively small gains to a few officials encouraged the continuation and expansion of a policy that eventually imposed enormous costs on Brazil.[27] Other conditions, including a widespread faith in government intervention as a means to improve Brazilian economic welfare, the powerful and largely autonomous IBC, and, during much of the period, a military government whose policies reduced public disclosure of information, increased the

[27] For example, newly appointed IBC presidents—whose average term in office throughout the period of the ICA was 18 months--frequently canceled existing long-term contracts and then signed new contracts with foreign roasters (see Bacha, 1992, for examples), a behavior that could signal rent seeking activity. The IBC had 14 presidents between 1963 and 1987.

potential for rent seeking. The complexity of Brazilian coffee policies during this period, involving administrative prices, subsidies and the simultaneous use of export taxes and rebates, doubtlessly obscured the effects of the rebates and made it easier for observers to accept official arguments that the rebates had a neutral welfare effect.[28] Further research on the political and institutional situation in Brazil may shed additional light on how and why these events occurred.

Although less developed countries are increasingly adopting market oriented policies and eschewing distortions that lead to rent seeking, it is worth noting that the ICA was a commodity agreement created jointly by less developed and more developed countries to increase and stabilize coffee prices. The price increase was expected to benefit coffee producing countries and, particularly, the coffee producers therein. Instead, it appears that Brazil and most other producing countries suffered large net social welfare losses as a result of the rent seeking that the export quotas created (e.g., Bohman, et al.). Within the producing countries, there is reason to believe that coffee farmers lost proportionately most heavily (Bohman and Jarvis, 1996). Developed country importers gained greatly and such gains may have contributed to their longer term political support for maintenance of the ICA (Bates, Jarvis, 2001), as well as their pursuit of export rebates within Brazil. Thus, rent seeking in this case had international as well as national characteristics.

28 Although foreign roasters appear to have received most of the export tax rebates, domestic roasters, domestic soluble producers, and domestic exporters also received sizeable amounts of export tax rebates, especially during the 1980s. Since the *avisos* were negotiable, they provided a convenient instrument for subsidizing the development of the domestic coffee industry.

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Table 1. Annual Emission, Redemption and Outstanding Balance of *Avisos de Garantia*, 1965-88

Millions of $

Year	Emission	Redemption	Cancellations	Outstanding Bal.
1965	0.9	0.6	0.0	0.3
1966	22.8	18.4	0.4	4.4
1967	21.4	23.7	0.6	1.5
1968	15.4	14.5	0.4	1.6
1969	23.3	21.6	0.4	2.9
1970	46.5	46.1	0.3	2.9
1971	95.5	89.9	1.7	6.8
1972	76.8	63.1	4.1	15.8
1973	192.9	192.6	1.1	15.0
1974	104.8	102.2	1.2	16.4
1975	408.3	403.4	1.1	20.2
1976	155.7	149.1	0.5	26.8
1977	391.8	329.6	14.0	75.1
1978	405.9	437.8	5.5	37.6
1979	160.9	163.3	12.8	22.4
1980	1,310.6	1,031.2	5.7	304.1
1981	1,917.0	1,990.5	11.4	273.3
1982	516.9	751.1	10.7	21.8
1983	546.2	559.2	0.4	8.4
1984	628.9	608.2	5.9	23.2
1985	678.2	678.7	3.8	19.4
1986	302.2	304.5	0.3	16.9
1987	134.4	136.5	1.6	13.2
1988	10.8	19.6	0.0	4.4
Total	8,229.7	8,142.1	83.2	NA

Source: Bertone, 1992, from data originally compiled by the Federacao Brasileira dos Exportadores de Cafe (FEBEC).

Table 2. The Effect of Export Tax Rebates on Brazilian Export Price, 1960-1991[@]

Dependent Variable	$P_{Santos\ 4}$	$P_{Santos\ 4}$
	(6.1)	(6.2)
Independent Variables		
Constant	-0.07	-0.04
	(1.18)	(0.59)
Alpha[&]	0.45 [a]	0.52 [a]
	(9.13)	(8.03)
Alpha*$D_{1965\text{-}71}$	0.26	0.32
	(0.56)	(0.53)
Alpha*$D_{1972\text{-}79}$	-0.40[a]	-0.15
	(3.61)	(1.02)
$P_{COMPETITOR}$[@]	0.95 [a]	1.01 [a]
	(24.96)	(18.51)
Relative supply[#]	-0.34[a]	-0.48[a]
	(3.02)	(3.27)
D_{1977}	1.24[a]	0.87[a]
	(12.39)	(5.94)
D_{1979}	-0.37[a]	-0.50[a]
	(4.79)	(4.79)
DW	2.21	2.02
Adjusted R^2	0.99	0.99
F-Statistic	540.13 [a]	304.47 [a]

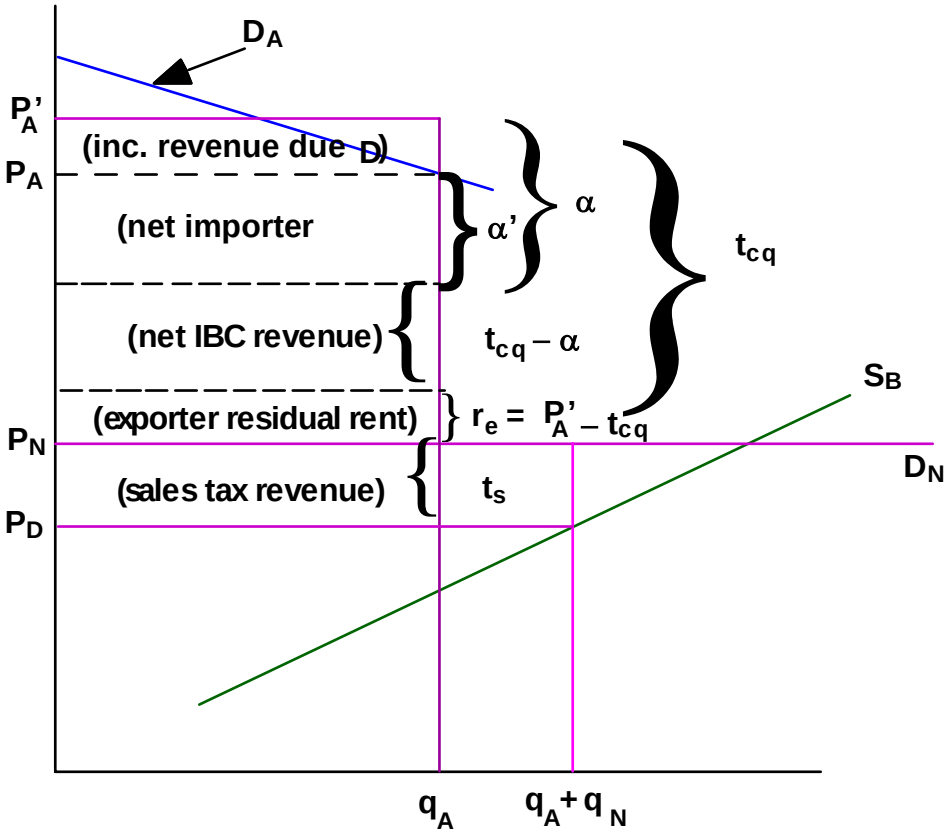
[@] The competitor price in Eqs. 2.1 is that for MAMS and the competitor price for Eqs 2.2 is that for Other Milds, each as quoted on the New York market.
[&] Alpha = (avisos redeemed in year t)/(Brazilian coffee exports in year t), i.e., the unit coffee export tax rebate.
[#] The independent variable is the deviation from trend of the relative supply of Brazilian and Colombian coffee, i.e., $X_{Brazil}/X_{Colombia}$.

[a] Coefficient significant at 1%
[b] Coefficient significant at 5%
[c] Coefficient significant at 10%

Source: Data on prices and exports taken from Bacha, 1992, Statistical Appendix. Data on Avisos from Bertone, 1992.

Table 3: Three Stage Least Squares Estimates of the Effect of Export Tax Rebates				
	$P_{Competitor}$ = MAMS		**$P_{Competitor}$ = OMILDS**	
Explanatory Variables	*Estimated Coefficient*	*T-Statistic*	*Estimated Coefficient*	*T-Statistic*
Equations 7.1 and 7.2 where dependent variable is ***$P_{Santos4}$***				
Constant	-0.01	0.07	0.04	0.30
$P_{Competitor}$	0.92*	13.29	0.95*	8.88
Alpha	0.42*	7.24	0.52*	6.71
$Alpha_{1972\text{-}79}$	-0.50*	3.43	-0.09	0.41
D_{1977}	1.31*	11.42	0.99*	4.95
D_{1979}	-0.35*	4.34	-0.42*	3.24
Relative Supply	-0.45***	-1.93	-0.40	-1.09
Durbin-Watson	2.14		1.96	
Adjusted R^2	0.99		0.99	
Equations 8.1 and 8.2 where dependent variable is ***$P_{Competitor}$***				
Constant	0.72*	6.58	0.56*	6.08
$P_{Santos4}$	0.55*	6.98	0.59*	9.46
Alpha	0.02	-0.19	-0.07	-0.76
$Alpha_{1972\text{-}79}$	0.31	1.06	0.01	0.04
Relative Supply	-1.62*	-3.54	1.48*	4.03
Durbin-Watson	2.25		1.91	
Adjusted R^2	0.83		0.87	
Equations 9.1 and 9.2 where dependent variable is ***Alpha***				
Constant	0.72**	2.03	0.61**	2.37
$P_{Santos4}$	0.59*	2.86	0.82*	5.12
$P_{Competitor}$	-1.04**	-2.62	-1.31*	-4.77
$D_{1965\text{-}71}$	0.04	0.20	0.23	1.40
$D_{1972\text{-}79}$	0.08	0.30	0.30	1.36
D_{AVISOS}	0.23	1.49	0.12	0.97
AR(1)	0.83*	7.02	0.84*	7.62
Durbin-Watson	2.03		1.83	
Adjusted R^2	0.35		0.56	
Equations 10.1 and 10.2 where dependent variable is ***Relative Supply***				
Constant	0.33*	4.31	0.34*	4.97
$P_{Santos4}$	0.25*	2.87	0.33*	4.03
$P_{Competitor}$	-0.45*	-3.93	-0.58*	-5.42
Durbin-Watson	2.36		2.08	
Adjusted R^2	0.13		-0.15	
* ,**, and *** denotes significance at the 1%, 5% and 10% level, respectively.				

Figure 1. A model of Brazilian policy with rent



** All prices, taxes and tax rebates converted to US $*

Figure 3a) Use of export tax rebates to achieve price discrimination in the member market

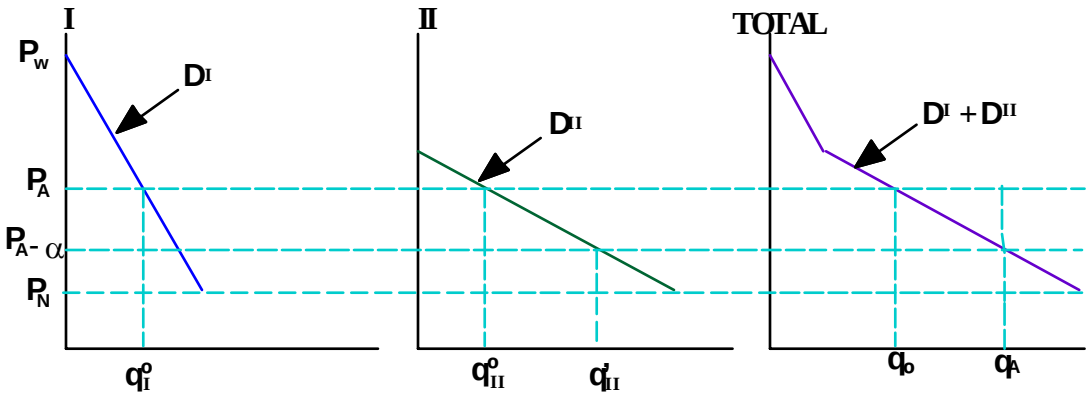


Figure 3b) Net effect of export tax rebates on Brazilian Welfare

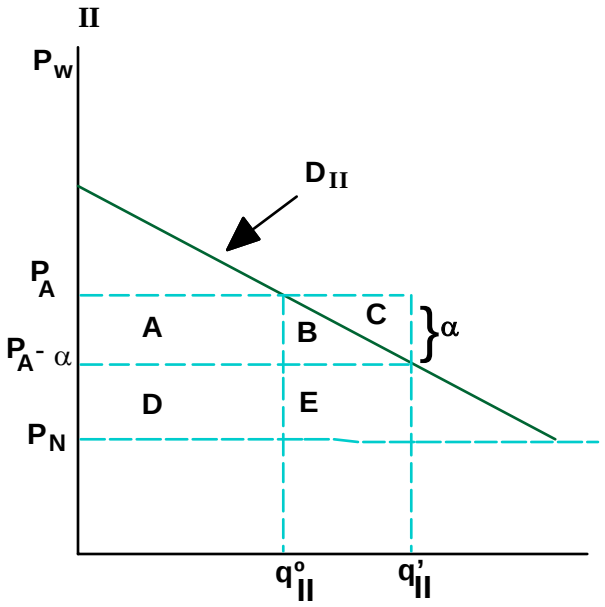


Figure 3. Estimated Effect of Export Tax Rebates on New York Price of Santos 4
US$/lb., 1984=100

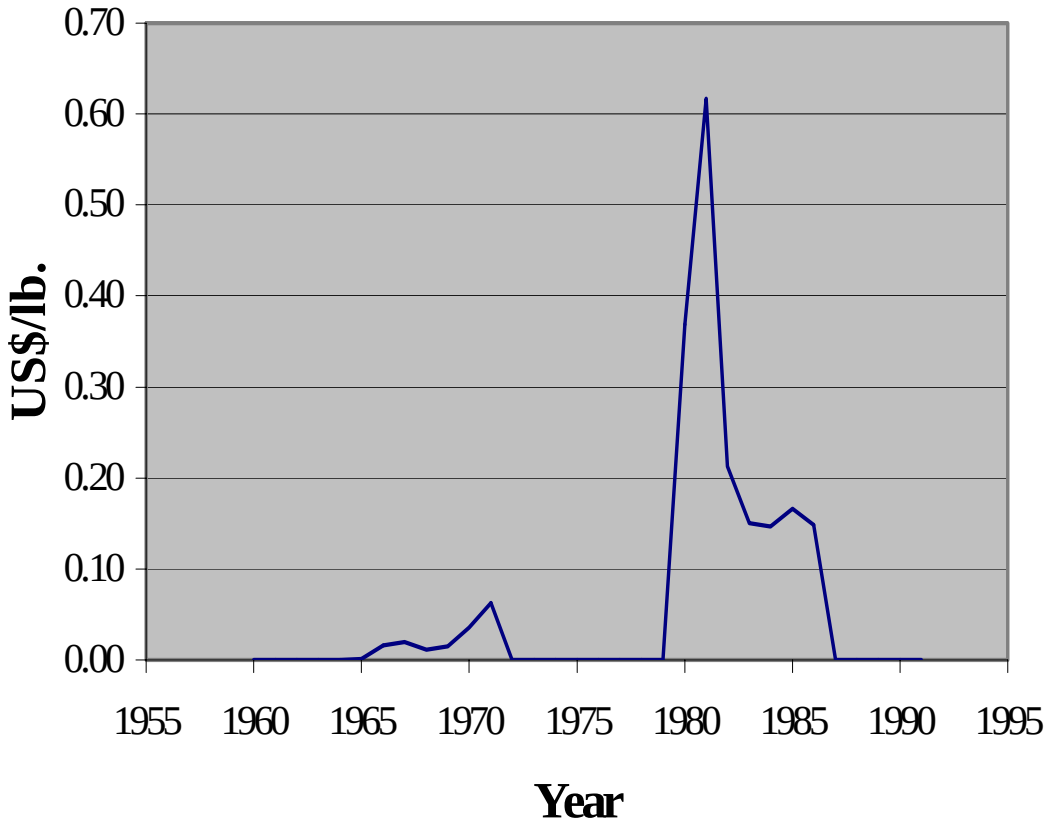


Figure 4. Effect of Export Tax Rebate on International Market