

Food pricing policy and its effects in Costa Rica

The case of rice and beans

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This article describes the National Production Council of Costa Rica's pricing policies in the rice and beans markets over the period 1950-80 and quantifies the costs and benefits resulting from those policies. Changes in production and consumption brought about by the policy are estimated on a yearly basis, as are changes in the welfare of producers, consumers and society in general, and the foreign exchange bill and the CNP's revenues.

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¹Pascuale L. Scandizzo and C. Bruce, *Methodologies for Measuring Agricultural Price Intervention Effects*, World Bank, Staff Working Paper No 394, Washington, DC, 1980, p i.

²M.D. Bale, 'Distribution aspects of price intervention', *American Journal of Agricultural Economics*, Vol 61, No 3, 1979, pp 348-350.

³M.D. Bale and B.L. Greenshield, 'Japanese agricultural distortions and their welfare value', *American Journal of Agricultural Economics*, Vol 60, No 1, 1978, pp 59-64.

⁴M.D. Bale and E. Lutz, 'Price distortions in agriculture and their effects: an international comparison', *American Journal of Agricultural Economics*, Vol 63, No 1, 1981, pp 8-22.

⁵R. Hertford, 'Government price policies for wheat, rice and tractors in Colombia', in T.W. Schultz, ed, *Distortions of Agricultural Incentives*, Indiana University Press, Bloomington, IN, 1978.

⁶D.G. Johnson, 'International prices and trade', in T.W. Schultz, ed, *Reducing the Distortions of Agricultural Incentives*, Indiana University Press, Bloomington, IN, 1978, pp 265-282.

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Governments in developing countries intervene in the agricultural commodities markets with a variety of objectives in mind, eg, the support of farm income, the provision of cheap staples to the populace, the achievement of self-sufficiency in the production of certain crops, or simply stabilization. Scandizzo and Bruce argued that, in the recent past, price intervention policies were based upon an implicit theory of economic development that prevailed among policy makers in developing countries:

There underlying this theory are two suppositions of considerable importance: first, is the assumption that prices do not matter because farmers are not price responsive and, therefore, they can be taxed without a major effect on overall output and without disturbing production patterns. Put in economic jargon, this means that supply is inelastic in both the short and the long run. Second, is the heroic belief that bureaucrats are capable of solving what are in essence a myriad of [sic] simultaneous equations, which are normally solved, however one may dislike the solutions in the market place. It is a heroic belief even in the more developed countries; how much more heroic is it in LDC's with their poor information services and very scarce managerial resources.¹

This has led to policies which are totally opposed to those undertaken in developed countries, in which the agricultural producers tend to be subsidized and the consumers taxed. In developing countries, farmers are usually taxed to pay for often considerable consumer subsidies - from which some farmers may benefit in part.

These kinds of price distortions are being discussed more and more in the literature,²⁻¹⁰ but their effects are seldom researched and quantified. What little research has been done has revealed that the interventions are widespread, and have important effects upon the efficiency of agricultural production, trade, investment and employment, upon cropping patterns and resource use, and upon the distribution of incomes, both within the agricultural sector and in other sectors.¹¹

The case of Costa Rica

Costa Rica's economy was largely agriculturally based before the 1950s.

Table 1. Costa Rica: per capita consumption of basic grains in 1976 (lb/yr).

Grain	Rural	Urban	Total
Rice	119	106	112
Corn	77	20	51
Beans	55	35	46

Source: Gómez and Quintana, *op cit* text, Ref 14.

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ana University Press, Bloomington, IN, 1978.

⁷J.G. García, *The Effects of Exchange Rate and Commercial Policy on Agricultural Incentives in Colombia: 1953–1978*, IFPRI Research Report No 24, Washington, DC, 1981.

⁸Bale Lutz and P.L. Scandizzo, *Price Distortions in Developing Countries: A Bias Against Agriculture*, World Bank Reprint Series No 175, Washington, DC, 1980.

⁹W.L. Peterson, 'International farm prices and the social cost of cheap food policies', *American Journal of Agricultural Economics*, Vol 61, No 1, 1979, pp 12–22.

¹⁰Alberto Valdés, 'Trade policy and its effect on the external agricultural trade of Chile, 1945–1965', *American Journal of Agricultural Economics*, Vol 55, No 1, 1973, pp 154–163.

¹¹Scandizzo and Bruce, *op cit*, Ref 1.

¹²Oficina de Planificación Nacional (OFIPLAN), *Evolución Socio-Económica de Costa Rica 1950–1980*, Editorial Universidad Estatal a la Distancia, San José, Costa Rica, 1982.

¹³OFIPLAN, *op cit*, Ref 12.

¹⁴M.B. Gómez and C. Quintana, *Estimaciones del Consumo de Granos Básicos en Costa Rica – 1976*, Universidad de Costa Rica, IIE, San José, Costa Rica, 1977.

¹⁵In Costa Rica, until recently, all banks were part of the National Banking System and operated under the guidance of the Central Bank. At the time of this legislation since there was no Central Bank, the Banco Nacional de Costa Rica operated as such. Today, all four banks of the system are still state banks, but there are a few private banks whose operations are limited by law. The rural boards are the sections of the banks that deal with agricultural credit and, to a limited extent, technical assistance.

¹⁶Jorge Corrales, *De la Pobreza a la Abundancia en Costa Rica*, Universidad Autónoma de Centro América, San José, Costa Rica, 1981.

In 1950, the agricultural sector contributed 40.9% of the GNP; its contribution declined to about 17.8% in 1980.¹² Between 1957 and 1980, the industrial sector's output grew at an annual rate of 7.8% (in terms of contribution to GNP), rising from 13.4% of GNP in 1950 to 20.4% in 1975, whereas the agricultural sector grew only 4.3% annually during the same period.¹³

In the agricultural sector, basic grains (rice, beans and corn) are second in importance to the export crops and constitute the major part of the diet of most Costa Ricans, who devote 20–25% of their total food expenditure to basic grains.¹⁴ Estimates of per capita consumption of basic grains in 1976 are shown in Table 1.

Farm prices of basic grains are set by the Consejo Nacional de Producción (National Production Council) or CNP. The CNP was founded in 1943, when Law No. 26 created the Sección de Fomento de la Producción (Section for the Promotion of Production), which is attached to the Rural Boards of the Costa Rican National Bank.¹⁵ However, it was not until 1956 that the CNP was converted into an autonomous state institution, through Law No. 2035, which gave it functional and administrative autonomy. The law states that the specific purpose of the CNP is to promote agricultural, animal and marine production, stabilize the prices of the goods necessary to feed the people, and seek a just equilibrium between producers and consumers through market intervention. The law further states that the CNP must set minimum prices to be paid to farmers for each crop before planting begins, and that once the prices are set, they cannot be reduced until after the specified period.

The problem

Government intervention in the basic grains markets can be summarized in the following manner. The CNP sets the producers' price before the planting season and enforces it by being ready to import or export whatever quantities are necessary (it acts as a residual buyer or seller; in the 1970s it bought about 30–35% of the grain production). Wholesale and retail prices are set by the Ministry of Economy. Enforcement at wholesale and retail levels is facilitated by the CNP acting as wholesaler and retailer.

Thus, the CNP and the Ministry of Economy, in their quest for prices that would be 'fair' to both producers and consumers, have distorted or changed the prices of the basic grains from what they would have been in a free-market situation. These distortions usually have important effects on the welfare of producers, consumers and society in general, and often do not produce desirable results. Corrales¹⁶ and others hypothesized that the pricing policies of the CNP amount to taxing producers and subsidizing consumers, with detrimental effects on basic grains production in Costa Rica.

This article describes the CNP's pricing policies in the rice and beans markets over the period 1950–80 and quantifies the costs and benefits resulting from those policies. Specifically, changes in production and consumption brought about by the policy are estimated on a yearly basis and graphed over time. Changes in the welfare of producers, consumers and society in general, as well as in the foreign exchange bill and the CNP's revenues, are also estimated.

The model employed

The basic analytical structure of the model employed is as follows:

Welfare gain of producers (surplus)

$$G_p = - \int_{P_{fd}}^{P_{fw}} AP^\epsilon dp = \frac{Q_{pd}}{(1+\epsilon)P^\epsilon} (P_{fd}^{1+\epsilon} - P_{fw}^{1+\epsilon}) \quad (1)$$

Welfare gain of consumers

$$G_c = \int_{P_{rd}}^{P_{rw}} AP^\eta dp = \frac{Q_{cd}}{P_{rd}^\eta + (1+\eta)} (P_{rw}^{1+\eta} - P_{rd}^{1+\eta}) \quad (2)$$

for $\eta \neq -1$. If $\eta = -1$, then

$$G_c = \frac{Q_{cd}}{P_{rd}^\eta} (\ln P_{rw} - \ln P_{rd})$$

Increase in government revenue

$$G_r = (P_{fw} - P_{fd})Q_{pd} - (P_{rw} - P_{rd})Q_{cd} \quad (3)$$

Net social benefits (losses)

$$NSB = G_p + G_c + G_r \quad (4)$$

Changes in production

$$\Delta Q_p = Q_{pw} - Q_{pd} \text{ where } Q_{pw} = Q_{pd} \frac{(P_{fw})^\epsilon}{P_{fd}} \quad (5)$$

Changes in consumption

$$\Delta Q_c = Q_{cw} - Q_{cd} \text{ where } Q_{cw} = Q_{cd} \frac{(P_{rw})^\eta}{P_{rd}} \quad (6)$$

Increase in the foreign exchange bill (cost)

$$FEB = P_{rw}(Q_{cd} - Q_{cw}) + P_{rw}(Q_{pw} - Q_{pd}) \quad (7)$$

Equation (7) measures the increase in the foreign exchange bill due to government intervention in each market. It is the difference between the actual bill and what it would have been without the policy. All variables in equations (1) - (7) are given in the list of symbols at the end of the article.

The following supply system, linear in logarithms, is postulated to estimate the supply elasticities:

$$\ln Y_i = \alpha + sP^* + \sum_j \tau_{ij} k_j \ln P_j \quad (8)$$

where $P^* = \sum_j k_j \ln P_j$, τ_{ij} is the transformation elasticity between grain i and j , and k_j is the share of grain j of the total value of grains. A Nerlovian partial adjustment is also postulated, which transforms equation (8) into the following equation suitable for estimation:

$$\ln Y_t = \sum_j \gamma k_j \tau_{ij} \ln P_j + s \ln P^* + (1-\gamma) \ln Y_{t-1} + e_t \quad (9)$$

where γ is the partial adjustment coefficient.

Table 2. Estimates of compensated elasticities of demand for basic grains in Costa Rica.

Grain	Rice price	Beans price
Rice	-0.78 ^a (0.28)	0.04 (0.05)
Beans	0.18 (0.34)	-0.10 (fixed) ^b

Notes: ^aCoefficient significant at the 0.05 level; ^bEstimated by Céspedes, *op cit* text, Ref 18.

¹⁷Because of its importance as a basic grain, maize was included in the estimation process, but is not discussed in this article.

¹⁸Victor H. Céspedes, *Costa Rica: La Distribución del Ingreso y el Consumo de Algunos Alimentos*, Publicaciones de la Universidad de Costa Rica, IECES, San José, Costa Rica, 1973.

¹⁹In this article, world prices are border prices.

²⁰The nominal rate of protection at the farm level is defined as: $NPR = (P_{fd} - P_{fw})/P_{fw}$.

Table 3. Nominal rate of protection at the farm level.

Year	Rice	Beans
1950	0.17	-
1951	0.29	-0.48
1952	0.34	-0.39
1953	0.20	-0.24
1954	0.32	-0.41
1955	0.48	-0.44
1956	0.69	-0.14
1957	0.69	-0.15
1958	0.63	-0.13
1959	0.28	-0.51
1960	0.25	-0.09
1961	0.10	-0.16
1962	0.05	-0.15
1963	0.11	-0.37
1964	0.17	-0.28
1965	0.20	-0.36
1966	0.17	-0.18
1967	0.05	-0.54
1968	0.15	-0.63
1969	0.13	-0.19
1970	-0.02	-0.60
1971	0.07	-0.25
1972	-0.27	-0.62
1973	-0.64	-0.74
1974	-0.55	-0.64
1975	-0.29	-0.02
1976	0.12	-0.14
1977	-0.33	-0.35
1978	-0.09	0.06
1979	-0.27	-0.21
1980	-0.20	-0.10

The demand functions are postulated to be of the following form:

$$Q_i = AP_i^\eta P_j^\alpha P_k^\gamma Y^{m_i} \epsilon \quad (10)$$

where Q_i is the per capita consumption (or disappearance) of grain i ; P_i , P_j and P_k are the real prices of grains i , j and k ; Y is the real per capita expenditure; η , α and γ are price elasticities of demand; m_i is the income elasticity of demand for grain i ; A is a constant; and ϵ is a random error term.¹⁷

A description of the data used in the model may be obtained from the author.

Results

Elasticities

Supply elasticities are estimated using the system of equations represented by equation (9). Based on these estimates, elasticities of 0.1 and 0.3 are used for rice and beans, respectively. Because of non-significance of cross coefficients, cross price effects are ignored. Demand elasticities, presented in Table 2, are estimated by equation (10). Beans price elasticity was estimated by Céspedes from a household survey.¹⁸

Price distortions

The estimates of demand and supply elasticities presented above are substituted into the basic structural model to obtain the effects of price distortions in basic grains markets.

Rice. The CNP pricing policy in the rice market is illustrated in Figure 1 which shows that, between 1950 and 1971, the domestic farm price was consistently above the world farm price,¹⁹ and after 1971 consistently below, except for 1975. The domestic and world retail prices had the same relation. Table 3 shows that the nominal rate of protection²⁰ (NPR_i) ranged from 5% to 70% during the first period and from -2% to -64% during the second period.

Beans. In the beans market, the CNP pricing policy was markedly different from that in the rice market. Figure 2 shows that, except for 1976 and 1978, the domestic farm price was consistently below the world farm price. At the retail level, the relationship between domestic and world prices was very similar. The nominal rate of protection ranged from -2% to -74% (Table 3).

Policy cases

At the retail level, policy circumstances for a given year in either of the markets are determined by the domestic equilibrium, the world (border) price and the domestic price fixed by the government. There were six possible price combinations (each determining a separate policy case) which completely describe the circumstances that prevailed in the markets over the period of study. The general model was used in each policy case to measure the changes in the items of interest. Descriptions of the six cases and their effects are given in Figure 3 and Table 4.

In policy case 1, for example, the world (border) retail price is above

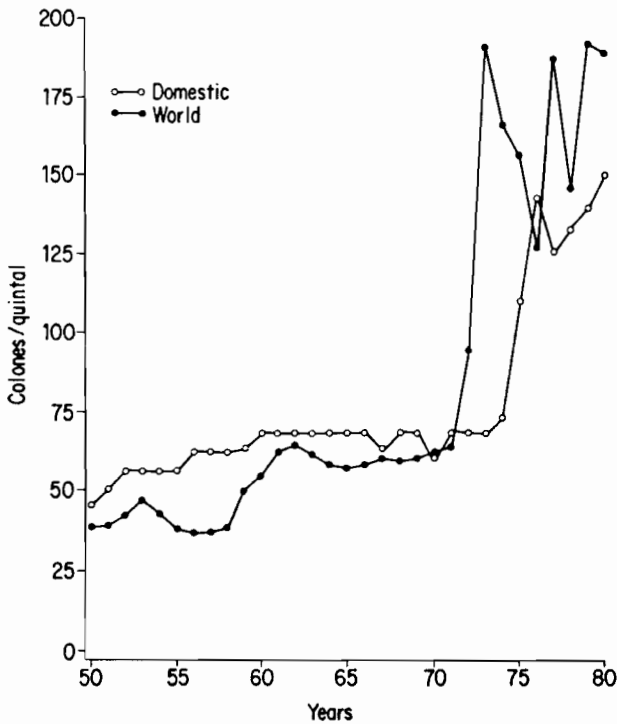


Figure 1. Rice: domestic and world farm prices.

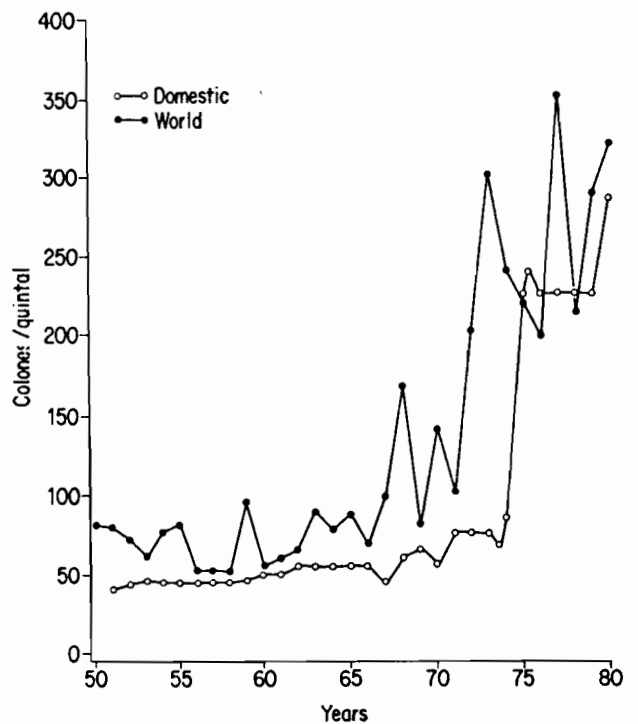


Figure 2. Beans: domestic and world farm prices.

the domestic retail price and both prices are below the price where the domestic supply and demand curves intersect. The effect of the policy is to decrease production and increase consumption, imports and governmental cost. In the rice market, policy case 2 was the most common, occurring 10 years out of 31; in the beans market, policy case 1 was the most common, occurring in 12.

Production and consumption effects

The effects of price distortions on production and consumption of rice and beans over the period 1950–80 are given in Table 5.²¹ On production, beans was the most affected, whereas on consumption it was rice. Table 5 shows that changes in rice production ranged between 0.2% and 10%, whereas in beans production they ranged between 0.6% and 34%. The changes in consumption ranged between 2% and 69% for rice and between 7% and 24% for beans. Figure 4 illustrates the beans production case.

Welfare effects

The average welfare effect of the policy over the whole period is depicted in Table 6. In the beans market, at both the farm and retail levels, the wedge between the domestic and world prices was very large, being frequently more than 100% of the domestic price over the period of study. As a consequence, the producers' welfare loss was significant, averaging 75% of the value of the crop produced at domestic prices, whereas the subsidy to consumers averaged 35% of the value of the crop consumed. In this market, consumers were favoured by the policy, which resulted in a tax to both producers and consumers in more years than in the rice market.

²¹Rigoberto Stewart, *Basic Grains Pricing Policies and Their Effects in Costa Rica*, unpublished PhD thesis, North Carolina State University, Raleigh, NC, 1984.

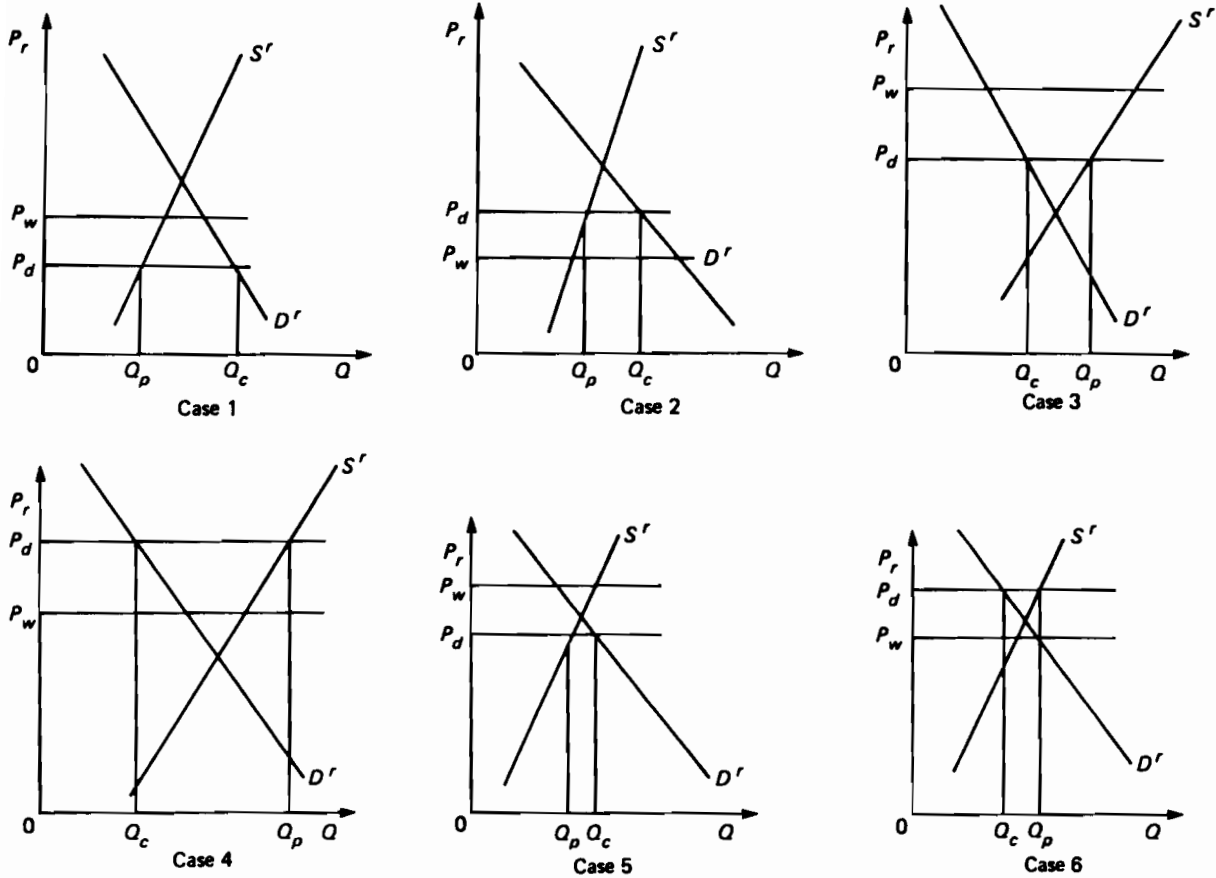


Figure 3. The six CNP price policy cases.

Conclusions

The results of this article show that the marketing board in Costa Rica did not always tax producers and subsidize consumers as hypothesized; the hypothesis was confirmed in the beans market and partially rejected in the rice market.

In the rice market, there were two periods in terms of pricing policies. During the first (1950–71), the hypothesis was rejected and producers were highly favoured, but it was confirmed during the second (1972–80) when the policy was reversed to favour consumers. The policy in the beans market was exactly as hypothesized – except for a few years, both levels of domestic prices were fixed below the corresponding world (border) prices.

Table 4. Six policy cases and their effects in the rice and beans markets.

Policy case	World retail vs domestic retail	World retail vs domestic equilibrium	Domestic retail vs domestic equilibrium	Production	Consumption	Imports	Exports	Government cost
1	>	<	<	-	+	+	0	+
2	<	<	<	+	-	-	0	+
3	>	>	>	-	+	0	-	+
4	<	>	>	+	-	0	+	-
5 ^a	>	>	<	-	+	+	-	+
6 ^b	<	<	>	+	-	-	+	-

Notes: ^aThis policy case forces the country to import instead of export; ^bThis policy case allows the country to move from an import to an export position.

Table 5. Percentage changes in basic grains production and consumption produced by CNP policies.

Year	Consumption		Production	
	Rice	Beans	Rice	Beans
1950	-	-	-	-
1951	-	-	2.6	- 8.0
1952	-	-	2.9	-13.8
1953	- 9.3	+ 9.0	1.8	- 8.1
1954	-16.4	+ 9.1	2.8	-14.9
1955	-21.5	+17.4	4.0	-16.2
1956	-24.5	-20.7	5.4	- 4.5
1957	-28.3	-23.4	5.4	- 4.9
1958	-32.0	-23.3	5.0	- 4.2
1959	-17.2	+20.0	2.5	-19.4
1960	-12.5	-22.6	2.2	- 3.0
1961	- 6.5	-22.2	0.9	- 5.3
1962	- 2.6	-13.5	0.5	- 4.8
1963	- 7.0	+ 9.3	1.0	-13.2
1964	- 9.6	+10.0	1.6	- 9.4
1965	-12.3	+ 8.6	1.8	-12.8
1966	-11.3	+ 7.5	1.6	- 6.0
1967	- 8.7	+13.4	0.4	-20.8
1968	-10.0	+10.7	1.4	-26.3
1969	- 8.9	+12.3	1.2	- 6.1
1970	- 8.0	+11.1	-0.2	-24.1
1971	- 6.0	+22.9	0.7	- 8.6
1972	+16.0	+17.4	-3.1	-25.6
1973	+ 2.9	+10.6	-9.7	-33.9
1974	+69.0	+ 9.2	-7.8	-26.7
1975	+32.6	-11.5	-3.3	0.6
1976	- 3.7	-17.8	1.1	4.0
1977	+34.7	+20.3	-3.9	-12.4
1978	+14.3	-24.0	-0.9	1.8
1979	+27.7	+19.2	-3.1	- 7.1
1980	+19.1	+21.0	-2.2	- 3.2

Source: Stewart, *op cit* text, Ref 21.

Given the distortions and the elasticities of supply, direct policy effects on production were significant only in the case of beans, where production reduction was as much as 75%. Other policies, such as investment in research, affected rice production positively. On the consumption side, rice was the most affected, the changes in consumption ranging from -32% to 69%.

Policy effects on government revenue were detrimental. The average effect over the period was a yearly loss of 18.45 million real colones. The losses, although much higher for rice, were a result of the CNP intervention in both markets. The policies were also detrimental to the foreign exchange bill, causing a drainage of 4.8-8.4 million real dollars per year. Most of this drainage resulted from intervention in the rice market.

Government policies produced social waste that cannot easily be overlooked. Most of this waste was caused by the rice market policy, with a net social loss as high as 51% of the value of the rice consumed, although the average waste over the 1950-80 period was only 4%.

It is concluded that the policies of the CNP were very costly by any standard of measurement, especially if all transfers are considered part of the costs.²² Rice market policies stimulated production and discouraged consumption during 1950-71; after this period, rice production was discouraged and consumption encouraged. In the beans market, the policy discouraged production and stimulated consumption and imports.

It is significant that in 1971, as soon as the price policy was reversed for rice producers, a rice crop insurance was instituted. The rice crop insurance agency lost millions of colones between 1971 and 1980 due to

²²D.G. Johnson, *World Agriculture in Disarray*, Fontana and Trade Policy Centre, London, 1973.

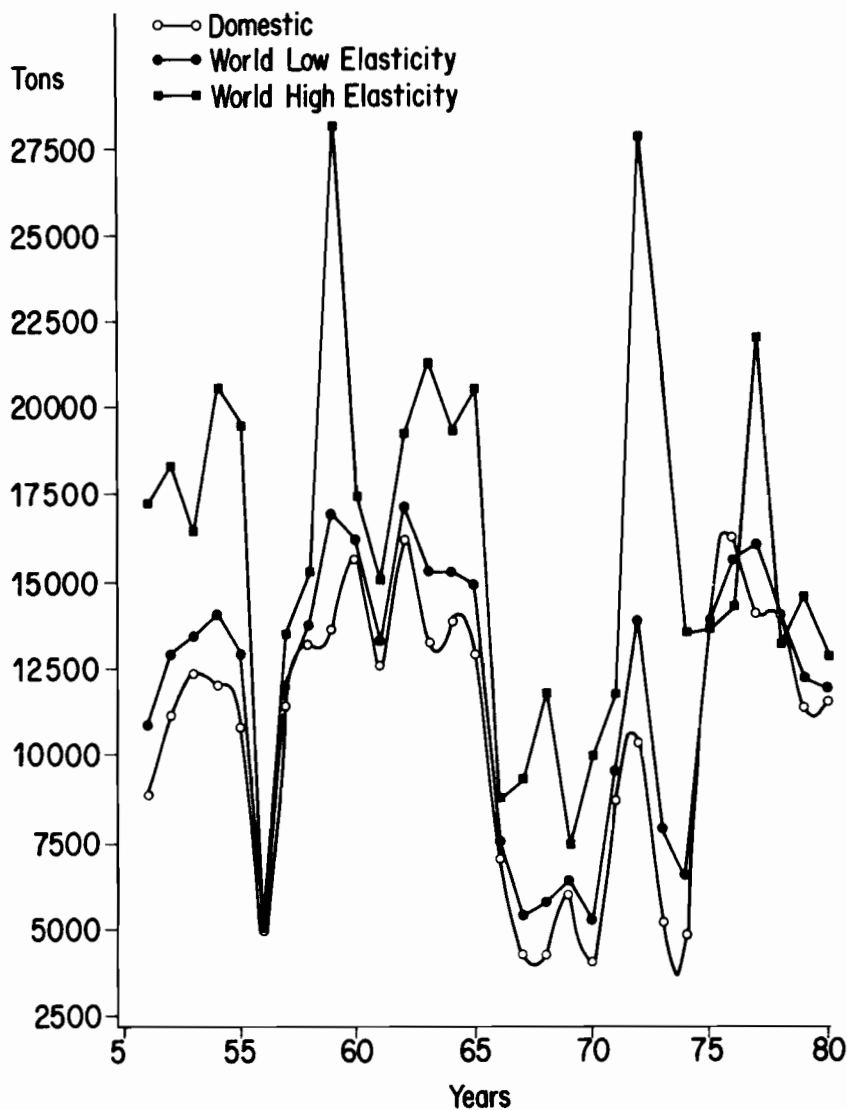


Figure 4. Beans: production at domestic and world prices.

an overwhelming amount of 'disaster' compensation. In fact, this disbursement went to compensate the powerful rice producers for the relative price decline. It is clear that political clout helped to shape pricing policies in Costa Rica. It is not just coincidence that rice producers are wealthy farmers with strong political influence, including individuals with high positions in government. Beans, on the other hand, are produced by very small farmers with no political influence.

Pricing policies of the CNP in the basic grains markets underwent an important change after 1980, most notably in the rice market. The producer price of rice was again set above world prices, and the negative

Table 6. Costa Rica: average effects per year of basic grain pricing policies, in real (1971) currency.

Grain market	Producer surplus	Consumer surplus	Government revenues	Dead weight loss	Foreign exchange ^a
Rice	-21.5	29.5	-21.8	16.2	-(5.7-6.6)
Beans	-15.7	23	-10.3	2.7	-(0.8-3.0)

^aReal dollars.

Source: Stewart, *op cit* text, Ref 21.

effects of the distortion were compounded by the importation of rice through law PL 480. The CNP was losing a considerable amount of money and could not act, since law PL 480 forbids exportation of the surplus, which in any case would have to be done at a loss.

It is important to emphasize that this article focuses solely on market intervention policies of the CNP and the Ministry of Economy, and that the conclusions apply to those alone. The author wanted to answer the question: what would have happened had the CNP and its pricing policies not existed, with everything else constant, including the Central Bank's policy? The implication is that exchange rate policies were not considered. The policies were evaluated taking the foreign exchange rate as given, and thus the official rate was used. Another study could incorporate and evaluate the exchange rate policy along with market intervention policies.

Appendix

List of symbols

FEB	increase in foreign exchange bill
G_c	gain in consumer welfare
G_r	increase (gain) in government revenue
NSB	net social benefits from the policy (dead weight loss)
P_{fd}	domestic farm price (colones per quintal)
P_{fw}	world (border) farm price (colones per quintal)
P_{rd}	domestic retail price (colones per quintal)
P_{rw}	world (border) retail price (colones per quintal)
Q_{cd}	quantity consumed at domestic prices
Q_{cw}	quantity that would have been consumed at world price (tons)
G_p	gain in producer surplus
Q_{pd}	quantity produced at domestic prices (tons)
Q_{pw}	quantity that would have been produced at world prices (tons)
ΔP_c	changes in production due to the policy (tons)
ΔQ_c	changes in consumption due to the policy (tons)
ϵ	elasticity of supply
η	own price elasticity of demand; η_r and η_b
