

**THE LINK BETWEEN FARMGATE AND WORLD PRICES IN THE
WAKE OF TRADE LIBERALIZATION:
THE CASE OF COLOMBIA**

by

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ABSTRACT

This paper evaluates whether trade liberalization in Colombia in 1990-91 increased market integration in 12 commodities that account for some 70 percent of agricultural GDP. Empirical results indicate that for all crops examined, the nature of integration relationships between local and world prices was not altered by reforms. Cotton and cocoa prices retained a high level of association with international markets. Rice, soybeans, oil palm, bananas, and coffee continued to exhibit only some degree of short-term integration but prices continue to diverge from world trends in the long-run. Maize and beef only displayed long-run integration. On the other hand, sugar and sorghum have preserved prices that are effectively isolated from external markets. Generally, results suggest that the majority of tradable agricultural commodities in Colombia have not exhibited high degrees of integration with world markets. This has continued in the post-liberalization period due to the combined effect of strong lobbying groups and policies that have tended to stabilize and/or protect domestic markets, including price bands, import controls, and purchasing agreements with processors.

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1. Introduction

One of the key objectives of economy-wide reforms implemented throughout Latin America since the mid-1980s was the elimination of barriers to trade. Despite strong political resistance, most countries extended trade liberalization to agricultural markets. Hence, greater integration between domestic and world agricultural markets was expected.

In Colombia, trade reforms were implemented between 1990 and 1991. Originally announced as a four-year program of tariff reduction, programmed cuts were accelerated at the end of 1991. A new substantially lower tariff schedule was in place by early 1992. Producers' associations of grains and oilseeds opposed trade reforms, largely because they had obtained substantial benefits from pre-1990 policies, which had emphasized protection, self-sufficiency and price stabilization (García and Montes, 1988). Government intervention guaranteed minimum returns and sheltered farmers from world market volatility. In contrast, producers of exportable crops—such as coffee, bananas and flowers—supported reforms. They expected direct benefits from reduced tariffs on imported inputs and elimination of indirect taxation, implicit in the pre-reform regime.¹

In theory, the new regime should have increased transmission of world market signals to local producers. However, post-liberalization interventions may have obstructed integration. On the one hand, trade liberalization was accompanied by the creation of a variable tariff scheme—known as the price band system—in eight politically sensitive crops. On the other hand, liberalization was followed by a profound agricultural crisis in 1992, caused by currency appreciation, tariff reductions, acute drought conditions and falling world commodity prices (Jaramillo and Junguito, 1993). The crisis prompted the government to adopt a number of ad hoc measures to restrict exposure to international competition in selected crops. Such measures included pressures on local processors to purchase crops at pre-arranged prices, minimum import prices and modifications of the price band methodology. Despite these measures, the value of agricultural imports has grown at a record pace—27 percent annually—between 1990 and 1996.

This study evaluates the extent to which structural change has occurred in the integration of Colombian agricultural markets as a result of the 1990-91 reforms. Econometric tests are developed that take into account the special time series characteristics of agricultural prices. These tests are put in practice with annual data for the period 1970-1997 for 12 crops that account for about 70 percent of agricultural GDP. Crops examined include important export commodities (coffee, bananas, cotton, cocoa and sugar), importables (sorghum, maize, soybeans, palm oil and wheat) and activities in which Colombia has historically been self-sufficient (i.e., rice and beef).

In the next section, a brief account of recent policies that affect market integration in Colombian agricultural markets is presented. The third section discusses benefits and drawbacks of

¹ Krueger et al. (1992) describe how indirect taxation of exportable crops arises with tariff-protection of industrial sectors.

empirical methodologies used in the literature to evaluate market integration. The fourth section presents econometric results. Some conclusions are drawn in the final section.

2. The Trade Policy Regime for Agricultural Crops in Colombia

The agricultural policy regime adopted in Colombia starting in the 1950s was not favorable to the transmission of international price signals to domestic producers.² The protectionist policy regime was based on the government's ability to regulate import flows. Policy makers established prices at planting time for most cereals and oilseeds and regulated the flow of imports to achieve price objectives. In some cases, controls included agreements with processors, who were required to purchase local harvests at pre-arranged prices in order to obtain access to imports. Another important instrument was direct purchases at support prices by IDEMA, the parastatal in charge of agricultural marketing.

Coffee, the main export crop, was subject to a complex taxation system.³ Non-traditional exports benefited greatly from a renewed emphasis on export promotion, initiated in 1967. Bananas, sugar, beef and cotton obtained export subsidies as well as subsidized interest rates to finance exports.⁴ For the case of cotton, policies supported a scheme that attempted to guarantee a steady supply of domestic fiber to textile industries.

Starting in 1990, significant structural changes were implemented in agricultural and trade policies, as part of general deregulation and market liberalization reforms. The policy regime for import-competing crops was dismantled between 1990 and 1991, when the government launched liberalization reforms centered in the elimination of barriers to trade flows. According to this plan, all sectors of the economy were to be exposed to international competition. Trade reform was initiated in October 1990 with the elimination of a large share of permit requirements and other non-tariff barriers for all crops except grains and oilseeds. In 1991, a plan was announced to reduce gradually average tariffs from 38.6 percent to 11 percent in four years, with a slower reduction rate for import-competing agricultural goods. However, all non-tariff barriers were eliminated for grains and oilseeds, as well as the virtual monopoly on grain imports held by IDEMA.

The opposition of some producers' association to reforms and government concerns about its impact on some politically sensitive crops led to the creation of the price band regime in mid-1991. Bands were designed to produce variable tariffs that would filter out extreme price variations from world market signals for eight politically sensitive crops, namely, wheat, barley, rice, maize, sorghum, soybeans, oil palm, milk and sugar.

Falling profitability for farmers generated strong pressure for compensatory measures starting in mid-1992. Initially, the government announced IDEMA purchases for cereals and oilseeds, higher protection for the maize and sorghum price bands, refinancing facilities and a continuation of export subsidies for bananas, sugar cane and flowers (Jaramillo, 1994). In May of 1993, the government announced a "Reactivation Plan." This plan included funds to finance IDEMA purchases, minimum import prices, modifications of the price band methodology to increase protection of substitutes and by-products, lowered tariffs for agricultural inputs, the creation of a safeguard statute, and a temporary ban on imports of chicken parts and powdered milk,⁵

² The pre-1990 agricultural policy regime is described in detail in García and Montes (1988), Machado (1985) and Jaramillo (1994).

³ The complex system of coffee taxes is described in Junguito and Pizano (1997).

⁴ These subsidies were initially known as Certificados de Abono Tributario (CAT) and in the 1980s were transformed into CERTs.

⁵ The prohibition on milk imports was in force from July 1993 to February 1994. The prohibition of shipments of chicken parts was substituted in January of 1995 by a prohibitive tariff resulting from the operation of the Andean price band.

extension of export subsidies to non-traditional crops, further refinancing facilities, subsidies for investment in agricultural infrastructure and an emergency rural employment plan. A new administration reinstated compulsory agreements between producers and agroindustrial firms in 1995.

In 1996, the government and rice producers agreed to a new policy regime based on a strict control of imports. A policy committee was created to decide import quota volumes, with the participation of the government, millers, producers and traders. Since then, the committee has banned imports of white rice, limited the flow of imports to maintain a stable real price to farmers and granted a monopoly of imports to selected millers and traders. The government has also provided funds for a new rice storage subsidy since 1996.

The direct effects of the reforms of 1990-91 were negligible for exportable crops. Nevertheless, falling world prices and exchange rate appreciation depressed sharply real prices of coffee, bananas and cotton.

3. Methodology

The relationship between world prices of agricultural commodities and producer prices has been the subject of some controversy. With data set for a large set of commodities and countries, studies by Hazell et al. (1990) and Quiroz and Soto (1993) concluded that transmission tends to be low, and often non-existent. Both studies suggest that governments across countries have a propensity to undertake interventions that stabilize and isolate domestic prices from external influences. For the case of Colombia, a study by Rueda (1995) yielded similar conclusions for six importable crops in the 1970-92 period. On the other hand, a study for 58 countries by Mundlak and Larson (1990) found that for virtually all cases producer prices move closely with world prices. The study concluded that while governments may intervene in domestic markets, these actions do not seem to obstruct the transmission of signals from external sources.

At the heart of the debate there is an important discussion about the most appropriate econometric methods to test market integration.⁶ The bulk of the early literature, tested for integration by examining price changes and calculating simple correlations. Other studies, including those by Mundlak and Larson (1992), Isard (1997) and Richardson (1978), estimated regressions of domestic producer prices as a linear function of world prices. The estimated relationship was:

$$(1) \quad p_t^d = \mu + \beta p_t^w + \varepsilon_t$$

where p_t^d and p_t^w denote the domestic and world prices of commodity under consideration, μ and β are parameters to be estimated, and ε_t is the error term. The studies tested the "Law of One Price" hypothesis, by testing whether the coefficient β was equal to one and the intercept was zero ($H_0: \mu + 1 = \beta = 1$). Alternatively, tests were performed of whether the price differential ($p_t^d - p_t^w$) was white noise.

Subsequent analyses have shown that estimating (1) and testing the hypotheses described presents two problems. First, it is unlikely that trade and other public policies in commodity markets will lead to a constant zero intercept, required for the null hypothesis to be accepted and for the true price differential to be white noise. Therefore, tests may reject the null, even where there is a strong relationship between international and domestic prices.

The second problem deals with the time-series properties of the series involved. If international and domestic prices are non-stationary, it is not possible to make valid inferences about the

⁶ A review of the methodological debate appears in Fackler (1997).

parameters in relationship (1). Deaton and Laroque (1992) have shown that agricultural prices tend to follow non-stationary processes.

Usually, it is possible to deal with non-stationarity by estimating cointegration relationships. However, use of this methodology may lead to additional problems.⁷ Ardeni (1989) estimated (1) with a data set of agricultural commodities and found that the error terms were non-stationary. He argued that this was evidenced against the Law of One Price. However, using the same data set, Baffes (1991) found that the price differential was stationary, i.e., $(p_t^d - p_t^w) \sim I(0)$.⁸

Inferences about the distribution of $(p_t^d - p_t^w)$ are better grounded in recent econometric advances than testing for (1). However, this test cannot answer important questions about the speed of adjustment in the transmission relationship. To tackle this issue, Baffes (1997) suggested a simple but practical methodology. It begins by considering the dynamic revised version of (1) proposed by Hendry, Pagan and Sargan (1984):

$$(2) \quad p_t^d = \mu + \beta_1 p_t^w + \beta_2 p_{t-1}^d + \beta_3 p_{t-1}^w + v_t$$

where μ and β_i ($i=1,2,3$) are parameters to be estimated, and v_t denotes the error term. Using this model, the non-stationarity problem may be resolved as well as the restrictive nature of (1). Imposing a homogeneity restriction, (2) can be expressed as an Error Correction Model (ECM):⁹

$$(3) \quad \Delta p_t^d = \mu + \alpha(p_{t-1}^w - p_{t-1}^d) + \tau \Delta p_t^w + v_t$$

where $\alpha=1-\beta_2$ and $\tau=\beta_1$. In this relationship, inferences about the parameters will be valid if the differenced series are stationary. Moreover, (3) allows for a useful economic interpretation of parameters. τ indicates how much of a given change in the world price of the commodity is transmitted to the domestic price in the current period (short-run effect). α indicates how much of the past differential between domestic and world prices is eliminated in the following period (i.e., error correction coefficient). Values of τ and α near one reflect rapid adjustment of domestic prices to variation in world prices.

⁷ For example, if the estimate of β is less than one, the price differential will grow across time, even when price movements are proportional.

⁸ Baffes used an alternative way to check if the relationship between prices is one to one, by testing for unit roots in the following univariate process (Engel and Yoo (1987)):

$$(p_t^d - p_t^w) \sim I(0)$$

which is equivalent to assuming a unit cointegration vector between the prices without imposing the $\mu=0$ restriction. Starting from (1) and assuming a unity cointegration vector, then:

$$p_t^d - p_t^w = \mu + \varepsilon_t$$

Taking the expected value and under ideal conditions ($\varepsilon_t \sim (0, \sigma^2)$), the result is $E(p_t^d - p_t^w) = E(\mu)$.

⁹ Without the homogeneity restriction, the relationship is:

$$\Delta p_t^d = \mu + (1 - \beta_2)(p_{t-1}^w - p_{t-1}^d) + \beta_1 \Delta p_t^w + (\beta_1 + \beta_2 + \beta_3 - 1)p_{t-1}^w + v_t$$

With the parameters estimated in this regression, it is possible to test three hypothesis: (a) If $\beta_1 = \beta_3 = 0$, then the markets are segmented; (b) if $\beta_1 + \beta_2 + \beta_3 = 1$, the homogeneity restriction is valid and the markets are integrated in the long run; and (c) if $\beta_1 = 1$, $\beta_3 = \beta_2 = 0$, the integration is short run. Note that the homogeneity condition implies that a long relationship between the prices exists and thus $(p_t^d - p_t^w) \sim I(0)$.

The dynamic model described can be used to estimate the amount of adjustment that has occurred after any given period of time (Baffes, 1997). In the current period, $n=0$, the amount of adjustment (k) takes the value of the short-run parameter τ , which can also be expressed as $k=1-(1-\tau)$. In period $n=1$, k takes the value of $\tau+(1-\tau)\alpha$, which can be decomposed into the effect of the previous period (τ), and the feedback effect, $((1-\tau)\alpha)$ or $1-(1-\tau)(1-\alpha)$. Following the geometric sequence, the amount of adjustment after n periods is:

$$(4) \quad k = 1 - (1 - \tau)(1 - \alpha)^n$$

For values of τ and α close to one, a small number of periods are required for a total adjustment of the domestic price. If $\tau=1$, total adjustment is attained in the current period, while if $\alpha =1$, complete adjustment is achieved by the second period.

Finally, relationship (3) also allows testing for structural break from policy reform, the central aim of this study. The test simply involves estimation of an unrestricted version of (3) in which parameters are allowed to vary across pre and post-reform periods. An F-test can then be formulated to test jointly whether parameters are equal across sub-periods.

4. Results

Annual international and producer price series were obtained for the 1970-97 period for rice, maize, sorghum, wheat, soybeans, palm oil, cotton, sugar, coffee, bananas, beef and cocoa (see Figure 1). In aggregate, these products account for about 70 percent of agricultural GDP. World prices are taken from monthly series from the IMF's International Financial Statistics. Producer prices were assembled from diverse sources, including producers' associations, the Ministry of Agriculture and the Wholesale Price Index. For the case of coffee, domestic and international prices were obtained directly from the Federation of Coffee Growers. Prior to the analysis, all prices were converted to local currency and deflated by the Colombian CPI.¹⁰

To determine the order of integration of the series, augmented Dickey-Fuller (ADF) and Phillips-Perron tests were conducted (See Appendix Table 1) (Dickey and Fuller, 1979; Phillips and Perron, 1988). With the exception of producer prices of rice,¹¹ all price series were found to be integrated of order one and the differenced series are stationary.¹²

Preliminary Evidence

Figure 2 displays NPCs for all commodities examined from 1970 to 1997. Increased integration should result in constant NPCs, that reflect stable non-prohibitive tariffs (Quiroz and Soto, 1993). Visual inspection does not reveal a general flattening out of protection levels after 1991. Stabilization of

TABLE 1 Coefficients of Variation of Relative Prices, 1970-96

Commodity	Coefficient of Variation (%)		F-statistic ^a
	70A-90B	91A-96B	
Rice	26.7	17.5	1.77
Maize	37.8	9.4	11.21
Sorghum	27.4	16.2	2.32
Wheat	26.0	20.9	1.77
Soybeans	35.6	17.2	3.46
Palm	27.3	6.7	41.40
Cotton	21.1	13.5	2.56
Sugar	35.0	17.8	2.05
Coffee	19.1	16.2	0.87
Beef	28.8	25.4	0.79

¹⁰ For calculation of NPCs and regression estimates adjusting for international freight, insurance and port

¹¹ The awkward result for rice may be related to the aimed to maintain a relatively constant level of producer prices.

¹² A test of the stationarity of the price differential between domestic and world prices was also performed using ADF and PP statistics (not included). Generally, tests using annual data find that stationarity can be rejected for maize, sorghum and coffee. For the remainder, the null hypothesis is accepted, although significance levels are low in some cases. With semi-annual data, yields two differences in test results. Stationarity is rejected only for the case of maize. Also, significance levels of acceptance of the stationarity hypothesis increase substantially.

NPC levels after 1991 seems to occur only for cocoa. This is reflected in a large amount of covariation of world and domestic prices in the post-reform period (see Figure 1). On the other hand, sugar and rice display upward trends in protection after 1991, corresponding to widening gaps between producer and world prices. By contrast, palm, soybeans and wheat exhibit downward trends in NPCs in the post-reform sample, confirming the convergence tendency of world and domestic prices after 1991 detected in Figure 1. For coffee, cotton, bananas, beef, sorghum and maize, NPC levels seem to have maintained a high degree of volatility after 1991, displaying no clear tendency for prices to move in unison.

Table 1 displays coefficients of variation (CV) of domestic price relative to world price for all crops. If markets displayed greater integration after reforms, relative prices would tend to stabilize around a value of one and the CV would be expected to fall near zero. However, for most crops, CVs continue to display similar levels of variability of relative prices before and after reforms. Formal tests for changes in CV levels after 1991 indicate that variability has decreased only in the cases of maize and oil palm (see Table 1).

Econometric Results

Table 2 presents results of estimating relationship (3) for each crop for the restricted model, i.e., excluding the possibility of post-reform structural change. The only crops for which the short and long-run coefficients are both significant are cotton, cocoa and wheat. Particularly, for the case of cotton, it is found that a change of \$10 in the world price in terms of local currency results in an adjustment of \$3.4 in the current period and \$1.37 in the following period. As a result, after three years, 95 percent of world price variations are transmitted to domestic prices. Short and long-term responses are somewhat lower than for cocoa and wheat. Changes in world prices lead to corresponding responses in current producer prices of 34 and 26 percent in cocoa and wheat, respectively. Three-year adjustment is 69 percent for cocoa and 71% for wheat.

By contrast, for the case of rice, soybeans, bananas, oil palm and coffee, only the short-term coefficient is significant. Short-term responses in local prices range from a low of 17 percent in oil palm to 39 percent in bananas. In these crops, the lack of significance of the adjustment coefficient implies that remaining differences are never adjusted and domestic and local price levels diverge in the long-run.

For maize and beef, the long-term coefficient is significant—22 and 10 percent—but no short-term integration is detected. The size of the three-year adjustment is 53 and 25 percent, respectively. This suggests that local prices tend to respond with a lag to world price variations and that both price series are cointegrated with world prices.

Table 2. Restricted Model, 1970-1997

Commodity	Adjustment		Short-run	R	DW	3-year
	Constant	Coeff.	Effect	Squared		Adjustment ^a
Rice	288.7 (-0.08)	0.04 (-0.72)	0.32 (3.37)***	0.33	2.53	32%
Maize	843.1 (-0.42)	0.22 (2.23)**	0.08 (-0.35)	0.17	2.78	53%
Sorghum	-717.0 (-0.60)	0.08 (-1.28)	0.09 (-0.51)	0.07	2.61	0%
Wheat	-511.9 (-0.37)	0.27 (3.49)***	0.26 (2.21)**	0.43	1.17	71%
Soybeans	-1744.2 (-0.78)	0.10 (-1.57)	0.24 (2.24)**	0.22	1.93	24%
Palm oil	-5090.8 (-1.15)	0.06 (-0.69)	0.17 (1.74)*	0.11	2.04	17%
Cotton	34768.7 (-1.13)	0.34 (2.27)**	0.81 (4.03)***	0.47	2.45	95%
Cocoa	-19977.3 (-2.97)***	0.22 (5.31)***	0.34 (8.97)***	0.79	2.52	69%
Sugar	607.3 (-0.77)	0.02 (1.95)*	0.01 -0.64	0.14	2.13	5%
Coffee	-25850.0 (-0.96)	0.11 (-1.34)	0.35 (6.07)***	0.62	2.47	35%
Beef	-19933.9 (-1.41)	0.1 (2.00)**	0.07 (0.07)	0.15	1.76	25%
Bananas	93.5 (-0.05)	0.15 (-1.09)	0.39 (3.51)***	0.34	2.46	39%

T-stats in parenthesis. Significance levels *10%, ** 5%, *** 1%.

^a Calculated using only significant parameters.

Finally, sugar and sorghum are two crops where not statistically meaningful short or long-run relationships are found. Local prices do not seem to respond to fluctuations in international markets.

To test whether structural reforms had any impact on the degree of integration, the unrestricted model was estimated for all products, with 1991 as the year for the structural break (see Table 3).¹³ F-tests for structural change do not detect any changes in short or long-run integration after 1991.

In summary, empirical results indicate that after reforms none of the 12 commodities studied increased their level of integration with world markets. Three crops continued to exhibit strong integration, five only short-term responses, two displayed long-term integration and two remained isolated from world market trends.

¹³ Initially, the model was estimated allowing for structural change in the constant in relationship (5). Since results did not detect that the constant was significantly different from zero, the model was re-estimated allowing only changes in the transmission parameters.

Analysis

The empirical evidence presented suggests strongly that recent trade liberalization in agricultural markets in Colombia has not resulted in generalized changes in market integration between local and world prices. None of the 12 commodities studied displayed significant changes in integration levels after reforms.

Since 1970, minor exportable crops such as cotton and cocoa have exhibited relatively high integration with world markets. For these crops, no changes were detected in integration levels after reforms. This result is not surprising for cocoa, where government interventions have been virtually non-existent before and after reforms. The finding also indicates that attempts to protect cotton growers after the 1992 crisis have been overwhelmingly unsuccessful, as reflected in the sharp drop in output levels between 1990 and 1997.

Crops that have traditionally been associated with strong political lobbies—including rice, oil palm, sugar, coffee, beef and bananas—have managed to avoid substantial changes in the degree of transmission of world price signals as well as in the relative volatility of producer prices. A powerful lobby of producers and processors may explain why sugar has managed to remain isolated from world market trends, by obtaining special protection and stabilization treatment from price bands. Similarly, rice, soybeans, oil palm, bananas, and coffee have displayed only partial short-term integration but substantial divergence between world and local prices in the long-term. For the case of rice, the absence of post-reform changes is clearly reflected in the large amount of compensatory measures extracted from the government after 1991, including price bands and substantial import restrictions. For soybeans and oil palm, weak

Table 3. Unrestricted Model, Reform Period Starts in 1991

Commodity	Pre-Reform Period				Post-Reform Period			R Squared
	Constant	Adjustment Coeff.	Short-run Effect	3-year Adjustment ^a	Adjustment Coeff.	Short-run Effect	3-year Adjustment ^a	
Rice	-579.8 (-0.13)	0.06 (-1.8)	0.32 (3.17)***	32%	-0.11 (-0.49)	0.34 (-0.04)	32%	0.33
Maize	1276 (0.58)*	0.21 (2.08)**	-0.03 (-0.13)	51%	0.24 (-0.07)	0.53 (-1.01)	51%	0.21
Sorghum	-127.8 (-0.09)	0.05 (-0.67)	0.01 (-0.03)	0%	0.23 (-0.58)	0.28 (-0.67)	0%	0.1
Wheat	314.8 (-0.21)	0.24 (2.87)***	0.24 (2.01)**	66%	0.65 (-1.33)	0.35 (-0.26)	66%	0.48
Soybeans	-132.3 (-0.05)	0.07 (-1.11)	0.19 (1.77)*	19%	0.29 (-0.34)	0.89 (-1.42)	19%	0.32
Palm oil	-4790.7 (-0.96)	0.06 (-0.65)	0.18 (1.74)*	18%	-0.08 (-0.30)	-0.23 (-0.62)	18%	0.13
Cotton	43468 (-1.17)	0.36 (2.18)**	0.82 (3.58)***	95%	1.07 (-0.64)	0.81 (-0.01)	95%	0.47
Cocoa	-22723.9 (-3.22)***	0.22 (5.42)***	0.34 (9.04)***	69%	0.98 (-1.63)	0.92 (-1.27)	69%	0.81
Sugar	809.6 (-0.85)	0.02 (1.78)*	0.01 (-0.54)	5%	0.03 (-0.23)	0.07 (-0.54)	5%	0.15
Coffee	-34467 (-1.28)	0.11 (-1.42)	0.32 (5.51)***	32%	0.39 (-1.08)	0.65 (2.07)**	65%	0.69
Beef	-23737.2 (-1.49)	0.1 (1.98)**	0.09 (1.09)	27%	0.08 (0.08)	-0.06 (-0.45)	27%	0.17
Bananas	745.9 (-0.41)	0.15 (-1.06)	0.31 (2.32)**	31%	0.62 (-0.54)	0.74 (-1.08)	31%	0.39

T-stats in parenthesis. Significance levels *10%, ** 5%, *** 1%.

^a Calculated using only significant parameters.

integration after reforms is the likely result of price bands. For bananas, local prices have been affected by export subsidies and other government measures to cushion falling prices since

1992. For coffee, results confirm that no substantive changes in the stabilization policies supported by the National Coffee Fund have occurred after 1991.

Maize is a crop with a weaker lobbying group which has gained only short-term isolation. However, local prices tend to follow world trends in the long-run. This is the expected result of price bands, which seem to have closely substituted for prior policy instruments that provided only short-term isolation. For the case of beef, results reflect the importance of domestic factors in determining short-term price variations for a product in which Colombia is essentially self-sufficient. The presence of hoof and mouth disease has kept Colombian beef out of major markets, but the finding of long-term integration indicates that marginal amounts of exports and imports have kept domestic prices connected to world price trends.

5. Conclusions

This paper has evaluated whether trade liberalization reforms in Colombia in 1990-91 were associated with a structural change in market integration in 12 commodities that account for some 70 percent of agricultural GDP. Empirical results did not suggest greater integration after reforms for any of the crops under study.

Before and after reforms, cotton, wheat and cocoa retained a high level of association of producer and international prices. Rice, soybeans, bananas, oil palm and coffee exhibit varying degrees of short-term integration but prices continue to diverge from world trends in the long-run. Maize and beef only exhibit long-run integration. On the other hand, sugar and sorghum have remained effectively isolated from world price changes.

Empirical results suggest that the majority of tradable agricultural commodities in Colombia have not exhibited high degrees of integration with world markets in the 1970-97 period. This result seems consistent with stabilization and import substitution policies prevalent in the pre-1990 period. However, this result does not seem consistent with the expected results of trade liberalization reforms after 1990. For most crops, it is likely that the combined effect of strong lobbying groups and policies that have tended to stabilize and/or protect domestic markets—including price bands, import controls, and harvest purchase agreements—after the 1992 production crisis have neutralized the expected effect of liberalization.

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Figure 2 Nominal Protection Coefficients, 1970-97

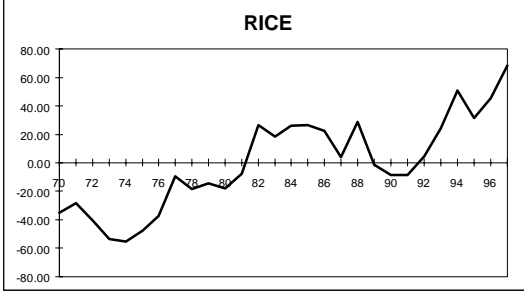
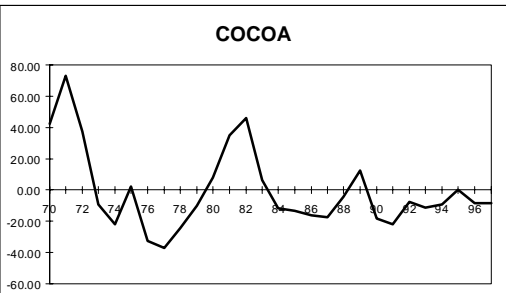
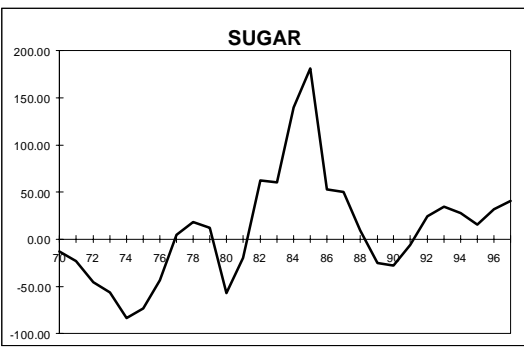
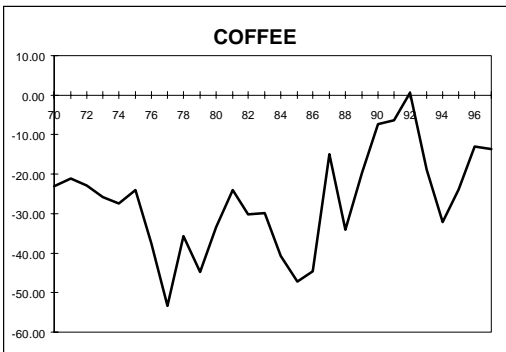
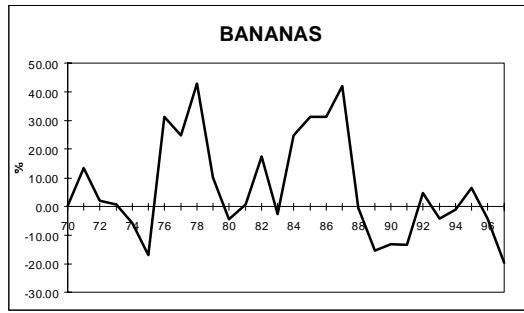
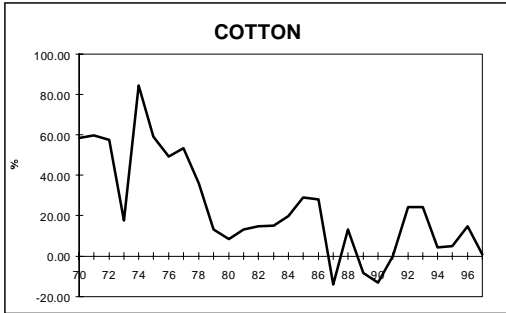


Figure 2 Nominal Protection Coefficients, 1970-97 (cont.)

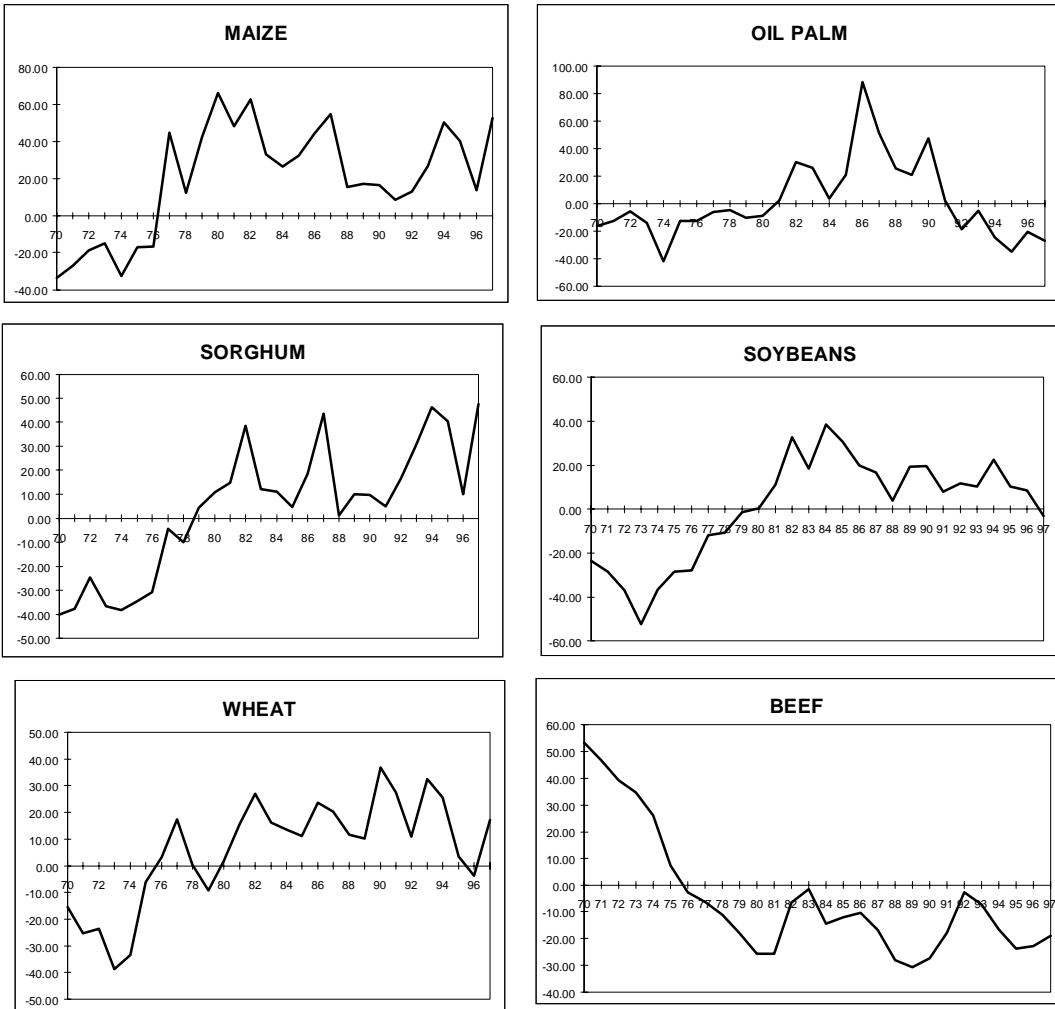


Figure 1 Domestic and International Prices (Pesos of 1990)

