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POLICY RESEARCH WORKING PAPER

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# Unfair Trade?

## Empirical Evidence in World Commodity Markets Over the Past 25 Years

*Jacques Morisset*

Consumer prices for many commodities in industrial countries have increased much more than world prices over the past 25 years. As a result, commodity-exporting developing countries may have lost \$100 billion a year. Who have been the winners?



## Summary findings

Since the 1970s, commodity prices have fallen in international markets at the same time that consumer prices have risen. The price of coffee declined 18 percent on world markets between 1975 and 1993, for example, but the consumer price for it increased 240 percent in the United States. Explanations for such diverging patterns remain largely unexplored in current economic literature.

Morisset examines the spreads between international and domestic commodity prices, explains why they have increased, and analyzes their implications for commodity-exporting countries. He finds that the spreads have increased dramatically because of the asymmetric response of domestic consumer prices to movements in world prices. In all major consumer markets, decreases in world commodity prices have systematically been transmitted to domestic consumer prices much less than have increases. This may have cost commodity-exporting countries more than \$100 billion a year because it has limited the expansion of demand for commodities in these markets.

The asymmetric response, which has been attributed to trade restrictions and rising processing costs, appears to be caused largely by the behavior of international trading companies. Many of these companies are large enough to dominate most commodity markets. Surprisingly, although mainstream economists have suggested imperfect competition in international trade at both the producer and the consumer levels, they have not yet pointed it out at the intermediary level. Free trade requires that all players “sing the same tune”: competition.

Morisset recommends a special effort to understand the determinants of consumer prices and the role of intermediaries at both wholesale and retail levels — starting with the collection of information about the activities of international trading companies. This effort would require the involvement of the World Bank and the World Trade Organization, because they have the resources to undertake such an operation worldwide. Only a better understanding of how these companies operate will remove the suspicion of unfair trade in international commodity markets.

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**UNFAIR TRADE?  
EMPIRICAL EVIDENCE IN  
WORLD COMMODITY MARKETS  
OVER THE PAST 25 YEARS<sup>1</sup>**

Jacques Morisset

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## *Introduction*

Since the 1970s, commodity prices have fallen in international markets. During the same time, however, prices for consumers in industrial countries have risen. For example, the price of coffee declined by 18 percent on world markets but increased by 240 percent for consumers in the United States between 1975 and 1993. Such diverging patterns can be generalized across a wide sample of commodities and countries; from crude oil to coffee; from Italy to the United States, but remain largely unexplored in the current economic literature.

This paper looks at the spreads between international and domestic commodity prices, then explains why these spreads have increased and analyzes their implications for commodity exporting countries. The main finding is that the spreads have increased dramatically because of the asymmetric response of domestic consumer prices to movements in world prices. In all major consumer markets, decreases in world commodity prices have been systematically much less transmitted than increases to domestic consumer prices. This asymmetric response, which has been attributed to trade restrictions and bidding processing costs, appears rather to be largely caused by the behavior of international trading companies. The role of these companies merits greater attention. While more evidence is still needed, I nevertheless show that many of these companies are large enough to have a dominant position on most commodity markets. Whatever the reason for the increasing spreads, their impact has been great: they may have cost commodity exporting countries over US\$100 billion a year because they have limited the expansion of the final demand for these products in the major consumer markets.

This paper argues that a special effort should therefore be made to understand the determinants of the price of each of the consumer goods associated with commodities. This effort should include the collection of information on international trading companies, despite their general protectiveness, in order to improve transparency and competition in these markets. Economists should also attempt to integrate intermediaries, a subject that remains largely ignored by the mainstream literature, in the international trade theory. Ultimately, only a better understanding of these companies will remove the suspicion of unfair trade in international commodity markets.

The paper proceeds as follows. In the first section, empirical evidence on the evolution of the spreads between world and domestic consumer prices is provided for several commodities over the past 25 years. A discussion of the data used throughout the paper is also included in this section. The second section is devoted to the relationship between world and domestic prices using a time-series analysis. Special attention is given to the asymmetric response of domestic prices to variations in world prices. The explanations for this behavior range from trade restrictions to the role of international trading companies, which are reviewed in the third section. The fourth section presents a simple partial model that illustrates some of the potential negative implications arising from the increase in the spreads over the past two decades. The last section contains concluding remarks and possible directions for future research.

### *I. Commodity Markets: Measuring the Variations in Spreads between World and Domestic Consumer Prices*

Consumers in industrial markets can easily observe that prices of coffee, rice, beef, and gasoline have increased almost continuously over the past two decades. When these prices have declined, it has only been because of the short-term corrections to episodes such as the oil price shocks in the 1970s. This generalized increase in consumer prices can be contrasted with the declining long-term trend of world commodity prices; for example, the World Bank's non-fuel commodity index declined by 11 percent in nominal dollars or 42 percent in constant dollars between 1980 and 1994.<sup>2</sup> It is not surprising, therefore, to find that the spread between the international and domestic commodity prices increased dramatically during this period. This section shows, first, how to measure the variations in these spreads and then gives the results for a sample of commodities and countries over the period from 1970 to 1994.

The variations in the spread between world and domestic consumer prices can be measured by the following standard equation (expressed in log-variations):

$$(1) \quad \Delta\mu_{ij} = \Delta p_{ij} - \Delta(e_j p^*_i)$$

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<sup>2</sup> Source: "Commodity Markets and the Developing Countries", World Bank Quarterly, February 1996.



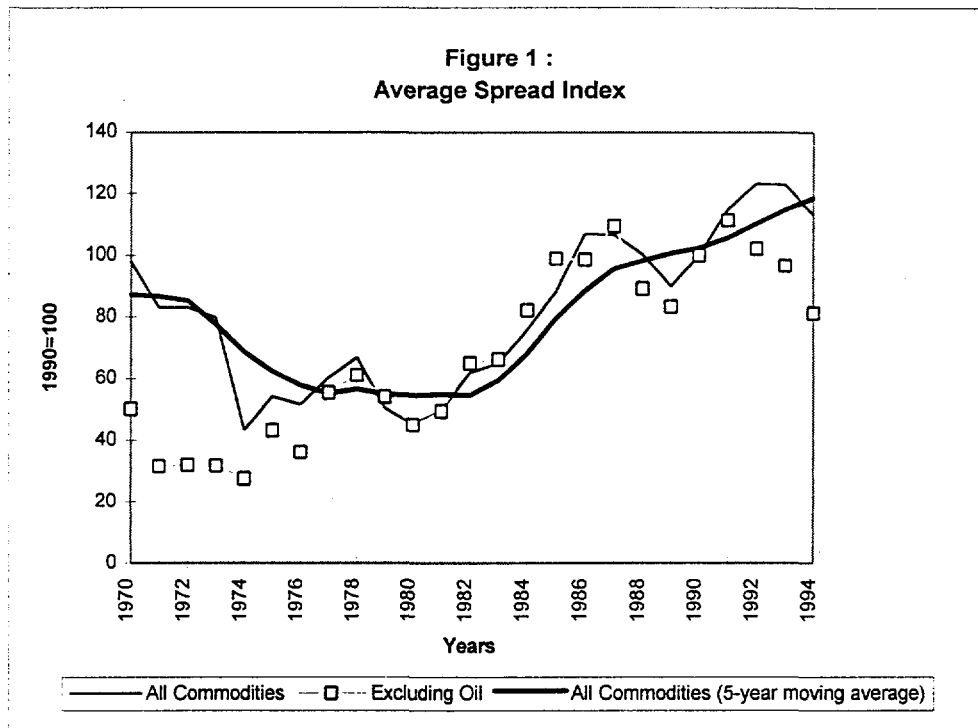
where  $\Delta\mu_{ij}$  is the variation in the spread (or markup) associated with product  $i$  in country  $j$ ,  $p_{ij}$  the domestic consumer price of product  $i$  in country  $j$ ,  $e_j$  the nominal exchange rate (dollar/local currency) in country  $j$ , and  $p^*_i$  the world price of commodity  $i$ . Domestic consumer prices rather than producer prices are used to capture the final demand for these products. Equation (1) reflects the evolution of the spread over time, but it does not provide information on its size at any given point in time. The variations in the spread can be the result of multiple factors that will be reviewed in the following sections of this paper.

This equation was applied to a sample of seven commodities: bananas, beef, crude oil, coffee, rice, sugar, and wheat. These commodities were selected with several factors in mind. One aim was to choose commodities that have as little processing as possible in order to limit the influence of exogenous factors. Another goal was to provide variation in terms of the types of products. For this reason, five of these commodities are produced in both industrial and developing countries, while two are tropical products (coffee and bananas). Only one mineral commodity (crude oil) was selected because it is hard to match one specific final product with such mineral commodities. The eight following pairs of commodities/consumer products were associated: bananas/bananas; beef/beef; crude oil/fuel oil; crude oil/gasoline; coffee/coffee; sugar/sugar; wheat/bread; rice/rice.

The data on domestic consumer prices were compiled on an annual basis for the six following countries: Canada, France, Germany, Italy, Japan, and the US. The choice of an annual frequency primarily reflects the need to economize on data collection efforts. All data were handcopied from government publications of these respective countries. This sample was constrained by unequal access to comparable national sources for all countries at a fairly desegregated level in the World Bank/International Monetary Fund Library in Washington, D.C. (see Annex A). Nevertheless, these countries should capture a large portion of worldwide consumption. In addition, the differences in their trade and tax policies as well as their production structures should guarantee enough diversity for the sample. International commodity prices were drawn from the World Bank data base (see Annex A). Finally, the exchange rate for every country was defined as the annual average rate reported in the IMF's International Financial Statistics.

The results show an unambiguous positive long-term trend in the spreads. For presentation purposes, the results are reported in index values rather than in percentage variations in Figure 1 and Tables 1a and 1b. The base year is 1990 for all variables (1990=100). Figure 1 shows that the (arithmetic) average spread for all commodities (and all

countries) has followed a positive trend over the past two decades, with an acceleration during the 1980s. To account for the annual volatility produced by seasonal and climatic factors in commodity markets, the trend is best captured by the 5-year moving average of the spread index., which doubled from a value of 51 to 117 between 1975 and 1994. The decline in the early 1970s is principally explained by the behavior of oil prices since the average index, which excludes this commodity, actually increased during this period. Finally, the recent reduction in the spread observed during the period from 1993 to 1994 is principally explained by the sugar and coffee commodities, whose prices fell dramatically.



The increasing trend in the spread is robust across countries and commodities. The spreads surged in all industrial countries between 1975 and 1994, ranging from an increase of 80 percent in the United States to almost 150 percent in Japan (Table 1a). Among the European countries, the strongest increase was observed in Italy, followed by France and Germany. Similarly, the spreads rose in all commodity markets, by descending order from the coffee to the banana markets (Table 1b). Most spreads declined in the first half of the 1970s due to unexpected commodity price booms, but they more than recovered during the 1980s. As a result, only the spread for crude oil/gasoline was still lower in 1994 than in the beginning of the 1970s. Finally, the secular increase in the spreads is also demonstrated when

**Table 1a:**  
**Spread Index by Country (1990=100) a/**

	1970-74	1975-79	1980-84	1985-89	1990-94	Variation 1975-94
<b>CANADA b/</b>						
Average	97	56	66	100	105	87%
Average (excludingoi)	63	54	68	97	102	90%
<b>FRANCE b/</b>						
Average	70	54	49	96	109	103%
Average (excludingoi)	42	49	49	86	105	114%
<b>GERMANY c/</b>						
Average	93	62	59	95	117	90%
Average (excludingoi)	57	51	61	92	107	112%
<b>ITALY b/</b>						
Average	65	53	53	90	118	124%
Average (excludingoi)	35	40	57	86	112	182%
<b>JAPAN</b>						
Average	62	56	62	112	133	138%
Average (excludingoi)	44	50	62	108	126	153%
<b>UNITED STATES</b>						
Average	83	61	82	113	110	79%
Average (excludingoi)	56	60	90	122	112	87%

Notes:

a/ Annual average of all commodities for each country

b/ Excluding bananas

c/ Excluding bananas and rice

**Table 1b:**  
**Spread Index by Commodity (1990=100) a/**

	1970-74	1975-79	1980-84	1985-89	1990-94	Variation 1975-94
Wheat/ Bread	37	39	47	82	106	173%
Coffee/Coffee	48	36	44	60	102	180%
Sugar/Sugar	55	55	98	171	136	147%
Rice/Rice b/	31	40	43	69	80	101%
Bananas/Bananas c/	103	97	95	112	120	24%
Oil/Fuel	123	64	58	110	127	98%
Oil/Gasoline	175	82	51	104	128	57%
Beef/Beef	45	53	66	86	105	100%

Notes:

a/ Annual average of all countries for each commodity

b/ Excluding Germany

c/ Only for the US and Japan

the coverage period is extended to the 1960s, at least for countries where the data was readily available (France, Italy, and the United States).

## *II. The Asymmetric Response of Domestic Consumer Prices to Changes in World Prices*

Why did the results presented above show a dramatic increase in the spread of most commodity prices over the past two decades? The answer lies in the asymmetric response of domestic consumer prices to changes in world prices. This section presents a simple empirical model of the relationship between the variations in world and domestic prices and then examines the asymmetry in this relationship for the sample of commodities surveyed in this paper.

The model used in this section is based on the approach developed by Mundlack and Larson (1992), and briefly summarized here. This model assumes that world prices play a significant role in setting domestic consumer prices but that exporters can discriminate prices by using their monopolistic power.<sup>3</sup> As a result, the impact of world prices on domestic prices is likely to vary across export destinations and commodities. The model also predicts that domestic prices will be influenced by the nominal exchange rate ( $e_{jt}$ ), labor costs ( $w_{jt}$ ), and the lagged domestic prices ( $p_{j,t-1}$ ). Labor costs should capture processing costs in the importing country<sup>4</sup> (see explanation in the next section), while the lagged dependent variable accounts for the presence of accumulated stocks and fixed-in-advance contracts between buyers and sellers in most commodity markets (see Anderson and Tyers [1992]). Other factors, such as changes in income in the destination market, may also play a role, although most would be of secondary importance due to the magnitude and variability of world commodity prices relative to changes in income. Transportation costs, marketing costs, trade barriers, and health and safety regulations that create subtle product differentiation were not introduced into the model due to the lack of homogenous data. The influence of these factors will therefore be examined in the next section.

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<sup>3</sup> This approach is similar to the one followed by the authors interested in the transmission of exchange rate variations to domestic prices, the so-called "pass-through" literature. See Knetter (1993), for a good summary.

<sup>4</sup> Labor costs were measured as the average unit labor cost in each industrial country covered in our sample. The data were extracted from the International Monetary Fund or UNIDO.

The general model of domestic consumer price adjustment I propose to estimate for the seven commodities in the six main consumer markets covered in this paper can be written as follows:

$$(2) \quad \Delta p_{ijt} = \beta \Delta p^*_{it} + \gamma \Delta e_{jt} + \rho \Delta w_{jt} + \phi \Delta p_{ijt-1}$$

All variables are defined in the text. The coefficient  $\beta$  is the elasticity of the change in the domestic price with respect to the change in the world price, to be referred to as the elasticity of transmission. The statistical interpretation of the  $\beta$ 's is straightforward. A value of 1 implies that the variations in world prices are fully transmitted to domestic prices. However, a perfect correlation should not be expected since the commodity price is unlikely to account for 100 % of the consumer price. What I try to show first is that there exists a significant and positive relationship between these two prices and then, that this relationship is asymmetric. The above equation was estimated for six countries and seven commodities from 1975 to 1994 using the random-effect estimation technique (see detailed results in Annex B). Bananas and rice were dropped because the data on their consumer prices were not available for all industrial countries surveyed in this paper.

Overall, the estimated elasticities of transmission indicate a positive and significant relationship between world and domestic prices in commodity markets (Table 2). The values of the elasticities are relatively low but such results can be expected with regressions in variations rather than levels.<sup>5</sup> A large portion of the price transmission seems to be made within one year, in contradiction with the results found by Anderson and Tyers for the 1960s and 1970s. The difference may be due to the more recent coverage period used in this paper, for it reflects the emergence of the large commodity funds in the 1980s, which have increased arbitrage opportunities and possibly shortened the transmission time between world and domestic prices.<sup>6</sup>

So far, the model assumes that upward and downward movements in world commodity prices have been equally transmitted to domestic prices. But, in reality, the elasticity of transmission may differ in periods of increasing or decreasing world prices. For

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<sup>5</sup> I use variables in first differences to reduce the possibility of spurious correlations associated with time-series data when measured in levels.

<sup>6</sup> For a study of the long-term relationship between world and domestic prices, a co-integrated approach could be developed along the lines followed by Palaskas (1995). However, the limited number of annual observations for each commodity prevented a similar approach in this paper.

example, the surge in oil price was almost perfectly passed on to domestic fuel prices in the early 1970s, but the decline of 30 percent observed in the early 1990s was not transmitted to domestic gasoline prices, which actually rose on average by 5 percent in the six countries surveyed in this paper. More generally, the asymmetric response of domestic prices was tested by estimating equation (2) for the years of increasing and for those of decreasing world prices. The results for these two respective sub-periods are presented in the “Upward Movements” and “Downward Movements” columns of Table 2.

**Table 2:**  
**Short-term and Long-term Elasticities of Transmission**

	Total Period		Upward	Downward
	Short-Run	Long-Run	Movements <sup>a/</sup>	Movements <sup>a/</sup>
Coffee	.25	.34	.31	.15
Sugar	.03	.06	.15	-.04 *
Wheat	.03*	.05	.23	-.13
Beef	.10	.11	.26	.12*
Gasoline	.15	.15	.24	.17
Fuel	.13	.14	.32	.16

Note: (\*) not significantly different from 0 at a 5 percent level.

a/ Only short-term elasticities are recorded because the long-term elasticities cannot be estimated for upward and downward movements due to the discontinuity of the years analyzed.

The empirical results seem to support the hypothesis of asymmetric transmission of movements in world prices in all commodity markets. The elasticity of transmission has always been much higher, on average 3.4 times higher, when the world prices were increasing rather than decreasing. Any decline in the international prices of sugar and beef is unlikely to be passed on to consumer prices, while reductions in petroleum and coffee prices are transmitted but much less than the corresponding increases. If upward movements are perfectly transmitted but downward movements are not the spread between world and

domestic prices will increase continuously over time, as reported in the first section of this paper. By comparison, Knetter [1993] found the inverse result for a sample of manufacturing products. Prices adjusted more rapidly to exchange rate depreciation (equivalent to a decline in world prices), suggesting that exporters of manufactured goods choose to increase their market shares rather than their markups. Similar behavior could not be shown in commodity markets.

Finally, the transmission from world to domestic prices has been remarkably similar in all consuming countries surveyed in this paper. The elasticities of transmission do not significantly differ across countries, as shown by the weak performance of the fixed-effect technique.<sup>7</sup> This finding was confirmed by the fact that the spreads of each commodity moved jointly in all industrial countries. The cross-country contemporaneous correlation between the spreads ranges from a minimum of 0.53 in the fuel market to a maximum 0.95 in the gasoline market (Annex C).<sup>8</sup> Since international effects appear to be more important than host-country effects in explaining the asymmetric response of domestic prices, the next section focuses exclusively on these effects.

### *III. How to Explain the Asymmetric Response of Domestic Prices*

Explaining the growing spreads and the asymmetric price transmission is clearly a matter of investigating the determinants of the price of each of the consumer goods in my sample. One approach is to carefully examine each product in every country. The quantity of data required is clearly beyond the scope of this paper. A second possibility and the one I have selected follow a global approach that is, in my view, justified by the homogeneity of the increasing spreads across countries and commodities.

There are multiple possible explanations for the asymmetric response of domestic prices to changes in world commodity prices, which obviously, cannot occur in a frictionless competitive model of trade. The two most popular explanations are the presence of trade restrictions in the main consumer markets, and increasing processing costs that act as bottlenecks in the trade of commodities. Still, these two explanations seem to be a drastic simplification of the reality. While no consensus will emerge yet, this section suggests that

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<sup>7</sup> Results are available upon request.

<sup>8</sup> Notice that, on the contrary, the variations in the spread of different commodities are only weakly correlated within each country (see Annex C for a presentation of the contemporaneous correlation).

the market power of intermediaries, international trading companies, is another possible explanation for the asymmetry. Surprisingly, their role has been largely ignored in the economic literature.<sup>9</sup>

The first explanation is based on the existence of trade restrictions in most industrial countries, and has been used by many authors interested in explaining the asymmetric transmission of exchange rates (see Knetter [1993]). It suggests that in the presence of binding quantity constraints in export markets, the decline in world commodity prices will not be transmitted to domestic prices because there is no incentive for exporters to stimulate the final demand by reducing their selling prices. Exporters will instead increase their margins. Empirical support to this theory is provided by the numerous import barriers faced by commodity exporters in consumer markets (see Anderson and Tyers [1994] for examples). The asymmetric transmission of world commodity prices has also been enhanced by using instruments specifically designed to insulate domestic producers from lower world prices. Perhaps the most notorious examples are the levies and variable tariffs adopted as part of the European agricultural policy, but examples can be found in other industrial countries as well (see Mitchell and Duncan [1987]).

The second explanation for the asymmetric response of domestic prices is that exporters face a series of binding internal constraints when they want to increase their sales abroad. For example, Foster and Baldwin [1986] introduce an approach using a fixed proportion marketing technology that is required to sell products in the foreign markets. This approach predicts that declines in world prices will be only imperfectly transmitted to domestic prices because, if existing sales are constrained by marketing capacity, exporters will compensate for increasing marketing costs by raising their selling prices. This increase will partially offset the initial impact of declining world prices on domestic prices. Since there is no similar constraint on higher world prices, one might expect more domestic price adjustments to occur with rising than with declining world prices. Potentially, this bottleneck approach can apply to a variety of costs, such as processing, distribution, marketing, and transportation, all of which play a significant role in setting domestic prices in commodity markets.

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<sup>9</sup> The market power exerted by exporting countries is not considered in this paper. These countries can influence world prices but certainly not their transmission to domestic consumer prices. The role of national marketing boards and producers' cartels is a different issue that clearly goes beyond the scope of this paper.



**Table 3:**  
**Spreads and Effective Rates of Protection (ERPs)**  
 (Percentage change between 1986-88 and 1989-93)

		Europe <sup>a/</sup>	Japan	United States
Sugar	ERP	-38%	-16%	-49%
	Spread	-13%	-16%	-34%
Wheat	ERP	-36%	-24%	0%
	Spread	9%	1%	7%
Coffee	ERP	na	na	0%
	Spread	23%	33%	45%
Beef	ERP	17%	-54%	-33%
	Spread	7%	6%	6%
Rice	ERP	-33%	-20%	100%
	Spread	6%	-1%	4%

Sources: Ingco (1995) for the effective rates of protection and my calculations for the spreads.

Notes:

a/ Only Germany, France, and Italy

The contribution of trade restrictions and bottleneck costs to the asymmetric response of domestic prices might not be as important as appears at first sight. Indeed, the variations in trade restrictions are weakly correlated to the movements in the spreads for the commodities and countries surveyed in this paper. The weakness of this correlation is most apparent when, despite significant differences in trade protection between Europe, Japan, and North America, the spreads have moved almost simultaneously in all these regions (see Annex C). The flaws of the hypothesized link are further exposed by the weak correlation between the effective rates of protection and the spreads.<sup>10</sup> As reported in Table 3, only in the case of sugar did

<sup>10</sup> Effective rates of protection present the advantage of capturing both the effects of both tariffs and non-tariff barriers. Obtaining exact measurements of the effective rate of protection is always difficult, even for relatively homogenous products such as foodstuffs. The differing qualities of products to which available price data refer and the presence of data on marketing margins are but two of the problems associated with using even the simplest indicator of the extent of distortions.

these two variables move in the same direction in all consumer markets between 1986 and 1994. Finally, it is certainly audacious to think that movements in trade barriers have significantly contributed to the surge in the spreads of coffee and rice in the United States, up 85 percent and 112 percent, respectively, over the period from 1975 to 1994, when their effective rates of protection were on average below 2 percent during this period.

Even the bottleneck approach does not work well for the simple reason that the costs associated with commodity exports have been declining over the past few decades. Indeed, transportation and insurance costs, which may contribute up to 10-20 percent of the final value of commodities,<sup>11</sup> have followed a descending trend over the past 20 years. For example, Amadji and Yeats [1995] report that the share of these costs in the total exports of developing countries declined from 7.8 percent in 1970 to 5.8 percent in 1991. The international evidence on marketing and distribution costs is more limited, but the trend in the United States has also been clearly negative, down from 18 percent of GDP in 1980 to only 10 percent of GDP in 1994.<sup>12</sup> Technological progress and new management techniques have clearly contributed to this trend. Among many examples, electronic data interchanges have powered up market clearing activities, and just-in-time techniques as well as new hedging instruments (e.g., warehouse bonds) have reduced consignment and inventory costs.

The bottleneck approach may, however, partially explain the asymmetric transmission of world commodity prices through rising processing costs, even though their influence was limited by the kind of commodities selected in this paper. Unlike transportation and marketing costs, processing costs have certainly increased over time due to higher wages in processing facilities (most are located in industrial countries). The direct evidence at hand remains sketchy but there is no reason to believe that these wages have behaved differently from average industrial wages. And, over the past two decades, average nominal industrial wages have seen a fivefold increase in the six countries analyzed in this paper. Higher processing costs can also be explained by the improved quality of consumer products such as unleaded gasoline and high-quality coffee (robusta vs. arabica). Nevertheless, processing costs need to play a very important role in sales to explain the asymmetric response of consumer prices. As an illustration, I estimated that the impact of the average labor costs --as a proxy for processing costs-- on domestic consumer prices should exceed by four times that

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<sup>11</sup> Atkin (1992) reports that transportation costs may account for 10 percent of the landed price of grain on a trade route between efficient ports used by large vessels (e.g., from New Orleans to Rotterdam) and 20 percent on a less efficient route.

<sup>12</sup> Source: Logistic Management Council (1996).

of world prices to compensate entirely for the increasing gap between world and consumer prices in the commodity markets examined in this paper.<sup>13</sup>

If the other explanations cannot provide a satisfactory answer to the rising spreads, another reason has to be found. The third explanation for asymmetry is derived from the presence of large trading companies in international commodity markets. The focus is on the large trading companies because their strategic position between buyers and sellers allows them to influence the transmission of world prices. Such an effect may occur when they purchase commodities from producers and/or when they sell these products to other intermediaries, processors, and consumers. These companies generally provide information, define the terms of transactions, manage the payments and record keeping for transactions, and so figure out ways of clearing the market (see Spulber [1996]). However, without competition, they may follow a pricing strategy that will maximize their profits and not those of producers and consumers. Such behavior could create an asymmetric response of the same sort as the bottleneck and trade restriction models described earlier.<sup>14</sup>

The issue of the market power of international trading companies remains largely ignored in the current literature. Several recent empirical studies have shown the existence of market power in most commodity markets,<sup>15</sup> but none of the leading journals of international trade and economic development<sup>16</sup> contain any reference to the influence of these companies. This lack of interest possibly arises from the difficulty of capturing the behavior of these companies in an integrated analytical framework. In addition to their trading activities, many companies are vertically integrated and thus close to production. For example, Cargill--the world's largest trading company of cereals--owns plantations, storage facilities, and vessels in many countries around the world. Similarly, Exxon carries out not only mining and refining

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<sup>13</sup> In other terms, equation (1) was modified as follows:  $\Delta\mu_{ij} = \Delta p_{ij} - \alpha\Delta(e_{jp}^*i) - (1-\alpha)\Delta w_j$  where  $w_j$  is defined as the unit labor cost in the recipient country  $j$  and  $\alpha$  as the weight of the world commodity price in the production function. The value of the parameter  $\alpha$  is difficult to estimate in the absence of precise information but must be as low as 0.2 for eliminating the spread between world and domestic prices in most commodity markets over the period from 1975 to 1994. These results are available upon request.

<sup>14</sup> While it is not done in this paper, a model of imperfect competition --or price leadership-- behavior could show that declines in world prices will not be transmitted to consumer prices, and the output level will not increase, at least not as much that in a competitive market. In contrast, an increase in world prices would be automatically transmitted to domestic prices because intermediaries maintain their margins.

<sup>15</sup> Recent studies include Buschena and Perloff (1991) on the coconut oil export market; Karp and Perloff (1989, 1993) on the rice and coffee exports; Lopez and Yon (1993) on the Haitian coffee exporting; and Deodhar and Skeldon (1995) on the banana export markets.

<sup>16</sup> Sources examined (for the past five years) were the *Journal of Development Economics* and the *Journal of International Economics* as well as the NBER working paper series. Notice, however, that this issue has been raised by non-mainstream economists such as Brown (1992).

but also a complex set of activities involving distribution, transportation, inventories, and pricing. The distinction between wholesale and retail trading is also not clear-cut. If most of these companies are involved in wholesales--transactions between business--there are many examples in which they also act in the retail sector either directly or indirectly through strategic alliances or intermediary arrangements.<sup>17</sup> Additional studies are necessary to identify at the stage of the intermediary process at which the highest profit is likely to be made: wholesale or retail. The response is likely to vary across countries and commodities.

**Table 4:**  
**The World's Largest Wholesale Trade Companies:**  
**1988**

Firm	Home Country	Sales (US\$ Million)
C. Itoh, Ltd.	Japan	106,791
Mitsui & Co. Ltd.	Japan	102,493
Marubeni Corp.	Japan	95,823
Sumitomo Corp.	Japan	94,479
Mitsubishi Corp.	Japan	91,583
Nissho Iwai Corp.	Japan	52,942
Cargill	US	43,000
Tokyo Menka Kaisha	Japan	31,945
Sharps Pixley Ltd.	UK	30,077
Nichimen Corp.	Japan	26,874

Source: Directory of the World's Largest Service Companies, Moody's Investors Service, and United Nations Centre on Transnational Corporations, December 1990.

Preliminary evidence indicates that large trading companies have been capable of influencing the transmission of world commodity prices to domestic prices. This is suggested first by the concentration of trading activities in few companies worldwide. UNCTAD has

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<sup>17</sup> For example, Itoh, the world's largest wholesaler, owns coffee shops and pubs, and most oil companies possess gas stations. Citgo, Texaco, Shell, Amocco, Exxon, and Chevron are the largest gasoline brands by number of stations, and are major wholesalers and distributors as well.

reported that six or fewer trading companies control about 70 percent of the total international trade, thus obviously limiting the choice of producers and consumers in these markets.<sup>18</sup> As an example, the banana export market is dominated by Del Monte, United Brands, and Standard Fruits, and the wheat export market by Cargill, Continental, Andre, Dreyfuss, and Bunge-Born. The suspicion that these companies use their dominant position to control prices is strengthened by the chronic absence of information on their activities. While many people can name retailers, few know wholesalers. These companies are often larger than the economies of many developing countries (Table 4). For instance, the sale volume of the world's largest trading company, C. Itoh, was as big as Argentina's GDP in 1988. The same company also traded over US\$20 billion of agricultural products--as much as all the sugar, coffee, beef, rice, and wheat exported by all developing countries at that time.

The trading companies' position of influence on the world market is further implied by the correlation between the variations in the spreads and the variations in the profits of the trading companies. Unfortunately, this hypothesis was tested only for the oil market because of the chronic lack of data on these intermediary companies. For each 10 percent variation in the spread between world and domestic oil prices, the profit of the 7 largest oil companies in the United States has changed on average by 8 percent during the period from 1979 to 1994.<sup>19</sup> Another indicator of correlation is that the markup in the wheat market grew by 50 percent over the past two decades, while the sales of Cargill, the world's largest trader of wheat, saw a fivefold increase during this period. In a historical perspective, it is suggestive that this firm has recorded an annual loss in only 3 of its 130 years of existence: 1921, 1936, and 1938.<sup>20</sup>

Finally, as discussed in the preceding section, the spreads of each commodity tend to move jointly in all industrial consumer markets. This homogenous behavior may reflect the influence of trading companies that are specialized in trading one commodity around the world rather than several commodities in one country. Companies such as Cargill and Continental trade almost exclusively in cereals in over 60 countries. A similar approach is taken by the petroleum trading companies and therefore gasoline prices have a tendency to increase and decrease at the same time around the world.

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<sup>18</sup> Source: UNCTAD, reported by Brown (1992).

<sup>19</sup> Calculated on the basis of information extracted from Fortune (various issues). To make the measurement of profits and markups compatible, the profit is defined as the ratio of total net profits of large US oil companies to the international petroleum price (1990=100). The markup index is measured by equation (1). The major oil companies include Exxon, Mobil, Texaco, Chevron, Amoco, Atlantic Richfield, Philips Oil, and Ashland Oil.

<sup>20</sup> Source: The Economist, March 1996.

#### IV. *What Are the Consequences for Commodity Exporting Countries?*

Rising spreads have had important consequences for commodity exporting countries, especially for those depending heavily on a few commodities. Over the past two decades, these countries have lost through the decline in world commodity prices and through the limited response of domestic demand for these products on main consumer markets. This section attempts to estimate how much additional export revenue these countries would have earned if the spreads had remained constant in the past few years, using a simple model of international trade. Finally, the results of two simulation exercises are presented for the sample of commodities surveyed in this paper.

The consequences of rising spreads on export revenues are illustrated as simply as possible with a standard, partial model of international trade in which the commodity supply function is determined by world prices and the demand by domestic prices in consuming countries.<sup>21</sup> For the sake of simplicity, these two functions are not influenced by changes in relative prices and income, which are subsumed in the constant term of these functions. There are neither dynamic effects nor strategic interactions between trading companies as the variations in the spreads are assumed to be exogenously determined. The model is principally intended to show the potential impact of rising spreads rather than analyze actual

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<sup>21</sup> Thus, the demand and supply functions can be written as follows:

$$Q_{S_i} = A e p_i^{*\epsilon_s}$$

$$Q_{d_{ij}} = C p_{ij}^{\epsilon_d}$$

where  $\epsilon_s$  and  $\epsilon_d$  are defined as the elasticity of supply and demand, A and C as constant parameters,  $Q_{d_{ij}}$  the demand for commodity i by consumers in country j, and  $Q_{S_i}$  the supply of commodity i by all developing countries. Other variables have been defined earlier.

Taking the log differential of the above equations and of the markup defined as  $\mu = p_i/p^*$ , the effects of a change in markup on export revenues ( $dR_i$ ) and producer surplus ( $dS_i$ ) are equal to:

$$dR_i = - ((1+\epsilon_s)\epsilon_d)/(\epsilon_d-\epsilon_s) d\mu_i$$

$$dS_i = (C/(\epsilon_s+1)) [(1-\epsilon_d/(\epsilon_d+\epsilon_s)d\mu_i)e p_i^{*\epsilon_s+1} - p_i^{*\epsilon_s+1}]$$

The positive effects of a decrease in markups are embodied in these two differential equations. A lower markup reduces the selling price on industrial markets. That, in turn, generates an increase in the final demand. The resulting effect would therefore be positive on both the export revenues and the producer's surplus. The magnitude of these potential positive effects depends partially on the percentage variation in the markup and partially on the (absolute) value of the elasticities of demand and supply.

pricing decisions. Nevertheless, it is easy to show that lower spreads reduce domestic consumer prices, which increases the final demand for commodities and, thus, export revenues. Obviously, the magnitude of these effects will depend on the reduction in the spreads and the values of supply and demand price elasticities.

The above model was applied to the sample of commodities over the period from 1991 to 1994. Rather than estimating the elasticity values of the demand and supply functions, I used those estimated by the United Nations [1990], which are in the lower range reported by Goldstein and Khan [1989]. These values are fixed over time, even though they should vary as changes in prices imply changes in the degree of policy intervention and in the degree of substitutability between products. However, within feasible ranges, these variations should not modify the basic reliability of the results presented below. The exogenous variations in the spreads are assumed to equal the percentage difference, first of all, between the actual spread and the minimum spread observed during the period from 1970 to 1994 (case A) and, second, between the actual spread and the average spread observed during the period from 1970 to 1994 (case B). All the parameters used for these simulations are summarized in Annex D.

Table 5 shows that developing countries would have doubled their export revenues from 1991 to 1994 if the spreads had remained at their minimal levels of the past two decades.

If the spreads had been maintained at their average levels, additional export revenues would have reached US\$40 billion per year, or about 27 percent of the actual revenues from the six commodities selected in this paper. The potential gains for producers would have also ranged from US\$29 billion in case B to US\$96 billion in case A. These results only apply to developing countries. Indeed, industrial countries may have benefited from asymmetry through higher tax revenues, higher value-added in their processing facilities, and higher intermediary margins in their trading companies, even though their consumers are clearly among the major losers. An estimate of the net potential gains/losses for the industrial countries would need to take into account these redistribution effects.

Table 5:  
Main Results of the Simulation Exercises  
(US\$ Billion)

	Export Revenue Gains		Producer Surplus Gains	
	Case A	Case B	Case A	Case B
	Oil (fuel)	102.1	33.0	77.1
Rice	1.9	1.0	1.5	0.7
Sugar	8.7	1.9	7.4	1.4
Coffee	9.1	3.9	8.3	3.2
Beef	0.9	0.4	0.6	0.3
Wheat	1.3	0.5	1.1	0.4
TOTAL	124.0	40.6	96.0	29.0
Memo:				
Oil (gasoline)	59.7	19.7	39.8	13.1

Notes:

Case A: Percentage difference between the 1991-94 spread and the minimum spread observed during the period 1970-94.

Case B: Percentage difference between the 1991-94 spread and the average markup observed during the 1970-94 period.

The simulation results indicate that petroleum would have accounted for about 80 percent of these additional potential gains since this commodity represents a large proportion of the total exports from developing countries. Other commodities would have also witnessed a significant increase in their export earnings. For example, the revenues derived from coffee, sugar, beef, and wheat exports would have more than doubled in case A, and increased in the range of 20-60 percent annually in case B. These results are consistent with the large percentage differences in the spreads observed for these commodities.



As expected the developing countries that have suffered the most are those that are heavily dependent on oil exports such as Saudi Arabia, the CIS countries, and Nigeria (Table 6). Brazil is also a major loser due to its significant dependence on coffee and sugar exports. For smaller countries, the consequences are even more dramatic because they rely on only one or two commodities for their exports. For example, Mauritius may have increased its total export revenues by an estimated 30 percent if the spread in the sugar market had remained at its minimal level. Similar results are obtained in the coffee market for El Salvador, Kenya, Madagascar, and Colombia (respectively, 50, 28, 27, and 25 percent of their total export revenues). The above results are only indicative. As already mentioned, the model is extremely simple.

## *V. Concluding Remarks*

The relatively low income and price elasticities of demand for commodities was emphasized by Prebisch and Singer about 35 years ago. This paper goes one step further by suggesting that the final demand for these products could not have increased in the major consumer markets because the declines in world commodity prices were not transmitted or were transmitted imperfectly to domestic consumer prices. In contrast, upward movements in world prices were clearly passed on to domestic prices. As a result of this asymmetry, the spread between world commodity prices and domestic consumer prices has increased over time, about 100 percent on average for the seven commodities analyzed in this paper over the past 25 years. This asymmetry has had severe implications for the commodity exporting countries, who may have lost as much as US\$100 billion per year in export revenues.

In this paper, I have attempted to review a number of possible explanations for the asymmetry, which is the most logical way to proceed without an existing general analytical framework in the economic literature. A consistent finding across commodity markets has been the simultaneous movement of the spreads in all countries, thus suggesting the influence of international rather than country-specific factors. There are at least two international factors that may explain the asymmetric response of domestic prices in commodity markets. First, the high quantitative restrictions on international commodity trade have discouraged exporters from stimulating the final demand by transmitting the decrease in world prices to domestic consumer prices. Second, the processing costs have been increasing due to rising labor costs and improvements in the quality of the final products associated with most commodities. In contrast, other costs such as transportation, insurance, distribution, and

**Table 6:**  
**Major Losers Ranked by Export Losses**

	Export Value per Commodity a/ (US\$ Million)	Export Revenue Losses (US\$ Million)		Export Revenue Losses (Share of Country's Total Exports)	
		Case A	Case B	Case A	Case B
<b>Petroleum Oil</b>					
Saudi Arabia	22,500	12,996	4,195	49.2%	15.9%
CIS	11,400	6,585	2,125	22.9%	7.4%
Iraq	10,500	6,065	1,958	56.7%	18.3%
Nigeria	8,420	4,863	1,570	52.9%	17.1%
UER	7,960	4,598	1,484	48.0%	15.5%
Venezuela	7,490	4,326	1,396	44.1%	14.2%
Mexico	6,820	3,939	1,272	12.2%	3.9%
<b>Coffee</b>					
Brazil	1,946	2,229	942	7.7%	3.3%
Columbia	1,656	1,897	801	37.3%	15.8%
Indonesia	553	633	267	3.4%	1.4%
Mexico	368	422	178	1.3%	0.5%
Guatamala	293	336	142	25.9%	11.0%
Costa Rica	256	293	124	17.7%	7.5%
India	255	292	123	2.5%	1.0%
<b>Sugar</b>					
Brazil	894	835	182	2.9%	0.6%
Thailand	620	579	126	3.7%	0.8%
China	538	503	110	0.6%	0.1%
Mauritius	350	327	71	35.7%	7.8%
Colombia	163	152	33	3.0%	0.7%
Turkey	163	152	33	2.0%	0.4%
Guatamala	162	151	33	11.7%	2.6%
<b>Rice</b>					
Thailand	1,429	489	252	0.6%	0.3%
India	397	136	70	1.1%	0.6%
China	384	131	68	3.4%	1.7%
Pakistan	293	100	52	0.5%	0.3%
Uruguay	151	52	27	2.4%	1.2%
Argentina	78	27	14	0.3%	0.2%
Egypt	60	20	10	0.7%	0.4%
<b>Wheat</b>					
Turkey	95	62	25	0.8%	0.3%
Argentina	48	32	13	0.4%	0.2%
China	33	22	9	0.0%	0.0%
South Africa	30	20	8	0.1%	0.0%
Singapor	23	15	6	0.1%	0.0%
Malaysia	17	11	5	0.0%	0.0%
Greece	14	10	4	0.1%	0.0%

Notes:

a/ Average 1993-94. Source: Finger and Reincke (1995) and UN trade data system.

marketing do not appear to play a role in the rising spreads. These costs have followed a declining trend over the past few decades and would thus explain a decline rather than an increase in the spreads.

There is little consensus on this issue, but the above explanations do not seem to provide a complete answer. Indeed, it appears that trade restrictions are only weakly correlated with the movements in the spreads, an observation that is consistent across countries and in one country over time. The contribution of processing costs to the increasing spreads is certainly limited in most cases examined here because the sample of commodities covered in this paper involves little processing between the commodity and the final product sold on consumer markets. For these reasons, another explanation had to be found to explain the asymmetric transmission of world prices.

This paper has argued that international trading companies are likely to influence the relationship between world and domestic prices. Their dominant position in most commodity markets enables them to affect the spreads between the buyer and the seller prices simultaneously in many countries. Some preliminary evidence points in that direction, but surprisingly policy-makers, economists, and consumers seem to remain largely unaware of these companies, even though they are often bigger than developing economies. The current academic literature as well as international institutions have traditionally ignored their presence. This insufficient attention partially explains why the debate over these companies lacks focus and clarity and why there are various misconceptions about what these companies actually do and whether their activities are a legitimate cause for public concern.

This paper should be viewed as a starting point for discussion. Possible directions for future research include an attempt to better understand the determinants of the consumer prices and of the role of intermediaries at both the wholesale and retail levels. In that sense, the first recommendation would be therefore to collect information on the activities of these companies. Competitive (or contestable) markets assume homogenous information. Today, producers and consumers generally have few alternatives when they trade their products in foreign markets because of the lack of information. Collecting information will require a concerted effort from the international community. First, it is crucial that the large international trading companies cooperate and disclose information on their activities and transactions. Second, this effort must necessarily involve the World Bank and the World Trade Organization because they have both the necessary financial and human resources to undertake such an operation on a worldwide basis.

The second recommendation is that economists incorporate the subject of intermediation within the basic framework of international trade. So far, trading companies might have been overlooked because they are located at the crossroads of different aspects of economic theory: business, industrial organization, international trade and finance, as well as public finance. The new international trade theory has emphasized the increasing rate of returns and imperfect competition but not at the intermediary level. There is a need to understand the behavior of the trading companies as well as the determinants of their pricing strategies to evaluate whether they operate efficiently. The remaining issue is to determine whether these companies seek to maximize their profits at the expense of those of consumers and producers.

Free trade requires fair trade. For the first time, anything can be sold everywhere and thus understanding the role of the international trading companies in commodities markets will become even more important in the future.

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**ANNEX A:  
Data Sources and definitions**

**A. Description of Domestic Price Series a/**

Commodity/ End-User Product	Canada	France	Germany	Italy	Japan	USA
Bananas/Bananas					✓	✓
Beef/Beef	✓	✓	✓	✓	✓	✓
Oil/ Fuel	✓	✓ b/	✓	✓	✓	✓
Oil/Gasoline	✓	✓	✓	✓	✓	✓
Coffee/Coffee	✓	✓	✓	✓	✓	✓ c/
Rice/Rice	✓	✓		✓	✓	✓ d/
Wheat/Bread	✓	✓	✓	✓	✓	✓
Sugar/Sugar	✓	✓	✓	✓	✓	✓ e/

Sources: National statistics for consumer price indexes and World Bank for commodity price index.

Notes:

a/ The annual domestic consumer price series were available for the following periods: Canada (1970 and 1975-94), France (1964-94), Germany (1966-94), Italy (1960-94), Japan (1973-94), and the US (1960-94).

b/ Only available for the period 1971-94.

c/ Only available for the period 1969-94.

d/ Only available for the period 1978-94.

e/ Only available for the period 1970-94.

**B. Description of International Commodity Prices**

Coffee: All Coffee, New York, US cents/LB

Sugar: Caribbean, New York, US cents/LB

Beef: All origins, US Ports, US cents/LB

Wheat: US, US Gulf Ports, US\$/Bushel

Crude Oil (petroleum): Average Crude Price, US\$/Barrel:

Bananas: Latin America, US Ports; US cents/LB

Rice: US, New Orleans, US\$/MT

Source: The World Bank. International Economic Department

**ANNEX B:**  
**Regression Results**

Elasticity of Transmission from World Prices to Domestic Consumer Prices  
Panel of six countries (1975-94)

	Coffee			Beef			Sugar		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
World Price	0.25 (6.85)	0.31 (5.51)	0.15 (2.06)	0.10 (2.30)	0.26 (4.13)	0.12 (.71)	0.03 (2.26)	0.15 (4.81)	-0.04 (-0.54)
Exchange Rate	-0.02 (-.12)	0.02 (.10)	-0.02 (-0.11)	0.14 (2.38)	0.24 (2.47)	0.09 (1.23)	0.19 (3.19)	0.15 (2.04)	0.22 (2.40)
Industrial Wage	0.44 (2.05)	1.13 (2.88)	0.01 (.439)	0.21 (2.01)	0.17 (1.33)	0.77 (5.54)	0.49 (7.62)	0.24 (2.56)	0.40 (2.75)
Lagged Domestic Price	0.26 (2.01)			0.09 (1.97)			0.50 (2.34)		
AdjR2	0.32	0.43	0.05	0.13	0.25	0.24	0.15	0.33	0.17
DW	1.93	2.24	2.33	1.63	1.86	1.92	1.48	1.72	1.73
Observations	114	60	54	114	54	60	114	60	54

	Wheat			Oil/Gasoline			Oil/Fuel		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
World Price	0.03 (1.04)	0.23 (3.08)	-0.13 (-2.10)	0.15 (4.50)	0.24 (4.32)	0.17 (3.13)	0.13 (2.98)	0.32 (4.33)	0.16 (1.64)
Exchange Rate	0.15 (3.30)	0.24 (2.29)	0.17 (3.41)	0.27 (3.18)	0.09 (.82)	0.29 (1.56)	0.33 (2.59)	0.05 (3.18)	0.30 (1.00)
Industrial Wage	0.32 (4.05)	0.41 (3.82)	0.58 (5.84)	0.49 (5.00)	1.04 (5.45)	0.30 (1.87)	0.62 (4.23)	1.42 (5.48)	0.46 (1.78)
Lagged Domestic Price	0.40 (1.77)			0.01 (2.13)			0.07 (2.41)		
AdjR2	0.23	0.12	0.39	0.29	0.50	0.01	0.22	0.48	0.01
DW	1.62	1.41	1.71	2.18	1.80	2.13	2.17	1.81	2.28
Observations	114	48	66	114	66	48	114	66	48

Notes:

All variables are expressed in log and in variations.

Column (1) are the estimated results for the entire period.

Column (2) are the estimated results for the years with upward movements in world prices.

Column (3) are the estimated results for the years with downward movements in world prices.



Annex C:  
Contemporaneous Correlations

Cross-Country Correlation by Commodity  
1970-94

COFFEE						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	0.7	1.0				
Germany	0.5	0.8	1.0			
Canada	0.9	0.5	0.6	1.0		
Italy	0.9	0.6	0.5	0.8	1.0	
US	0.9	0.2	0.0	0.8	0.8	1.0
FUEL						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	0.7	1.0				
Germany	0.7	0.7	1.0			
Canada	0.7	0.7	0.5	1.0		
Italy	0.5	0.0	0.3	0.3	1.0	
US	0.7	0.8	0.6	0.7	0.0	1.0
GASOLINE						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	1.0	1.0				
Germany	0.9	0.9	1.0			
Canada	0.9	1.0	0.9	1.0		
Italy	1.0	1.0	1.0	1.0	1.0	
US	0.9	1.0	0.9	0.9	1.0	1.0
RICE						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	0.9	1.0				
Germany	NA	NA	NA			
Canada	0.8	0.8	NA	1.0		
Italy	0.9	0.7	NA	0.8	1.0	
US	0.8	0.7	NA	0.9	0.9	1.0
WHEAT						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	1.0	1.0				
Germany	1.0	1.0	1.0			
Canada	0.9	0.9	0.9	1.0		
Italy	1.0	1.0	0.9	0.9	1.0	
US	1.0	0.9	0.9	0.9	0.9	1.0
SUGAR						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	0.9	1.0				
Germany	0.9	0.9	1.0			
Canada	0.9	0.9	0.9	1.0		
Italy	1.0	1.0	0.9	1.0	1.0	
US	0.9	0.9	0.9	1.0	0.9	1.0
BEEF						
	Japan	France	Germany	Canada	Italy	US
Japan	1.0					
France	0.9	1.0				
Germany	0.5	0.6	1.0			
Canada	0.8	0.8	0.3	1.0		
Italy	0.8	0.8	0.3	0.7	1.0	
US	0.4	0.6	0.4	0.5	0.5	1.0

**Cross-Commodity Correlation by Country**  
1970-94

US								
	Coffee	Banana	Sugar	Rice	Bread	Gasoline	Fuel	Beef
Coffee	1.0							
Banana	0.2	1.0						
Sugar	0.5	0.1	1.0					
Rice	0.8	0.3	0.6	1.0				
Bread	0.5	0.3	0.4	0.6	1.0			
Gasoline	-0.7	-0.1	-0.5	-0.7	0.1	1.0		
Fuel	-0.3	0.0	-0.3	-0.3	0.5	0.9	1.0	
Beef	-0.3	-0.2	-0.2	-0.1	0.1	0.3	0.3	1.0

JAPAN								
	Beef	Banana	Coffee	Fuel	Gasoline	Sugar	Bread	Rice
Beef	1.0							
Banana	0.5	1.0						
coffee	0.7	0.5	1.0					
Fuel	0.7	0.6	0.5	1.0				
Gasoline	0.5	0.6	0.4	0.7	1.0			
Sugar	0.5	0.5	0.5	0.5	0.2	1.0		
Bread	0.9	0.5	0.8	0.7	0.4	0.7	1.0	
Rice	0.8	0.5	0.8	0.7	0.4	0.7	1.0	1.0

ITALY							
	Bread	Beef	Sugar	Coffee	Fuel	Gasoline	Rice
Bread	1.0						
Beef	0.8	1.0					
Sugar	0.6	0.4	1.0				
Coffee	0.8	0.6	0.5	1.0			
Fuel	0.0	0.0	-0.4	0.0	1.0		
Gasoline	0.0	-0.2	0.2	0.3	0.2	1.0	
Rice	0.9	0.7	0.7	0.6	-0.2	-0.2	1.0

GERMANY						
	Bread	Sugar	Fuel	Gasoline	Coffee	Beef
Bread	1.0					
Sugar	0.1	1.0				
Fuel	0.0	0.2	1.0			
Gasoline	-0.2	0.3	0.8	1.0		
Coffee	-0.2	0.3	0.4	0.6	1.0	
Beef	0.3	-0.1	0.1	-0.1	-0.1	1.0

FRANCE							
	Bread	Beef	Rice	Sugar	Coffee	Gasoline	Fuel
Bread	1.0						
Beef	0.7	1.0					
Rice	0.7	0.8	1.0				
Sugar	0.5	0.4	0.6	1.0			
Coffee	-0.1	0.3	0.4	0.4	1.0		
Gasoline	-0.2	0.2	0.3	0.4	0.8	1.0	
Fuel	0.1	0.3	0.5	0.6	0.7	0.9	1.0

CANADA							
	Beef	Bread	Rice	Sugar	Coffee	Fuel	Gasoline
Beef	1.0						
Bread	0.8	1.0					
Rice	0.8	0.9	1.0				
Sugar	0.6	0.7	0.8	1.0			
Coffee	0.7	0.8	0.8	0.6	1.0		
Fuel	0.8	0.8	0.8	0.8	0.7	1.0	
Gasoline	0.3	0.4	0.5	0.3	0.5	0.6	1.0

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