THE TERMS OF TRADE FOR AGRICULTURAL AND FOOD PRODUCTS, 1951-2000*

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ABSTRACT

This study aims to answer whether empirical records confirm the existence of a secular decline in the terms of trade affecting primary producers (the Singer–Prebisch hypothesis). The paper analyses the evolution of the terms of trade for agricultural and food products in the second half of the 20th century. We obtain sixty new real price indices for internationally traded agricultural products. We conclude, from a long-term perspective, that the deterioration in the terms of trade for agricultural and food products was strong and clear in the second half of the last century. In general, less processed products suffered a very heavy fall in their real prices. However, there was no continuous and persistent deterioration in the terms of trade either as a whole or for the great majority of the agricultural and food product groups (with the exception of natural rubber, textile fibres and other raw materials). Rather, this deterioration occurred in stages.

Keywords: Singer–Prebisch hypothesis, terms of trade, agricultural and food trade, agricultural prices

JEL Code: F14, N50, N70, Q17

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* Received 17 June 2010. Accepted 23 May 2011. This study has received financial support from the Spanish Ministry of Science and Innovation, Project ECO2009-07796 and the Department of Science, Technology and Universities of the Government of Aragon, Excellence Research Group for «Agri–Food Economic History». Help with price series data from the United Nations Statistical Office was invaluable. The final version has benefited from the comments of Albert Carreras, Domingo Gallego, Marcelo Reyes, Joan Roses, Marcela Sabaté, Daniel Tirado and participants in the Fifteenth World Economic History Congress, especially the session organisers Jeffrey Williamson, Giovanni Federico and José Antonio Ocampo. We are also grateful for the suggestions of the editor of the journal and two anonymous referees. Any errors are the sole responsibility of the authors. Our special thanks to Stephan Pfaffenzeller for providing us with updated data for the Grilli–Yang price series.

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Vol. 29, No. 2: 213-243. doi:10.1017/S0212610911000103

RESUMEN

El objetivo de este trabajo es comprobar con datos empíricos si ha habido, como plantearon Singer–Prebisch, un declive secular en los términos de intercambio de los productos primarios. El trabajo se centra en el análisis de la evolución de los términos de intercambio de los productos del comercio agrícola y alimentario en la segunda mitad del siglo pasado. Hemos construido sesenta nuevas series de índices de precios reales de productos agrarios que participaban en el comercio internacional. Concluimos, que desde una perspectiva de largo plazo, el deterioro de los términos de intercambio de los productos agrarios y alimentos fue nítido y fuerte en los últimos cincuenta años del siglo pasado. En general, los productos con menor grado de elaboración han sufrido una caída muy importante de sus precios reales. Sin embargo, ni en conjunto ni para la gran mayoría de los grupos de productos agrarios y alimentos (a excepción de los grupos, caucho natural, fibras textiles y otras materias primas) hubo un deterioro continuo y persistente de los términos de intercambio, sino que éste se produjo de forma escalonada.

Palabras clave: Hipótesis Singer-Prebisch, términos de intercambio, comercio agrario y alimentario, precios agrarios

1. INTRODUCTION

A recurrent debate in the development economics literature concerns the possible deterioration in the real terms of trade for low-income countries. This hypothesis was formed simultaneously, but independently, by Prebisch (1950) and Singer (1950), who argued that the terms of trade for primary products had suffered a continuous and persistent deterioration, and that this was one of the key factors limiting the growth of the least developed economies[1].

A review of the principal research in this field compiled by Nguyen (1981) and extended by Diakosavvas and Scandizzo (1991) indicates that the debate remains open (see also Cuddington and Urzúa 1989). The results obtained for the secular (continuous) trend of relative prices differ according to the period analysed, the definitions used and the estimation techniques used. In recent decades, some studies have improved the price series (e.g. Spraos 1980 and Grilli and Yang 1988), whereas others have focused on the use of more refined methodologies such as structural models (Sapsford 1985). Diakosavvas

[1] See the terms of the theoretical debate in Hadass and Williamson (2003), Ocampo and Parra (2003) and Cashin and McDermott (2006). An up-to-date synthesis of this debate can be found in Ocampo and Parra-Lancourt (2010).

and Scandizzo (1991) and Ocampo and Parra (2003 and 2010) have utilised time series methods together with structural break models (see also Lutz 1999a; Newbold *et al*. 2005; Zanias 2005; Kellard and Wohar 2006; Cuddington *et al*. 2007; Balagtas and Holt 2009; Spatafora 2009), whereas a further group of scholars, including Hadass and Williamson (2003), has focused on the impact of the deterioration in the terms of trade on developing countries.

The literature reveals a remarkable lack of consensus, not only with regard to the verification of otherwise of the Prebisch–Singer hypothesis, but also with regard to the theoretical arguments that would explain a deterioration in the terms of trade. Some later studies, using more adequate price series, emphasise the existence of a long-term deterioration in the terms of trade for primary products in contrast to manufactures, but on the other hand question whether this was a secular or continuous trend. They suggest instead that it was concentrated in certain periods, particularly the interwar years and the 1980s, and therefore suffered a two-step fall (Ocampo and Parra 2003 and 2010).

According to Diakosavvas and Scandizzo (1991) and Hadass and Williamson (2003), there is even less consensus with regard to the impact of the deterioration in the terms of trade on developing countries (i.e. the situation in which countries exporting primary products are left in terms of income and welfare). This means that even if the thesis of deterioration in primary product prices is correct, the far-reaching economic and technical changes occurring in the world economy and causing this variation in prices are difficult to measure by the simple quotient that expresses the real terms of trade relations.

Our objective is to contribute to this debate by analysing the evolution of the terms of trade for agricultural and food products in the second half of the last century. The study aims to answer one of the three principal questions on which the debate has centred: whether empirical records confirm the alleged secular decline in the terms-of-trade shock affecting primary producers, which has been called the «debate about the facts» (Hadass and Williamson 2003, p. 630).

Our study period, the second half of the last century, is somewhat shorter than usual for this type of research[2], but it has certain features that amply justify the choice. Firstly, it is evident that inter-industry trade based on exchanging agricultural products for manufactures, which predominated in the first wave of globalisation, tended to be replaced during the second by principally intra-industrial trade, in which the most important exchanges were between advanced countries (Krugman 1980; Helpman and Krugman 1985). Secondly, although trade in agricultural products increased at an annual rate far above that of the first wave of globalisation, its weight in total

[2] The majority of the literature on this subject uses the original series of Grilli and Yang (1988), covering the period 1900-1986. Some studies, for example Ocampo and Parra (2010) and Pfaffenzeller *et al*. (2007), have extended these series forwards, whereas in the opposite direction Ocampo and Parra (2010) go back to 1865 and Harvey *et al*. (2010) to 1650.

world trade declined considerably. This loss of relative importance was due to both slower growth in the volume of agricultural trade and to a significant fall in the real prices of agricultural products and food (Serrano and Pinilla 2011b and 2011c).

Therefore, we attempt to establish the exact nature of this fall. In line with the literature referred to above, which emphasises that the behaviour of the terms of trade for primary products has varied significantly depending on the products and period in question, we perform a highly disaggregated analysis for the set of products of agricultural origin, with the aim of excluding non-agricultural raw materials. Many studies using the price indices constructed by Grilli and Yang (1988) have approached the problem by including agricultural and raw material prices together, but we believe that these obey different logics. A recent analysis by Ocampo and Parra-Lancourt (2010) of a more heterogeneous group of primary products over a longer time period underlines that it was precisely agricultural products that displayed the most negative price behaviour in the long term, with a significant decline in the second half of the 20th century, whereas in the same period mineral prices remained stable or tended to increase. Our study is therefore partially distanced from the product group that was *stricto sensu* the original subject of the studies by Prebisch and Singer (the comparison of all primary products with manufactures), as it concentrates only on products of agricultural origin.

Given the historical importance of agricultural products in the exports of most developing countries, however, we believe that our study also makes a contribution in this area, as it focuses on the possible problems that such countries experience because of the poor performance of the real prices of products in which they are highly specialised. This was the case of many countries in Latin America, for example, whose exports were highly concentrated in agricultural products by 1950. The attempt to develop an import-substituting industrialisation strategy, justified in part by the deterioration in the continent's terms of trade and the economic development of the following decades, helped somewhat to reduce this specialisation; however, these products were still the principal export items of many countries at the end of the century (Bulmer-Thomas 1994).

We constructed sixty new series of price indices for specific agricultural products that were traded internationally between 1950 and 2000, to accurately represent all the groups comprising farm trade[3]. In addition, to obtain real prices, we deflated the agricultural price series by an index for international trade prices in order to include the important changes in the prices not only of manufactures but also of other goods, such as energy products, which strongly influenced the shocks occurring in the study period.

[3] Various studies suggest that the composite primary products index does not adequately represent commodity price behaviour in general. Therefore, it is interesting to study the individual series of the distinct products or groups of products (Cuddington 1992; Newbold *et al*. 2005).

In summary, we are specifically interested in the evolution of the real prices of agricultural and food products. We selected this option because we are especially interested in determining the behaviour of the prices of each group of products of agricultural origin, not in contrast to another product group, such as manufactures, but instead to the set of all the goods comprising international trade. This allows a more complete understanding of the impact of the evolution of export prices for developing countries, and especially for the least developed, as these do not import exclusively manufactures; for example, energy products make up a significant part of their imports. The significant rise in energy prices and their strategic character within the international economy provides further justification of our subject selection.

A second contribution of this study is the use of a new time series methodology that helps to fill the gaps left by some previous studies. Drawing on the work of Clemente *et al*. (1998), we analyse the presence of two structural breaks in non-stationary series, and in addition establish endogenously in which years these took place[4]. We study when this deterioration occurred and its nature, analysing whether this occurred in specific periods or, by contrast, was gradual and continuous.

This set of analyses is aimed at characterising the different behaviour of the product groups that comprise international agricultural trade, determining in which of them the greatest deterioration occurred and proposing various hypotheses regarding their possible causes, both economic and institutional.

Following this introduction, section 2 explains the construction and long-term evolution of the series. Section 3 describes the econometric analysis and presents the principal results. The section 4 presents some conclusions, and also tentatively explores the case of Latin America.

2: CONSTRUCTION OF THE SERIES AND EVOLUTION OF THE REAL PRICES OF AGRICULTURAL AND FOOD PRODUCTS

In order to analyse the possible deterioration in real agricultural prices, we constructed nineteen price indices for the group of products that, according to the Standard International Trade Classification (SITC Revision 2), form part of agricultural and food trade. In addition, we prepared a general index of agricultural and food trade prices with the objective of analysing their aggregate evolution. To obtain these price indices, we calculated sixty price series for distinct products; these are the unitary value of world exports of each of them, on the basis of the trade figures compiled by the Food and Agriculture

[4] As Ocampo and Parra (2003) state, «unfortunately, the methodology used so far only admits a structural change. This means that there is still space for another possible step to be «hidden» behind the statistical estimations». Recently, the work of Kellard and Wohar (2006), using the original series of Grilli and Yang, also permits two structural breaks.

Organisation (FAO) of the United Nations[5] (see Appendix 1 for a description of the individual price series used and Appendix 2 for the series). The prices of the different products were aggregated to construct the price indices and weighted according to their share of world exports in each year.

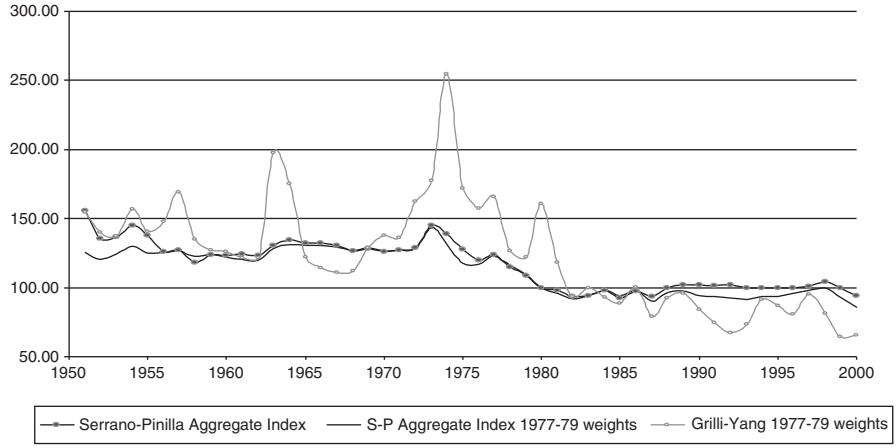
In the first place, the selection of these prices instead of possible alternatives, such as the customary series of Grilli and Yang (1988), permits greater coverage of the products that participated in agricultural trade. The representativeness of the aggregate series is far broader than that of similar studies. Thus, whereas the series used by Grilli and Yang (1988), and subsequently reused in numerous studies by other authors, cover 49 per cent of all food products and 83 per cent of all non-food agricultural products in the period 1977-1979, our series represent 94 per cent of world trade in agricultural and food products in 1978[6]. The homogeneity of our series also offers a certain advantage. We use the export unit values of agricultural products and food in the numerator, and the export unit values of world trade as a whole in the denominator, in order to deflate the nominal prices of the former. In the classic series of Grilli and Yang (1988), the numerator to construct the nominal price index of commodities uses fourteen series from international market quotations, five from import unit values (cost, insurance and freight (CIF) prices from different countries for each series: the United States, the United Kingdom and Europe) and six from export unit values (free-on-board (FOB) prices from different countries for each series). The deflator used by Grilli and Yang is a trade-weighted index of the unit values of the exports of manufactures from the five major developed countries (France, Germany, Japan, the United Kingdom and the United States) to developing countries (Pfaffenzeller *et al*. 2007). Moreover, as our series is composed of export prices, they are FOB, and thus prices are unaffected by international costs of transport and insurance or by the effects of the trade policies (quotas, tariffs, etc.) of the different countries.

The deflator used to calculate the real prices of agricultural and food products is the unit value index of total world trade, once more taking exports into account to avoid the above-mentioned problems (World Trade Organization 2003). This provides a wider vision than simple comparison with the evolution of the prices of manufactures, given that the structure of trade has changed substantially since the mid-20th century. The increased dependence on fuel, on raw materials for industry, on processed foods and on minerals has changed the structure of countries' imports. In short, our series obtains real prices and, consequently, measures the evolution of the purchasing power of agricultural products forming part of international trade compared with all goods comprising such trade. Obviously, we cannot

[5] These figures are available in paper format, the FAO Yearbooks (FAO 1947-2000) and in electronic format, the FAOSTAT (2004) database. The price series were supplemented for the period 1950-1984 by the United Nations Statistical Office (United Nations 1987), offering the movements of the products included in our sample.

[6] This figure increases yet further if we go back in time (97 per cent in 1961) and falls slightly if we go forward (89 per cent in 1995).

FIGURE 1
EVOLUTION OF THE REAL PRICES OF AGRICULTURAL AND FOOD PRODUCTS, 1951-2000



Source: Authors's elaboration on the basis of FAOSTAT (2004). The series used to construct the index Grill–Yang (1977) was kindly supplied by Stephen Pfaffenzeller.

measure the evolution of real prices exclusively for developing countries, as our basket of goods includes «all» agricultural products and not only those exported by such countries. Logically, the terms of trade of these countries will depend on the composition of both their imports and their exports[7].

An initial view of the evolution of real agricultural and food product prices is given in Figure 1 (the Serrano–Pinilla (S–P) aggregate index). We also present two further indices constructed for comparative purposes. The first was prepared in the same way as our aggregate index, but this time weighting the prices of the distinct product groups by their relative importance in world trade in agricultural products and food in 1977-1979 (S–P aggregate index, 1977-1979 weights). The second comprises the eighteen products of agricultural origin included by Grilli and Yang (1988) in their original study and to whose characteristics we have already referred, also weighted as previously (Grilli–Yang 1977-1979 weights). For the two new series, we used the same deflator as for the initial S–P aggregate index.

This series of the real prices of agricultural and food products shows a gentle but persistent fall from 1951 until 1972. The 1970s were marked by the two oil price shocks of 1973 and 1979 and the deep worldwide economic

[7] A very different approximation to ours consists of exploring the country-specific dimension of global commodity price movements, as performed by Spatafora and Tytell (2009) for the past 40 years and for 150 countries.

crisis, producing notable turbulence in agricultural prices and a downward trend that persisted until the mid-1980s when prices tended to stabilise.

The comparison with the two additional series is intended to examine possible composition biases; the S–P Index is only an aggregate index. We make the first comparison with the series «S–P aggregate index, 1977-1979 weights», to observe the sensitivity of our index with respect to the weighting system employed. With the exception of the years 1951-1955, the result is that both series display extraordinarily similar behaviour, with a correlation coefficient of 0.94.

The second series compared is the index «Grilli–Yang 1977-1979 weights». In this case, the principal difference resides less in the trend and evolution of the two series and more in the enormous fluctuations the latter series display. This is logical if we remember that as the number of products is much smaller, eighteen compared to sixty, the Grilli–Yang index is affected far more deeply by the shocks of the 1970s and in general displays much lower stability. Whatever the type of weighting used, we believe that our indices reflect the real price evolution of agricultural and food products much more accurately[8].

The evolution of our price series is also summarised in Table 1, which presents the annual rates of growth for the index of real prices of agricultural and food products and for its nineteen constituent groups (see column 1). Taken together, the reduction was substantial, as the real price of agricultural products fell at an annual rate of 1.02 per cent during the second half of the past century[9]. The deterioration was very gentle in the first two decades, sharp in the period 1973-1988, when relative agricultural prices fell at an average annual accumulative rate of 2.34 per cent, and once again very slight in the final 15 years.

The behaviour of the different product groups was fairly heterogeneous. In general, less-processed products suffered a very substantial decrease in their real prices, far greater than that of the aggregate index. This is the case of raw materials and basic foods (SITC groups: 21. leather and hides, 22. oil seeds, 26. textile fibres, 29. other commodities and 04. cereals), the traditional tropical export products (06. Sugar, 07. coffee, tea and cocoa and 232. natural rubber) and other products (42. vegetable oils, 41. animal fats). By contrast, agricultural products and processed and high-value foods performed better (02. dairy products, 05. fruit and vegetables, 08. animal feeds and 09. miscellaneous edible products) or even suffered no deterioration (01. meat, 03. fish, 11. beverages, 12. tobacco and 24. cork and wood). Despite rising real prices in the long term, the latter (except tobacco and wood) were (like the remaining products) unable

[8] In order to address biases from the use of unit values rather than prices for individual commodities, we have also constructed a new series based on the unit values for the same eighteen products as used in the «Grilli–Yang 1977-1979 weight index», using the same deflator as used in this series. Both series are very close, and the correlation coefficient is high at 0.96. In this light, we relieve that no significant bias exists.

[9] See similar results in Bloch and Sapsford (1997) for the deterioration of raw material prices after the Second World War.

TABLE 1
EVOLUTION OF REAL PRICES OF AGRICULTURAL AND FOOD PRODUCTS
(CUMULATIVE AVERAGE ANNUAL RATES OF GROWTH)

Group of products	1951-2000	1951-1973	1973-1988	1988-2000
Aggregate Index	**−1.02**	**−0.30**	**−2.34**	**−0.42**
232. Natural rubber	−3.71	−3.67	−1.93	−5.11
26. Textile fibres	−2.92	−2.44	−2.37	−3.76
21. Leather and hides	−1.80	−0.45	−2.18	−3.29
04. Cereals and cereal preparations	−1.68	0.52	−4.42	−1.72
29. Other commodities	−1.61	−1.59	−2.06	−0.73
22. Oil seeds	−1.59	1.58	−4.90	−2.61
41. Animal fats	−2.43	−1.23	−4.06	−1.96
42. Vegetable oils	−2.31	−0.40	−4.90	−1.92
06. Sugar	−1.99	0.12	−2.70	−4.31
07. Coffee, tea and cocoa	−1.34	−0.72	−1.58	−1.81
08. Animal feeds	−0.89	3.56	−5.57	−2.45
05. Fruit and vegetables	−0.45	−0.18	−0.94	−0.21
02. Dairy products	−0.44	0.36	−1.44	−0.52
09. Miscellaneous edible products	−0.36	1.12	−2.48	−0.25
01. Meat	0.34	4.10	−3.27	−1.69
24. Forest products	0.50	1.70	−2.13	1.56
12. Tobacco	0.74	1.29	0.37	0.05
03. Fish and fish products	1.93	4.71	−0.98	0.28
11. Beverages	2.40	3.65	0.76	1.69

Source: Authors' elaboration, using the FAOSTAT (2004) database.

to avoid a sharp fall in the period 1973-1988, when the increase in oil prices produced a strong shock in international markets (see column 3 of Table 1).

3. ECONOMETRIC ANALYSIS OF REAL PRICE TRENDS FOR AGRICULTURAL AND FOOD PRODUCTS

To determine whether there exist structural breaks or discontinuity in the series, and to examine changes in their trend that may determine the character of the shock, our objective now is to analyse the evolution of the real prices of the products comprising international agricultural trade in the period 1951-2000 using time series analysis.

TABLE 2
UNIT ROOT TESTS FOR THE LOGARITHM OF THE REAL PRICE SERIES FOR TRADE IN AGRICULTURAL AND FOOD PRODUCTS

Product group	ADF	Significance	PP	Significance
Aggregate Index	−2.25	*	−2.52	*
01. Meat	−1.62	*	−2.66	*
02. Dairy products	−2.27	*	−2.98	*
03. Fish and fish products	−1.75	*	−2.98	*
04. Cereals and cereal preparations	−1.76	*	−2.26	*
05. Fruit and vegetables	−1.91	*	−2.43	*
06. Sugar and honey	−1.69	*	−2.12	*
07. Coffee, tea and cocoa	−3.66	**	−3.43	**
08. Animal feeds	−1.49	*	−3.06	*
09. Miscellaneous edible products	−2.05	*	−2.25	*
11. Beverages	−2.83	*	−3.07	*
12. Tobacco	−2.01	*	−2.40	*
21. Leather and hides	−2.88	*	−3.66	**
22. Oil seeds	−1.52	*	−2.32	**
232. Natural rubber	−3.50	*	−4.45	
26. Textile fibers	−3.50	**	−4.98	
29. Other commodities	−1.68	*	−4.71	
41. Animal fats	−2.51	*	−3.46	**
42. Vegetable oils	−2.14	*	−2.78	*
5. Forest products	−1.53	*	−2.17	*

ADF: Augmented Dickey–Fuller test; PP: Philips Perron test.
Source: Authors' estimates.
The functional form contrasted with lags is:
$\Delta t = \mu + \beta_t + \gamma X(-1) + \Sigma\delta_i \Delta X_{t-j+1} + \varepsilon_t$.
The null hypothesis is that the variable contains a unit root, and the alternative is that the variable was generated.
Values of the t statistic corresponding to the coefficient of the lagged variable X_{t-1}.
The critical values at 1%, 5% and 10% are −4.156, −3.504 and −3.181, respectively. (t-ratios are significant * at 1%, ** at 5% and *** at 10%.)

First, to establish whether structural shocks exist, we performed the conventional unit root tests on the real price series for aggregate agricultural trade between 1951 and 2000, and similarly for the nineteen product groups. Using the augmented Dickey–Fuller (ADF; 1981) and Phillips–Perron tests (1988),

we then examined whether a unit root is present and whether the different series are stationary. Column l of Table 2 gives the results of the ADF test. As may be observed, the null hypothesis of non-stationarity (the existence of a unit root) cannot be rejected either for the aggregate series or for the nineteen product groups.

According to the Phillips–Perron test (column 3), this does not occur for three groups (232. natural rubber, 26. textile fibres and 29. other raw materials) that, following this criterion, do not display a unit root. Consequently, their trend adapts well to the Prebisch–Singer pattern of continuous deterioration in the terms of trade.

This result is easily explained if we remember that in these cases the chemical industry permitted partial substitution of these commodities by synthetic products as early as the 1950s). Natural fibres, such as cotton, were replaced by new materials such as nylon and polyester (Baffes 2005). The application of new technologies gave rise to competition between different products applied to the same use, as in the case of natural rubber and its substitutes. This caused demand for them to fall sharply and, consequently, severely affected their real prices.

Second, to establish the character of the discontinuities that exist in the majority of the groups, we have tested the hypothesis of structural change, that is to say, whether in reality the series are non-stationary or, in the long term, undergo changes in their level or trend. Following the proposal made by Perron and Vogelsang (1992), we propose two tests of structural change in which the year of rupture is determined endogenously for the sixteen series and the aggregate series which, following both the Dickey–Fuller and Phillips–Perron criteria, we previously verified as displaying a unit root. The first of these we call the *additive outlier model* (AO), in which structural change is produced instantaneously; in other words, it is no more than a temporary event in the series. The second we have termed the *innovational outlier model* (IO), in which the change in the mean is gradual instead of instantaneous, affecting the trend of the series and, consequently, various periods. In addition, taking as base the work of Clemente *et al*. (1998), we propose the same unit root tests for the case in which the series present two structural changes (AO2 and IO2).

The following equation represents the models to be tested in general form. The models include dummy variables in the trend ($TDUi_t$) and in the level (DUi_t), which take the values $TDUi_t = (t - DUi_t)$ and $DUi_t = 1$, if $t \geq TBi$ and 0 otherwise, TBi being the moments of rupture. In the model, the breakpoints DTB_1, DTB_2 ($\zeta 1$, $\zeta 2$ are the shocks to the series) and the appropriate lag order k are unknown. The breakpoints are located by a two-dimensional grid search for the maximal (most negative) t-statistic for the unit-root hypothesis ($\alpha = 1$), while k is determined by a set of sequential F-tests.

$$y_t = \mu + \beta t + \gamma_{t-1} + \Sigma c_j \Delta X_{t-j} + \alpha \, DUi_t + \sigma TDUi_t + \zeta 1 \, DTBi_{1t} + \zeta 2 \, DTBi_{2t} + \varepsilon_t \quad [1]$$

TABLE 3
STRUCTURAL BREAKS FOR THE LOGARITHM OF THE REAL PRICE SERIES FOR TRADE IN AGRICULTURAL AND FOOD PRODUCTS

	Breaks in mean TB AO		Breaks in trend TB IO	
Product group	**AO1**	**AO2**	**IO1**	**IO2**
Aggregate Index	1977 (−0.268)*	1971 (0.000)	1976 (−0.125)*	1953 (−0.000)
		1977 (−0.268)*		1976 (−0.127)*
01. Meat	1980 (−0.180)*	1962 (0.107)*	1972 (−0.109)*	1962 (0.107)*
		1976 (−0333)*		1972 (−0.146)*
02. Dairy products	1975 (−0.220)*	1976 (−0.279)*	1971 (−0.089)*	1975 (−0.180)*
		1988 (0.121)**		1986 (0.067)**
03. Fish and fish products	1966 (0.474)*	1966 (0.414)*	1967 (0.123)*	1967 (0.134)*
		1988 (0.170)*		1984 (0.053)***
04. Cereals and cereal preparations	1981 (−0564)*	1978 (−0.434)*	1973 (−0.128)*	1975 (−0.206)*
		1988 (−0.219)*		1984 (−0.227)*
05. Fruit and vegetables	1971 (−0.298)*	1971 (−0.333)*	1971 (−0.214)*	1972 (−0.247)*
		1988 (0.085)*		1989 (0.086)*
06. Sugar and honey	1988 (−0.485)*	1972 (0.190)**	1985 (−0.179)**	1970 (0.214)**
		1983 (−0.565)*		1980 (−0.452)*
07. Coffee, tea and cocoa	1984 (−0.529)*	1975 (−0.098)	1985 (−0.431)*	1957 (0.001)*
		1984 (−0.457)*		1985 (−0.431)*
08. Animal feeds	1981 (−0.466)*	1971 (0.028)	1972 (−0.143)*	1972 (−0.107)*
		1981 (0.485)*		1983 (−0.153)**
09. Miscellaneous edible products	1980 (−0.200)*	1962 (0.122)*	1976 (−0.069)*	1959 (0.057)**
		1978 (−0.258)*		1976 (−0.114)*
11. Beverages	1987 (0.584)*	1959 (0.374)*	1984 (0.264)*	1955 (0.000)
		1987 (0.493)*		1984 (0.287)*
12. Tobacco	1972 (−0.011)	1975 (−0.093)**	1983 (0.028)	1971 (−0.065)*
		1987 (0.218)*		1983 (0.081)*

21. Leather and hides	1986 (−0.314)*	1971 (−0.130)**	1972 (−0.118)*	1972 (−0.108)*
		1991 (−0.320)*		1987 (−0.151)*
22. Oil seeds	1981 (−0.542)*	1977 (−0.363)*	1978 (−0.251)*	1977 (−0.221)*
		1987 (−0.272)*		1983 (−0.181)*
232. Natural rubber	—	—	—	—
26. Textile fibres	—	—	—	—
29. Other commodities	—	—	—	—
41. Animal fats	1982 (−0.576)*	1977 (−0.359)*	1978 (−0.207)*	1978 (−0.222)*
		1987 (−0.319)*		1984 (−0.196)*
42. Vegetable oils	1977 (−0.622)*	1977 (−0.411)*	1978 (−0.436)*	1978 (−0.480)*
		1982 (−0.268)*		1984 (−0.417)*
5. Forest products	1994 (0.139)*	1977 (−0.101)*	1991 (0.041)	1978 (−0.075)**
		1990 (0.201)*		1987 (0.111)*

AO: additive outlier model; IO: innovational outlier model; TB: time breaks.
Note: Coefficients are given in brackets.
Sources: Authors' estimations.

The AO incorporating structural changes requires a regression of the form:

$$\bar{y}_t = \sum_{i=1}^{k} \omega_{1i} DT_{b1,t-i} + \sum_{i=1}^{k} \omega_{2i} DT_{b2,t-i} + \alpha \bar{y}_{t-i} + \sum_{i=1}^{k} \theta_i \Delta \bar{y}_{t-i} + e_t,$$

where $DT_{bmt} = 1$ for $t = T_{bm} + 1$ and 0 otherwise, for $m = 1,2$. No intercept is necessary as $\bar{y}_t$ is mean 0. This regression is then estimated over feasible pairs of T_{b1} and T_{b2}, searching for the minimal t-ratio for the hypothesis $\alpha = 1$; that is, the strongest rejection of the unit root null hypothesis. The equivalent model for the IO (gradual change) expresses the shocks to the series (the effects of δ_1 and δ_2) as having the same autoregressive moving average (ARMA) representation as other shocks to the model, leading to the formulation:

$$y_t = \mu + \delta_1 DU_{1t} + \delta_2 DU_{2t} + \phi_1 DT_{b1,t} + \phi_2 DT_{b2,t} + \alpha y_{t-i} + \sum_{i=1}^{k} \theta_i \Delta \bar{y}_{t-i} + e_t,$$

where again an estimate of α significantly less than unity will provide evidence against the I(1) null hypothesis. In each of these models, the breakpoints T_{b1}, T_{b2} and the appropriate lag order k are unknown. The breakpoints are located by a two-dimensional grid search for the maximal (most negative) t-statistic for the unit root hypothesis ($\alpha = 1$), while k is determined by a set of sequential F-tests.

Critical values to test for the unit root are −4.94 for «IO» models and −5.57 for «AO» models (t-ratios are significant * at 1%, ** at 5% and *** at 10%; Clemente *et al*. (1998): $T = 100$, $P = 5$).

Several conclusions may be extracted from the results we present in Table 3. First, the aggregate series of the set of agricultural and food products, and similarly twelve of the sixteen groups examined (leather and hides, cereals, oil seeds, animal fats, vegetable oils, fruit, dairy products, tobacco, forest products, processed products, animal feed and meat), suffered a structural break of a permanent nature in and around the 1970s. Both the aggregate index and these twelve groups display a structural break in the level (AO2) around 1976 and in the trend (IO2) during the 1970s.

Specifically, the aggregate index of the real prices of agricultural and food products presents a structural break in the level (AO2) in 1976 and in the trend (IO2) in 1977, which suggests that they suffered, with a lagged effect, the impact of the first oil crisis on the world economy in the 1970s[10].

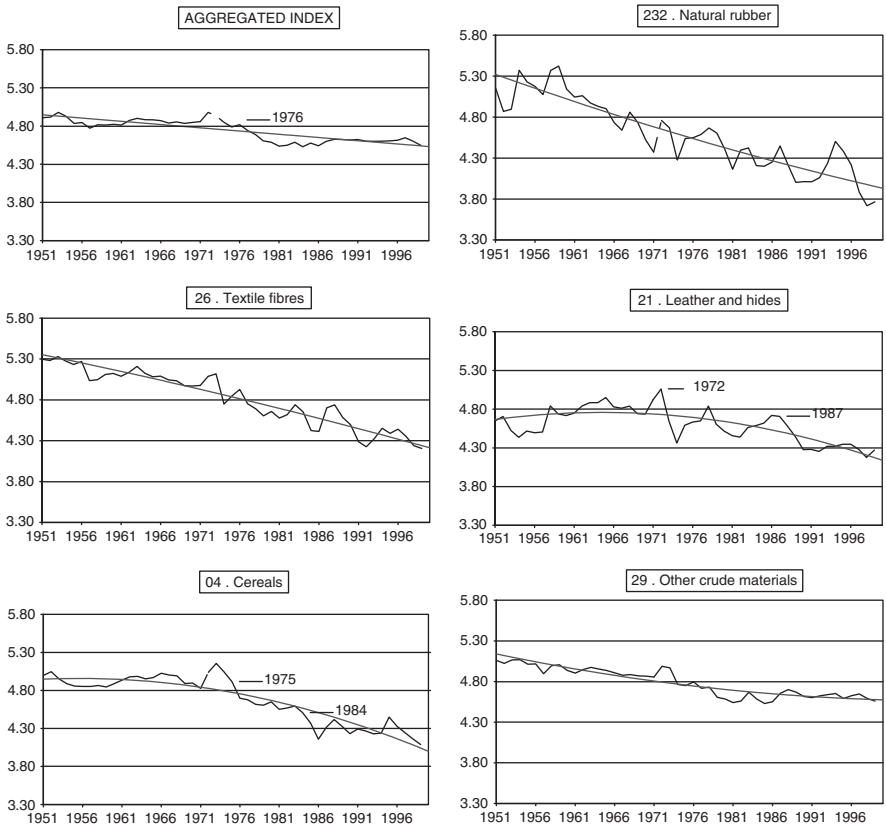
Consequently, the ruptures produced by that decade's economic crisis deeply affected almost all the product groups into which we have divided agricultural and food trade. As Figure 2 shows, in a significant number of cases, this meant that the stagnation or slight fall that their prices had experienced until then suffered an additional decrease to that undergone during the shocks, which produced a profound deterioration in real prices as a whole throughout the period (León and Soto 1997).

Second, of these twelve groups, ten (leather and hides, cereals, oil seeds, animal fats, vegetable oils, animal feeds, fruit and vegetables, dairy products, forest products and tobacco), in addition to two that had no previous experience of this type (sugar and honey and coffee, tea and cocoa), underwent a structural break with changes in both level and trend in the mid-1980s. Despite this common feature, however, their behaviour was notably heterogeneous from then on. We now attempt to explain the principal trends.

On the one hand, in the groups we classified in section 2 as performing poorly (leather and hides, cereals, oil seeds, animal fats, vegetable oils, coffee, tea and cocoa and sugar, which had in general seen real prices stagnate or fall slightly until the beginning of the 1970s), the shocks experienced involved not only one or two sharp falls, but also a subsequent trend of price decline. The cause of this deterioration may be explained in two ways: supply–demand imbalances (generated by the strong growth of production and stagnating demand) and trade in markets that were significantly distorted by interventionist policies. These imbalances were generated by a strong rate of production growth, which tended to exceed that of population and *per capita* food consumption as a consequence of the low income elasticity of this type of products or declining demand because of

[10] To test the robustness of our aggregate index, we performed the same analysis of structural breaks on the alternative series we constructed and discussed in section 2 (S–P aggregate index, 1977-1979 weights). The results are quite similar, as in this case we find a structural break in the trend (IO2) in 1978 (−0.137*), only 2 years later than in the series «S–P aggregate index». A single break is found in 1977 (−0.145*), 1 year later. These results are available on request from the authors.

FIGURE 2
EVOLUTION OF THE REAL PRICES OF AGRICULTURAL AND FOOD PRODUCTS: AGGREGATE INDEX AND GROUPS SHOWING GREATEST DETERIORATION



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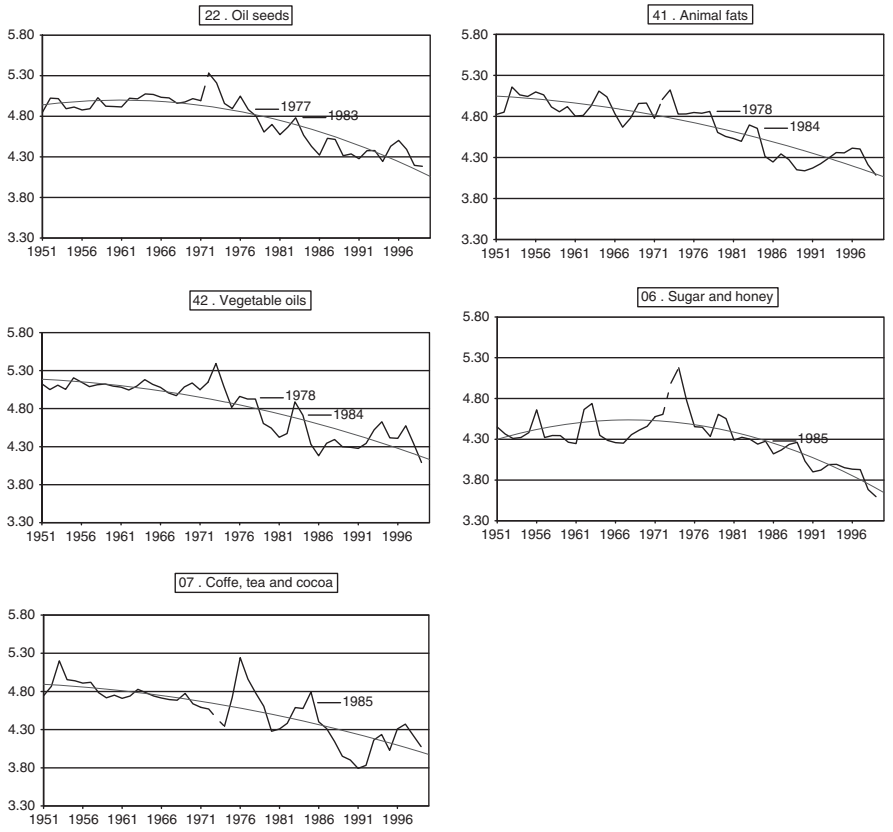
competition from new synthetic substitute products. In short, the interactions between technological progress, demand and public intervention were probably the principal causes of the deterioration in the real prices of agricultural and food products in the second half of the 20th century.

Productivity gains in the agriculture of the period were greater than those of preceding historical periods and those of other sectors. The technological advances that led to the green revolution and the mechanisation of agriculture explain this important growth. Between 1961 and 2000, according to our calculations based on figures from the FAOSTAT (2004) database, production grew extraordinarily in some product groups. Thus, it doubled for «cereals», «animal

Figure 2 (Continued).



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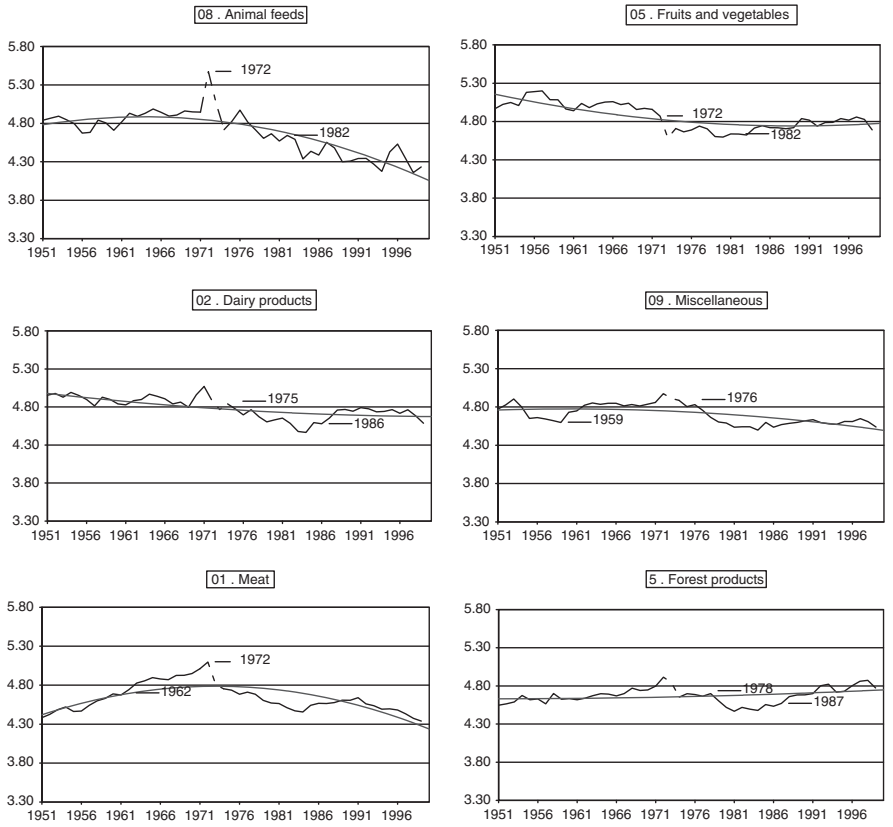
feeds», «sugar» and «coffee, tea and cocoa», tripled for «oil seeds», «fruit and vegetables», and even quadrupled in the case of «vegetable oils».

This formidable output growth, in contrast with the situation worldwide level until the interwar period, was based on a strong capitalisation of agriculture that drove productivity up sharply, normally above the rate of increase in the economy as a whole[11]. As Giovanni Federico (2005) has argued, highly intensive growth in agriculture from the second post-war period onwards replaced the more extensive growth that had predominated since the mid-19th century.

[11] Hayami and Ruttan (1985) concluded that following the Second World War, technological innovation was used to create a new agricultural production function on an international scale, based on capital and technical inputs.

Figure 2 (Continued).
EVOLUTION OF THE REAL PRICES OF AGRICULTURAL AND FOOD PRODUCTS: GROUPS OUTPERFORMING THE AGGREGATE INDEX



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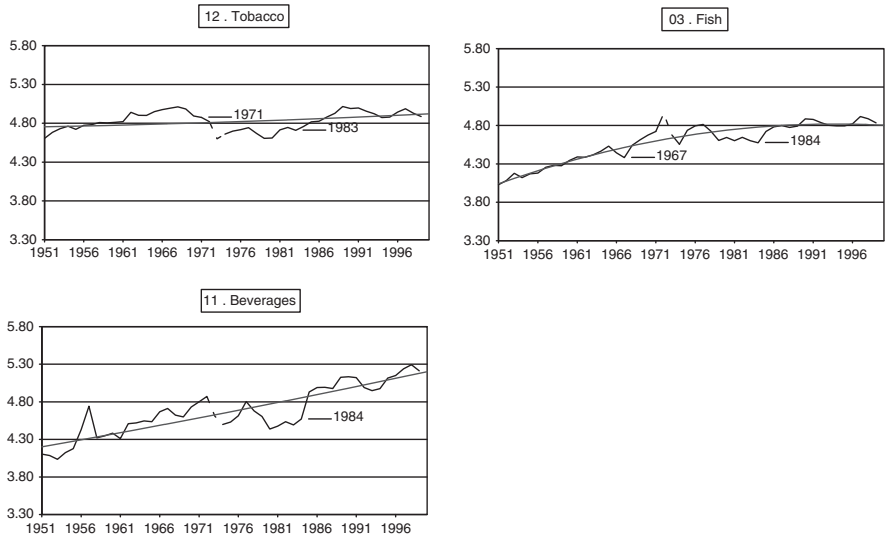
Another key variable was the evolution of consumption. In many of the groups, this tended to increase less than output. The majority of traded products had low income elasticity of demand, in contrast to consumer demand for manufactured goods and services (especially in the developed world). This contrast is essential to understanding international price evolution in a context of sharp growth in world income[12]. It is also crucial in explaining the heterogeneous long-term behaviour of the evolution of real prices among product

[12] Studies by Yates (1960), Gehlhar and Coyle (2001), Regmi *et al*. (2001), Yu *et al*. (2002), Cranfield *et al*. (2003) and Reimer and Hertel (2004)) show the demand inelasticity of these products, which in addition became progressively accentuated over the period.

Figure 2 (Continued).



Notes: Note that the dates coincide with breaks in the trend of the series Innovational outlier models 1 and 2. The series may be consulted in Appendix 2.

Source: Authors's elaboration on the basis of FAOSTAT (2004).

groups. The slow annual growth between 1961 and 2000 of *per capita* consumption for the groups of cereals (0.4 per cent), sugar (0.6 per cent) and coffee, tea and cocoa (0.14 per cent), with a market deterioration in their real prices contrasts with the strong growth in the consumption of fruit and vegetables (1.11 per cent) and meat (1.7 per cent), whose real prices performed better[13].

Basic foods, such as cereals, sugar, oil seeds and vegetable oils and fats suffered a considerable decline in the rate of consumption growth from the 1970s onwards, since by then they were faced with mature markets and a deceleration in the rate of population growth, which until then had formed the basis for growth in demand. This may explain the new changes of level and trend in the mid-1980s for cereals and oil seeds (in Table 3, see the AO2 and IO2 breaks between 1984 and 1989). These products reached their maximum levels of consumption *per capita* in the 1970s and were progressively replaced by other, high-value foods (Rosegrant and Paisner 2000; FAO 2002).

Furthermore, we must understand that the global production of these goods increased greatly, especially in the developed world, where subsidies and continuous protection caused serious problems of oversupply in the

[13] These annual rates of growth were estimated by the authors, using the FAOSTAT (2004) database.

1980s. Meanwhile, export subsidies shifted surpluses to other countries, depressing international prices (Lindert 1991; Tyres and Anderson 1992; Diaz-Bonilla and Tin 2002; Askoy 2005).

For example, the Common Agricultural Policy of the European Union tended to stimulate cereal production for export. Subsidies, saturated markets and the exploitation of technological progress transformed its trade pattern from net importer to that of net exporter in the 1980s (Dyson 1996; Pinilla and Serrano 2009; Serrano and Pinilla 2011a). Between 1976 and 1987, the surpluses produced by such policies were placed on the international markets through export subsidies.

In other groups, something similar occurred with raw materials, which suffered a sharp deterioration in prices, although in later periods. For example, cane and beet sugar were increasingly replaced by sweeteners extracted from maize (isoglucose, glucose, dextrose) and even by artificial sweeteners (saccharine). Moreover, this sector was highly distorted by the policies of the high-income countries, in which farmers received up to twice the international market prices, thereby generating incentives to increase production (Tyres and Anderson 1992)[14]. As a result, prices were subjected to strong pressure from excess supply by high-income countries. Nevertheless, they managed for a long time to remain within the limits set by the International Sugar Agreement, 1954-1985 (Gilbert 1996). Subsequently, in 1985, when these agreements and controls were suspended, relative prices suffered a deep shock (see Table 3, AO and IO in 1985).

Similarly, the group of coffee, tea and cocoa was affected by strong interventionism, had a highly concentrated and saturated consumption in the industrialised countries, experienced a significant increase in production through increases in productivity and the extension of cultivated land — both in traditional producers (Brazil) and new competitors (Vietnam) — and succeeded in maintaining its prices via the International Coffee Organization, which used production quotas to moderate and reduce price volatility (Gilbert 1996). Following the abandonment of these practices in 1986, the fall in their real prices accelerated sharply (see Table 3, change in level and trend, AO1 and IO1 in 1985).

On the other hand, cattle feedstuffs, fruit and vegetables, dairy products and processed food evolved somewhat better, and behaved similarly until the 1970s, stagnating or falling slightly. However, their prices stabilised following the shocks or, in general, slowly recovered until the end of the century (see in Table 3 the IO and AO points of rupture around 1982-1987). This appears to be related to the increasing importance of dairy produce, fruit and vegetables and processed food, among other products, in diets worldwide[15].

[14] The nominal protection of these products was extremely high, compared with other agricultural products. See an estimation disaggregated by product type and country in Serrano and Pinilla (2009, p. 26).

[15] On this question, see, among others, Teuteberg (1992), Grigg (1995), Delgado *et al*. (1999), Rosegrant and Paisner (2000), Gehlhar and Coyle (2001), FAO (2002), Moreno *et al*. (2002) and Pinilla and Ayuda (2008).

To the price behaviour of the latter certain products such as cattle feedstuffs, closely related to the expansion of the livestock sector, can be added.

The most dynamic behaviour was displayed by five groups (meat, forest products, tobacco, fish and beverages), which reveal positive long-term growth in their real prices. Whether they experienced two shocks with important falls in their prices, in the 1970s and 1980s (tobacco and wood) or the first on earlier dates (meat and fish) or only one in the 1980s (beverages), all (except meat) overcame the shocks and recommenced the trend to increasing prices experienced before the shocks. The final outcome was the most positive performance of all agricultural and food products. The groups «forest products» and «beverages» were two exceptions to this rapid output growth, and it is therefore unsurprising that their real prices increased continuously throughout the second half of the 20th century.

To sum up, it is reasonable to hypothesise that only those products that had higher income elasticity or greater difficulties in increasing output at a rate similar to that of the products that benefited most from the new technologies of the green revolution and mechanisation, and were difficult to replace by synthetic substitutes, finally experienced improvements in their terms of trade.

4. CONCLUSIONS

We conclude, from a long-term perspective, that the deterioration in the terms of trade for agricultural and food products was strong and clear in the second half of the last century. In addition, and from a comparative perspective, the product groups displayed fairly heterogeneous behaviour. In general, less processed products suffered a very heavy fall in their real prices, far in excess of that of the aggregate index. These products are the groups showing greatest deterioration, and they comprise raw materials and basic foods (SITC groups: 21. leather and hides, 22. oil seeds, 26. textile fibres, 29. other commodities and 04. cereals), traditionally exported tropical products (06. sugar, 07. coffee, tea and cocoa and 232. natural rubber) and vegetable oils and animal fats (SITC groups 42 and 41).

Nevertheless, the other question raised initially was whether this deterioration was continuous, as Prebisch and Singer suggest, or instead took place in steps, in response to the different shocks occurring in the international economy of the period. On this point, our results align themselves with recent studies, such as those by Ocampo and Parra (2003 and 2010 or Zanias (2005)), as they indicate that there was no continuous and persistent deterioration in the terms of trade either as a whole or for the great majority of the agricultural and food product groups (with the exception of natural rubber, textile fibres and other raw materials). Rather, this deterioration occurred in stages. Specifically, from the 1970s onwards, when the international economy was struck by the energy and economic crisis, agricultural

and food products as a whole, and most traded product groups experienced a structural break that caused a sharp fall in real prices.

From then onwards, the behaviour in the evolution of the different product groups was heterogeneous. Although in some groups this rupture was only a cyclical shock (Table 1 shows the recovery of the real prices of fruit and vegetables, dairy products and eggs, processed foods, fish and forest products, for example), for most (leather and hides, cereals, oil seeds, animal fats, vegetable oils, coffee, tea and cocoa and sugar) relative prices deteriorated sharply until the end of the century following a new structural break in the 1980s.

In short, these products underwent a marked deterioration in their terms of trade from the beginning of the 1970s until the end of the period, together with the three product groups that validated the Prebisch–Singer hypothesis for the entire period. From the long-term perspective, meanwhile, we have already termed this the «group with greatest degree of deterioration».

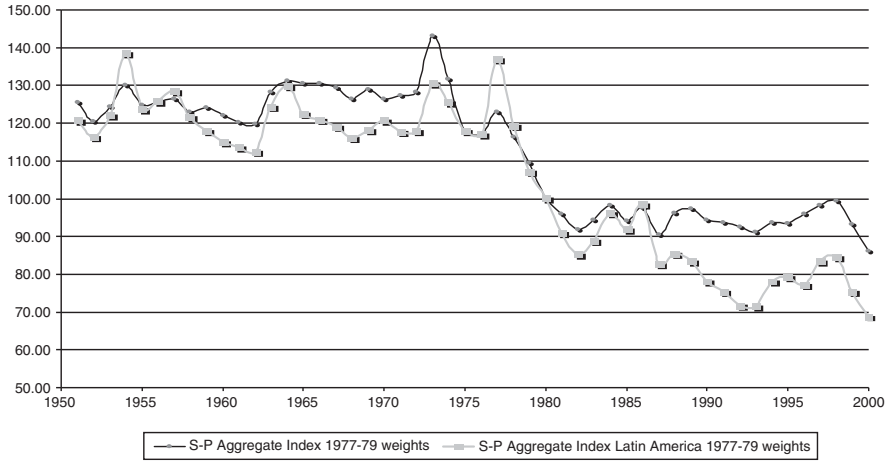
The objective of this study is not to analyse the price behaviour of this group for the countries most dependent on them for exports. Nevertheless, as a future research line, we are interested in analysing the impact this behaviour may have had in the case of Latin America, with two objectives. First, to determine whether this deterioration, affecting agricultural and food products in general, was similar in Latin America. Second, to establish which countries within this region were most deeply affected by the evolution of the real prices of its principal agricultural exports.

To answer the first question, we constructed a new index of real prices of agricultural and food products for the same period. In it, the weight used to aggregate the prices of the different product groups was the average of their weight in the agricultural and food exports of all Latin American countries in 1977-1979. Figure 3 shows that the series «S–P aggregate index, Latin America 1977-1979 weights» behaved very similarly to the world series until 1976, when the latter underwent a structural break and the former began a much sharper downward trend. For the period as a whole, the growth rates for the world series fell by an annual average of 0.77 per cent, whereas the figure for Latin America was 1.15 per cent. This difference is principally explained by the much greater fall in the Latin American series after 1976, when it began to fall at 2.2 per cent per year, compared with a worldwide annual decline of 1.3 per cent.

Why did the Latin American series behave worse than the world series? Principally, because the basket of exports of countries in the region had a much greater weight of products that from 1976 onwards were most affected by price deterioration (i.e. bulk and plantation products), and a relatively low weight of the most dynamic goods. In particular, there was a strong concentration of some of the product groups whose prices dropped furthest, especially coffee, tea and cocoa and sugar (Serrano and Pinilla 2008 and 2011b).

Lastly, we believe that it interesting to reflect upon the impact of the price falls in these product groups on Latin American countries. Logically, those countries with the greatest concentration of exports in the ten product

FIGURE 3
EVOLUTION OF THE REAL PRICES OF AGRICULTURAL AND FOOD PRODUCTS, LATIN AMERICA 1951-2000



Source: Authors' elaboration on the basis of FAOSTAT (2004).

groups whose real prices deteriorated most sharply saw the greatest decline in the purchasing power of their exports; consequently, their development possibilities were the most likely to have been adversely affected (León and Soto 1995; Lutz 1999b; Blattman *et al*. 2007; Cuddington *et al*. 2007).

The Latin American countries that still concentrated over 40 per cent of the value of their exports in the ten product groups with the worst price behaviour in 1983-1989 were Nicaragua, El Salvador, the Dominican Republic, Cuba, Guatemala, Paraguay, Colombia and Argentina. All except the last two of these countries had a low level of *per capita* income.

A certain association can be observed between a high share of these products and a low rate of growth in their export value between 1973 and 2002 (Faostat 2004). Some countries, such as Nicaragua, the Dominican Republic and Cuba, even experienced an absolute decline in their exports, and although many economies tried to increase their production of exportable goods the environment for trade in such products was extremely unfavourable.

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APPENDIX 1: SPECIFIC PRICES INCLUDED IN THE INTERNATIONAL AGRICULTURAL AND FOOD TRADE INDICES

The sixty series of unitary values of worldwide exports of the products used to construct the index, classified by product groups as per Standard International Trade Classification Revision 2.

01. Meat: bovine meat, pig meat, bacon-ham of pigs, meat sheep and poultry meat
02. Dairy products: butter, milk, cheese and curd and eggs
03. Fish and fish products
04. Cereals and cereal preparations: wheat, maize, rice, barley and oats
05. Fruit and vegetables: tomatoes, onions, potatoes, cassava, beans, peas, oranges, lemons and limes, grapefruit and pomelos, bananas and plantains and apples
06. Sugar and honey: sugar
07. Coffee, tea and cocoa: coffee, tea, cocoa beans and pepper
08. Animal feeds: feeding stuff and flour fish
09. Miscellaneous edible products
11. Beverages: wine
12. Tobacco: tobacco
21. Leather and hides
22. Oil seeds: soyabeans, copra, groundnuts and linseed
232. Natural rubber: rubber
26. Textile fibres: cotton lint, wool (greasy), sisal, flax fibre and jute
29. Other commodities
41. Animal fats
42. Vegetable oils: oil of soyabeans, oil of palm, oil of groundnuts, oil of coconuts, oil of cotton seeds, oil of linseed, oil of palm kernels and oil of sunflower seeds oil of soyabeans, oil of palm, oil of groundnuts, oil of coconuts, oil of cotton seeds, oil of linseed, oil of palm kernels and oil of sunflower seed
5. Forest products: sanwood, wood pulp, industrial roundwood

APPENDIX 2: INTERNATIONAL AGRICULTURAL AND FOOD TRADE: REAL PRICES INDICES

(Index numbers, 1980 = 100)								
Year	Aggregate index	01. Meat	02. Dairy products	03. Fish and fish prod.	04. Cereals & cereal preparations	05. Fruit and vegetables	06. Sugar and honey	07. Coffee, tea and cocoa
1951	156	65	122	49	137	136	97	114
1952	135	80	142	56	148	144	86	115
1953	137	84	145	59	155	152	79	130
1954	145	89	138	65	141	156	74	182
1955	138	92	147	62	133	150	75	142
1956	126	87	141	65	129	178	80	140
1957	127	87	134	65	128	180	106	135
1958	118	94	123	70	128	181	75	137
1959	124	99	138	72	130	162	77	120
1960	123	103	134	72	127	161	77	112
1961	124	109	126	77	133	143	71	116
1962	123	107	125	81	139	140	70	111
1963	131	115	132	80	145	154	106	114
1964	134	125	134	83	146	146	114	125
1965	132	128	144	87	141	153	77	120
1966	132	134	140	93	144	157	73	115
1967	130	132	135	85	152	157	71	111
1968	126	131	126	80	149	152	70	109
1969	128	138	129	94	147	154	78	108
1970	126	138	121	101	133	142	82	118
1971	127	141	143	107	134	144	86	103
1972	129	150	159	112	125	142	97	99
1973	145	164	132	142	154	130	100	97
1974	139	122	118	108	173	98	147	86
1975	128	116	127	95	155	111	177	77
1976	120	114	118	114	136	106	119	112
1977	124	108	110	121	110	109	86	189
1978	115	111	117	123	108	114	85	143
1979	109	108	107	113	101	110	76	119
1980	100	100	100	100	100	100	100	100
1981	98	97	102	104	105	99	95	72

APPENDIX 2 *(Cont.)*

(Index numbers, 1980 = 100)								
Year	Aggregate index	01. Meat	02. Dairy products	03. Fish and fish prod.	04. Cereals & cereal preparations	05. Fruit and vegetables	06. Sugar and honey	07. Coffee, tea and cocoa
1982	93	96	105	100	95	103	73	74
1983	94	91	98	104	96	103	76	80
1984	98	87	88	100	99	102	74	99
1985	93	86	87	97	91	112	69	97
1986	97	94	99	112	79	115	72	121
1987	94	96	97	119	64	112	62	82
1988	100	96	105	121	75	112	65	75
1989	102	97	117	118	83	111	69	63
1990	102	100	118	120	76	112	71	52
1991	101	100	115	132	69	126	56	49
1992	102	104	121	131	73	124	49	44
1993	100	96	119	126	71	114	50	46
1994	100	93	114	122	69	120	54	64
1995	100	89	115	121	69	120	54	69
1996	100	90	117	121	86	126	52	56
1997	101	88	112	124	76	124	51	74
1998	104	84	117	136	70	129	51	79
1999	100	79	108	133	64	125	40	69
2000	94	77	98	126	60	109	36	59

Year	08. Animal feeds	09. Miscellaneous edible products	11. Beverages	12. Tobacco	21. Leather and hides	22. Oil seeds	232. Natural rubber	26. Textile fibres
1951	107	112	57	92	174	144	276	286
1952	127	118	61	100	104	128	174	200
1953	130	125	60	108	110	152	130	197
1954	133	135	57	113	92	151	134	207
1955	127	122	62	117	84	133	215	195
1956	121	105	65	112	92	136	187	187
1957	107	106	84	118	90	131	177	194
1958	108	104	115	119	90	133	160	154

APPENDIX 2 *(Cont.)*

Year	08. Animal feeds	09. Miscellaneous edible products	11. Beverages	12. Tobacco	21. Leather and hides	22. Oil seeds	232. Natural rubber	26. Textile fibres
1959	127	102	75	123	127	153	214	156
1960	122	99	77	122	114	137	226	166
1961	111	113	80	123	112	137	171	168
1962	124	115	74	124	115	136	155	162
1963	138	124	91	140	127	152	158	170
1964	133	128	92	135	132	151	144	183
1965	139	126	94	134	132	160	139	168
1966	147	127	93	141	141	159	135	161
1967	140	128	106	145	125	153	114	163
1968	134	123	111	147	123	152	104	155
1969	135	126	102	150	126	143	129	154
1970	143	123	99	146	115	145	114	144
1971	141	126	113	133	114	151	92	144
1972	141	129	122	131	137	147	79	145
1973	238	145	131	124	157	207	117	162
1974	156	136	100	100	104	183	107	167
1975	112	132	90	106	78	142	72	116
1976	125	122	93	110	99	134	94	127
1977	144	125	101	112	103	156	94	138
1978	123	116	122	115	104	132	98	116
1979	112	106	108	107	126	122	106	109
1980	100	100	100	100	100	100	100	100
1981	106	98	85	101	91	110	82	105
1982	97	93	88	112	86	97	64	97
1983	104	94	93	115	85	106	81	101
1984	99	94	89	111	96	119	83	114
1985	76	90	97	116	98	96	67	105
1986	84	99	139	124	101	84	67	84
1987	80	93	147	125	112	75	70	82
1988	95	97	148	132	111	93	85	110
1989	88	98	145	138	98	91	68	114
1990	74	99	168	151	85	75	55	98
1991	74	101	170	147	72	76	55	90
1992	77	103	168	148	72	72	55	73

APPENDIX 2 *(Cont.)*

Year	08. Animal feeds	09. Miscellaneous edible products	11. Beverages	12. Tobacco	21. Leather and hides	22. Oil seeds	232. Natural rubber	26. Textile fibres
1993	77	99	147	142	71	80	58	68
1994	71	98	141	138	75	80	69	75
1995	65	97	145	131	75	70	90	86
1996	84	101	167	132	77	84	80	81
1997	93	100	172	140	77	90	68	85
1998	77	104	189	146	72	81	49	78
1999	64	100	199	138	65	66	41	69
2000	69	94	184	133	72	66	43	67

Year	29. Other commodities	41. Animal fats	42. Vegetable oils	5. Forest products
1951	212	198	188	92
1952	158	124	168	94
1953	152	128	156	96
1954	158	174	166	99
1955	159	158	156	107
1956	150	155	182	101
1957	151	164	172	103
1958	134	158	162	96
1959	148	136	166	110
1960	149	129	168	102
1961	139	137	164	103
1962	135	122	161	101
1963	141	123	155	103
1964	145	138	163	107
1965	142	165	178	110
1966	139	154	167	109
1967	135	126	161	107
1968	131	106	149	110
1969	132	119	144	118
1970	130	142	162	114
1971	130	143	170	115
1972	129	119	156	121
1973	147	149	172	136

APPENDIX 2 *(Cont.)*

Year	29. Other commodities	41. Animal fats	42. Vegetable oils	5. Forest products
1974	144	168	220	127
1975	117	125	164	105
1976	116	125	124	110
1977	121	127	143	109
1978	112	126	138	106
1979	113	129	138	110
1980	100	100	100	100
1981	98	95	94	92
1982	94	93	83	87
1983	96	90	88	92
1984	107	109	133	90
1985	98	105	111	88
1986	93	75	76	95
1987	95	70	65	93
1988	105	77	77	97
1989	110	72	81	106
1990	107	63	74	108
1991	101	63	73	108
1992	100	65	72	110
1993	102	68	77	122
1994	103	73	92	124
1995	105	78	102	112
1996	99	78	83	113
1997	102	83	82	122
1998	104	82	97	129
1999	99	68	77	131
2000	96	59	60	118

Sources: Author's elaboration on the basis of Food and Agriculture Organization of the United Nations (1947-2000) and FAOSTAT (2004).