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Terms of Trade of Agriculture and Food Production: Case of Mexico

Antonio Yunez N.[1]

Abstract: This paper presents the main results of a study that proposes a methodology for studying whether or not a heterogeneous agricultural sector, such as that of Mexico, faces unfavourable terms of trade. These results are used to interpret the origins of the basic food production problems experienced by Mexico since the 1960s. The analysis takes classical economics as the theoretical framework; the study's empirical nature makes it one of the few quantitative studies on agricultural terms of trade in this tradition. Agriculture clearly faced unfavourable terms of trade during 1960 and 1970, and the terms of trade of its peasant component explain the phenomenon. This, together with government intervention in setting low basic crop prices, explains the agricultural problems of contemporary Mexico.

Introduction

Several authors have argued that, through unfavourable terms of trade, agriculture supports the process of industrialization. Some have used the labour theory of value to sustain this view; none, however, has proved this empirically.

This paper presents the main results of a study that proposes a methodology for studying whether or not a heterogeneous agricultural sector, such as Mexico's, faces unfavourable terms of trade. These results are used to interpret the origins of the basic food production problems experienced by Mexico since the 1960s.

Agricultural Terms of Trade: 1950, 1960, and 1970

The analysis consists of measuring sectoral values (i.e., the total amount of labour contained in a particular commodity) and comparing them with sectoral, observed prices (i.e., what a productive sector of the economy really receives in the process of buying and selling commodities). If, for example, agriculture's estimated labour value (Z_a^v) happens to be greater than its corresponding price (Z_a^p), it faces unfavourable terms of trade, since the total labour expended in the commodity it produces is lower than the price it receives in the market. The proposed methodology allows for more precise comparisons between agriculture's price-value ratio and the same ratio for the remaining economic sectors; i.e., agricultural terms of trade. So, if one denotes the remaining sectors by j, and if, for example, $[(Z_a^p/Z_a^v)/(Z_j^p/Z_j^v)] < 1$ for all j, agriculture has unfavourable terms of trade.[2]

The empirical study is based on data for the Mexican economy; the main sources being its input-output tables for 1950, 1960, and 1970 and the population censuses for the same years. Sectoral labour values were estimated using an algorithm worked out by Morishima and Seton (1961), and sectoral gross domestic production, measured in price terms, came from national accounts.

The main results can be summarized as follows:

$$(\%Z_a^p/\%Z_a^v)_{1950} = 0.94,$$

$$(\%Z_a^p/\%Z_a^v)_{1960} = 0.59, \text{ and}$$

$$(\%Z_a^p/\%Z_a^v)_{1970} = 0.72.^3$$

Since agriculture's price/value ratios are less than one for the three years under study—particularly for 1960 and 1970—the argument stating that a heterogeneous agricultural sector faces unfavourable terms of trade is not rejected empirically.

The above is confirmed by our more detailed terms-of-trade results. They show that, for 1950, agriculture's unfavourable terms of trade are compensated by its favourable terms

Table 1-Agricultural Terms of Trade, Mexico, 1950-70*

	Sector	1950	1960	1970
1.	Agriculture (a)	1.000	1.000	1.000
2.	Livestock rearing	0.304	0.408	0.670
3.	Forestry, etc.	0.658	0.444	0.829
4.	Mineral products	1.004	0.633	0.655
5.	Oil extraction and refining and coal and by-products	1.048	0.542	0.766
6.	Foods	0.724	0.655	0.676
7.	Drinks and beverages	1.207	0.594	0.642
8.	Tobacco and products	2.645	0.418	0.547
9.	Textile industries	1.154	0.838	0.866
10.	Tailoring	0.974	0.692	0.684
11.	Wood industries	0.765	0.468	0.757
12.	Paper and cardboard	1.027	0.677	0.745
13.	Printing and publishing	1.169	0.807	0.897
14.	Leather and by-products	0.803	0.565	1.033
15.	Rubber products	0.949	0.530	0.675
16.	Chemistry and chemicals	1.033	0.647	0.735
17.	Nonmetalic mineral products	1.181	0.712	0.811
18.	Basic metal industries	1.115	0.660	0.679
19.	Other metal products	0.876	0.761	0.769
20.	Machinery, equipment, and electrodomestics	0.967	0.695	0.651
21.	Motor vehicles, transport, and bodywork	1.023	0.731	0.557
22.	Other manufacturing industries	0.971	0.761	0.757
23.	Construction	1.520	0.845	0.950
24.	Electricity	1.324	0.860	0.793
25.	Commerce	0.675	0.257	0.471
26.	Transport	0.926	0.960	0.818
27.	Communications	8.662	1.095	0.796
28.	Restaurants and hotels	1.907	0.808	0.568
29.	Financial services	1.674	0.921	1.162
30.	Other services	0.993	0.487	0.806

* $(Z^a_t / Z^a_0) / (Z^j_t / Z^j_0)$; $j = 1 \ldots 30$.
Sources: SPP (1980) and the author's own estimations.

of trade. On the other hand, in 1960 and 1970, they were unfavourable with respect to all of the economy's sectors, except for sectors one and two, respectively (Table 1).

So, the outcome for 1950 does not contradict the argument that a heterogeneous agricultural sector faces unfavourable economic terms of trade in the product market, and the findings for 1960 and 1970 provide sound empirical foundations.

Sources of Unfavourable Terms of Trade of Agriculture

In the above analysis, the dual character of Mexico's agrarian structure was considered implicitly; i.e., the fact that family-based producers coexist with commercial farmers. This was taken into account in the agricultural labour value estimation by imputing the ruling minimum wage to the productive members of the peasant economy. This procedure is crucial since, if family labour is ignored, agricultural terms of trade appear to be favourable; furthermore, they become the most favourable when compared with the terms of trade of other sectors.

The sharp contrast between the two sets of results is related to the controversial issue of whether unequal terms of trade are rooted in low productivity or in low remuneration of peasant family labour. One can argue, for example, that since the peasant economy is unproductive, the correct procedure is to dismiss family labour. However, as well as ignoring a component of agriculture's labour value, the outcome of this procedure—agriculture being one of the sectors that benefits most in the process of buying and selling commodities—contrasts with the observed decline of its rates of growth since the mid-1950s. Furthermore, the nature of the adopted methodology makes the results independent of the controversy because the previous analysis shows that, by considering family labour as part

of agriculture's value, the fact that the peasant economy uses living labour intensively is taken into account, as well as the incomplete valorization of this component of value. Since intensive use of labour with respect to capital means lower productivity of labour, and nonvalorization of a portion of peasant labour means lower remuneration, both aspects are part of the reason why the peasant economy contributes to making agriculture face unfavourable terms of trade.

This latter conclusion is reinforced by the results relating to terms of trade of the agricultural components when taken separately. The exercise was done for 1970, where agriculture is divided into three sectors: peasant, family-based farms (*p*); commercial, labour-hiring plots (*e*); and intermediate or transitional units (*t*). The main result is that the peasant sector and, to a lesser extent, transitional agriculture, suffered unfavourable terms of trade (i.e., $\%Z_p^p / \%Z_p^v = 0.60$, $\%Z_e^p / \%Z_e^v = 0.93$, and $\%Z_t^p / \%Z_t^v = 0.65$).[4]

In order to complete this study, one must consider the evolution of the other element of the comparisons: prices. The changes in agricultural prices *vis-à-vis* GDP from the mid-1940s to the beginning of the 1970s show that they were not much different (Oliver, 1978, Table 3, p. 717). So, when agriculture is taken as a whole, its conditions of production and not its relative prices explain the terms of trade it faces.

Agricultural Terms of Trade, Prices, and Food Production Problems

The findings can be used to argue that unfavourable terms of trade are one of the factors explaining the reduction of rates of growth that agriculture has experienced since the mid-1950s. After a period of high growth from the 1940s to the mid-1950s, agriculture began to be less dynamic, especially from the mid-1960s up to the end of the 1970s, and this was not true for the other main economic sectors, including livestock rearing (Yunez N., 1988b, Chapter 8). This coincides with the result that, in 1960 and 1970, agriculture clearly faced unfavourable terms of trade with most of the remaining economic sectors.

However, the above is not sufficient to explain why stagnation is found in production of basic crops for human consumption; to establish this, one must study the evolution of the prices of specific peasant and commercial crops and the government influence on them.

From the 1950s, Mexico has established guaranteed prices to regulate the markets for several basic crops: the guaranteed price of beans was first set in 1953, that of maize in 1956, rice and wheat in 1960, sorghum in 1961, safflower and soyabeans in 1965, cotton seed and sesame in 1966, and barley and sunflower in 1971. This control accounted for a general decrease in real prices until 1973, which had a negative influence on production. This was particularly true for maize and, to a lesser extent, for beans—typical peasant crops and the most important grains in the Mexican diet (Santoyo, 1977; Gomez Oliver, 1977; Vera Ferrer, 1987; and Yunez N., 1988b, Chapter 8).

This, together with the observed increases in the production of crops for animal feeding and livestock rearing—typical commercial activities in rural Mexico—leads to the following interpretation being considered plausible. Since the 1960s, Mexico has been experiencing a strong change in the use of land, from crops for human consumption to fodder crops and from crops to livestock rearing. If one considers that the objective of commercial agriculture implies changes in the use of land when profitability of alternative activities change, and that this is not so for the peasant economy, Mexico's basic food production problems are explained by both a reduction in the productive capacity of peasant farms and a change in the use of land by commercial farms.

The historical experience of countries with divergent socioeconomic settings shows that agriculture has played a major role in growth. In not a few cases, this has been implemented by extracting surplus from the agricultural sector.

Mexico, through land reform, created the contemporary peasant economy and, through its agricultural policies, promoted commercial farmers. Both actions contributed to the formation of a heterogeneous agrarian structure. This, together with government intervention to maintain low food prices for urban consumers, created the conditions for

agriculture to support urban industrial growth. However, the process has led to contradictions, which have imposed limits on this function: the polarization of agriculture created the conditions for the existence of unfavourable terms of trade, but it also meant increasing productivity and payment differentials between its components as well as the maintenance of low productivity or even the deterioration of the production conditions of those farms facing unequal terms of trade.

The low-productivity, low-reward peasant economy has been incapable of performing the role it had before, and a transformation of agriculture is taking place. The period of prominent agricultural support of growth has come to a halt and one of the consequences has been the erosion of agriculture's capacity to produce enough food for Mexico's population.

Notes

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[2]The details are presented in Yunez N. (1986). Also see Yunez N. (1988a) for a theoretical discussion of the conclusions of agricultural terms of trade arising from the labour theory of value.

[3]Note that the price-value ratios are defined in terms of proportions because the nature of the value estimations requires normalization of the elements of the value and price vectors in order to make them comparable. This is not required by the terms of trade (Yunez N., 1986, Part II and Appendices).

[4]Similar results are obtained for the terms of trade of the three agricultural subsectors, and, again, the results on peasant and transitional agriculture's terms of trade become quite favourable when family labour is ignored (Yunez N., 1986, Chapter 6). Agriculture could not be subdivided for the other two years under study due to data restrictions.

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DISCUSSION OPENING—*Dušan Tomić* (Yugoslav Economic Institute)

Yunez's paper is a good stimulus for the exchange of opinions following two directions based on the example of Mexican agriculture: the experience of developing countries concerning agricultural development and what to do to overcome the trend of nonequivalent terms of trade of agricultural products.

The results show that the Mexican agriculture faces, in its local market, unfavourable terms of trade over the long term, which seriously limits its development. That is a common feature of many developing countries. I want to add to this investigation the fact that developing country agriculture also faces unfavourable terms of trade in the world market, resulting in great economic damage for agricultural product exporters. Some data edited by FAO showed that, in the 1960s and 1970s, the losses borne by underdeveloped countries, which arose because of aggravated terms of trade of agricultural products in the world market, were larger than the total economic aid they received.

Past experience based on the example of Mexican agriculture shows that the economic development strategy of the underdeveloped countries was based on agriculture as the source of funds for national industrialization and the maintenance of the average standard of living of the nonagricultural population. In the underdeveloped countries, as also in Mexico, agriculture was in the past in a subordinate economic position, which resulted in the intensification process of agricultural production being retarded, and a serious gap between supply of and demand for food. In that regard, the author's conclusion that agriculture can no longer be the source of funds for nonagricultural development or for carrying out a social function (e.g., to provide cheap food for the nonagricultural population) is correct.

The paper underlines some problems related to food production in Mexico: the agrarian structure, price policy, role of the state, etc. A more complex way of overcoming the unfavourable trend in the terms of trade of agricultural products should be based on the following four points.

1. Increasing labour productivity appears as the central problem in agriculture. Modern agricultural production based on new technology has to replace farmers' own production, which is low on the whole. The technology inflow must be more evenly shared among the agricultural production branches, types of farms, and characteristics of some agricultural regions.

2. Modification of the agrarian structure is a long-term process. Both development and production policies have to stimulate the differentiation of farms more efficiently according to the value of capital owned, types of production, and the scope of commodity production, so as to increase production and labour productivity.

3. A policy of achieving an equal economic position for agriculture in relation to the other sectors must: (a) provide for more efficient use of production factors, since agriculture has many resources in reserve; (b) make new investments and use more and better machines to transform agriculture more quickly into modern and specialized production, to establish larger farms, and to decrease costs of production per production unit; (c) establish an efficient system of economic conditions and stimulate measures that will speed up the development of agriculture. Agricultural producer prices should be formed in accordance with market conditions, with the numerous components of the total agricultural price policy worked out in advance; and (d) integrate modern economic and social developments within the agricultural sector. Integration in food production is an important precondition for achievement of greater production and higher income for farmers.

4. Science and research as well as agricultural policy are important preconditions for more efficient agricultural development. A high degree of interrelationship is needed between long-term and current agricultural policy.

GENERAL DISCUSSION—*Chinkook Lee* (Economic Research Service, US Department of Agriculture)

Yunez was asked if he could explain how the dualistic structure of the Mexican economy, where prices discriminate against agriculture and promote cheaper urban food prices, helps or hinders Mexican agriculture. He was also asked if different rates of technological change on Mexican farms could be segmented in the analysis.

In reply, Yunez said that, in the long-run, Mexico aims to follow world agricultural prices. However, in the short-run the government is using intervention policies to maintain cheaper food prices for consumers. The government is also helping farmers with some support policies that are effective in the short-run.

Only 1970 data were used, which cannot segment commercial (large) and peasant (small) farms in terms of their different rates of technical change.

Participants in the discussion included H.P. Binswanger and F. Homen de Melo.