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The Role of the Price Structure

Economic Integration,

Rates of Exchange, and

Value Comparisons in Latin America

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DEVELOPMENT economics has accelerated the interest in comparative economic studies. Such studies often require the translation of values from one national currency to another. The main objective of this paper is to outline a set of techniques which can be used for the comparison of costs, income, expenditures, and other value data among a group of countries.

The need for comparative studies is especially important among countries which are embarking on a process of economic integration. This paper refers to studies which focus on the eleven countries which make up the Latin American Free Trade Association (LAFTA): Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Mexico, Paraguay, Peru, Uruguay, and Venezuela.

Section I indicates the nature of the Latin American integration movement. Section II describes briefly a cooperative research program

of comparative studies (known by its Spanish acronym, "ECIEL") related to the economic development and integration of the LAFTA countries and examines the experience of the first ECIEL study. The importance of exchange rates in this study and the problems of converting costs from one currency to another are analyzed in section III.

The remaining sections deal with the current international price comparison study of the ECIEL program. Some of the methodological questions that arise in value comparisons are analyzed in sections IV and V. The procedures followed in the study are discussed in section V, and preliminary results are presented in section VI.

I. THE LATIN AMERICAN INTEGRATION MOVEMENT

The first successful steps toward economic integration were taken at the end of the 1950's. These resulted in the formation of the Central American Common Market (CACM) in 1960 and the Latin American Free Trade Association (LAFTA) in 1961. The move has progressed farthest in Central America, where five small republics comprising CACM have successfully removed almost all tariff barriers to trade among themselves. LAFTA, which now encompasses Mexico and all of South America except the Guianas, has encountered far greater difficulties. Within LAFTA a subregional arrangement, the Andean group of the five Western countries in South America, came into being in 1969 and holds out greater promise for progress in integration, at least in the short run, than LAFTA as a whole.

A special coordinating commission for Latin America (CECLA) was created on an *ad hoc* basis in Alta Gracia, Argentina, in 1964 to work out a common Latin American position vis-à-vis the United Nations Conference on Trade and Development (UNCTAD), whose first meeting took place in Geneva later that year. CECLA has continued to meet on occasion to deal with questions on international trade and development in relation to UNCTAD in particular and the outside world in general. In the spring of 1969 it took upon itself the difficult job of coordinating Latin American attitudes on economic issues vis-à-vis the United States. This effort resulted in the "Consensus of Viña del Mar" which was presented to President Nixon in June of 1969.

CECLA is a first attempt to reach a Latin American consensus on international economic matters, but its bargaining power with the rest

of the world cannot be significant if it is not backed up by a common market arrangement or permanent regional institutions.

LAFTA

The Montevideo Treaty, which brought LAFTA into existence, established a rather complicated trade-negotiation system aimed at the gradual elimination within twelve years—or by mid-1973—of customs duties and any other restrictions on substantially all reciprocal trade. Each party to the treaty was committed to granting annually to other LAFTA members reductions in duties and charges equivalent to 8 per cent of the weighted average applicable to countries outside the agreement; a free trade zone would thus be achieved by the end of the period. Every three years these concessions, open in the meantime to withdrawal through renegotiation, were to be consolidated into a common schedule of products on which all customs duties and other charges on intrazonal trade would be eliminated before mid-1973. This common schedule was to constitute, in terms of the aggregate value of trade among the member countries, 25 per cent of such trade by mid-1964, 50 per cent by mid-1967, 75 per cent by mid-1970, and "substantially all of such trade" at the end of the period.

An impressive number of escape clauses was made available to member countries with respect to trade in agricultural products and in cases of intrazonal trade disequilibriums and seriously unfavorable overall balance-of-payments situations. The treaty offered special provisions for the less developed countries within the region: nonreciprocal trade concessions, special nondiscriminatory measures aimed at protecting their industries, and collective arrangements for financial and technical assistance.

Commitments outside of trade liberalization were put in extremely vague language. They envisaged the reconciliation of overall import and export policies vis-à-vis the rest of the world and the coordination of the treatment of capital and services coming from outside the area. They also pledged progressively closer coordination of industrialization policies.

During the first eight years of LAFTA, a maze of about 11,000 concessions on individual trade items was negotiated in successive annual meetings of the Conference of Contracting Parties. Partly as a result

of these concessions and partly because the emergence of LAFTA led to the discovery of many trade opportunities, trade among the members expanded more rapidly than their world exports. The intra-regional share of total trade rose from 6 per cent in 1961 to over 12 per cent in 1968.

The Montevideo Treaty was only the beginning of a long process of political and economic adjustment among a group of countries that, in spite of a common historical tradition and considerable cultural affinities, had followed very different economic paths. Inter-Latin American economic relations have never played a major role in the development of the large and middle-sized republics, which were characterized by autarkic industrialization and a growing dependence on the developed outside world. The Montevideo Treaty, therefore, represented a compromise—at the level of the lowest common denominator—among many conflicting political and economic forces. It tried to accommodate the three leading industrial countries (Argentina, Brazil, and Mexico), as well as the others with their varying degrees of bargaining power. Finally, it had to consider the interests and attitudes of international organizations and of countries outside the region.

The unequal development levels of LAFTA countries proved to be one of the important stumbling blocks in the way of more rapid economic integration. The least-developed countries (Bolivia, Ecuador, and Paraguay) received some preferential treatment, consisting mainly of unilateral trade concessions on the part of the rest of the group. But they have been unable to improve their positions within the area, and their trade deficit with the zone has persisted.

As a result of the nationalist outlook of Latin American governments and the pressures from domestic and foreign interests, little progress has been made on intracountry and intraregional industrial specialization, whether in private or state-controlled activities. In the area of private industry, 16 complementarity agreements had been signed and ratified by the end of 1970, the first few mainly on the initiative of foreign enterprises operating in various countries at the same time. These agreements provided for eliminating customs duties and other restrictions, not only on final-use products but also on components and necessary raw materials, and they permit better horizontal

and vertical integration of productive units, most of them belonging to a small number of foreign-owned corporations. The contribution of these agreements to the expansion of intrazonal trade and the growth of the involved industries has so far been negligible.

While the Central American Common Market has continued to progress, the integration movement within LAFTA has slowed down significantly since the mid-1960's. Several attempts were made to inject dynamism into LAFTA, such as a high-level report by four leading Latin American statesmen, prepared at the request of Chile's President Frei in 1965.[1] The most important effort derived from the rising interest of the United States in Latin American economic integration which resulted in the "summit" meeting of President Lyndon Johnson with the heads of state of nearly all Latin American countries in Punta del Este in 1967. The Action Program which emerged from this meeting and was primarily designed to lead to a regional common market by 1985 has remained a document without implementation. Neither the large Latin American countries nor the United States followed through with active support.

The slowdown in the integration movement within LAFTA was formally recognized in the "Protocol of Caracas," which was signed by all "contracting parties" at their ninth conference in December 1969. The protocol postpones for an additional seven years, from December 31, 1973, to December 31, 1980, the full operation of the free trade area. Furthermore the minimum annual 8 per cent reduction in tariffs was reduced to 2.9 per cent in future negotiations, and the system of the common schedule mentioned earlier was suspended until 1974. At the same time the protocol instructed LAFTA's Standing Executive Committee to complete studies, before the end of 1973, which would result in the design of new procedures for the common schedule and the creation of "conditions favorable to the establishment of a Latin American common market."

Andean Integration

Besides the small Central American Common Market, the most encouraging sign of progress in Latin American economic integration

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[1] See Raul Prebisch, Felipe Herrera, Carlos Sanz de Santa Maria, and Jose Antonio Mayobre, "Proposals for the Creation of the Latin American Common Market," *Journal of Common Market Studies,* September 1966.

is the signing of the Subregional Andean Integration Agreement by Bolivia, Colombia, Chile, Ecuador, and Peru in May 1969. Venezuela, which participated in the lengthy negotiations leading to the treaty, did not sign but has the option of joining later. The Andean group was created within the LAFTA context, and the treaty was approved by the full LAFTA membership. In addition, the Andean group established the Andean Development Corporation of which Venezuela is also a member.

The Andean treaty provides for the automatic and irrevocable reduction of tariff and nontariff barriers so that there would be substantially free intra-Andean trade by the end of 1980. By that date, a common external tariff, to be established gradually, is also to go into full effect. Moreover the treaty provides for the elaboration of sectoral development programs, special treatment of Bolivia and Ecuador as less developed nations within the group, and coordination of economic policies. A complementarity agreement in the petrochemical industry is already in effect within the Andean group. The Andean Development Corporation is designed to promote and help finance regional investments.

Including Venezuela, the Andean group represents about one-fourth of Latin America in important aspects (gross national product, population, and area), and if successful, may well provide the needed stimulus for effective integration not only of the subregion, but also eventually of all of LAFTA and, indeed, of Latin America as a whole.

II. THE FIRST ECIEL STUDY

One of the gaps in the regional integration movement was the lack of serious and specific studies. In 1963 several major Latin American economic research institutions joined forces under the coordination of staff members of The Brookings Institution for the purpose of undertaking studies in a common research program related to the region's economic integration. While the program's major objective is to prepare professionally competent studies which will yield useful results, an important by-product is to strengthen the economics profession in Latin America through this cooperative effort and to aid in the development of the participating institutions.

There are now nineteen institutes collaborating in the eleven coun-

tries which constitute the Latin American Free Trade Association. The focus of the research program, known as ECIEL (Estudios Conjuntos sobre la Integración Económica Latinoamericana) has been the preparation of comparative studies of Latin American countries.

The basic coordination of the program is effected mainly through periodic seminars. These meetings are attended by the principal researchers concerned with the project in each participating institution and a number of observers from nonparticipating institutions who are specifically invited. The purpose of the seminars is to work out the methodology and procedures, to present and examine each institute's progress report, to analyze the experience in the field, and to resolve research and coordination problems to facilitate international comparative analyses. The seminars are scheduled at about six-month intervals, and at each meeting the steps for the next stage of the project are planned as carefully as possible. In the interseminar periods, the coordinator keeps in close touch with all the institutes, and gives, wherever necessary, methodological, technical, and administrative support.

Several studies have been undertaken by ECIEL, and the first of these, now completed, deals with the integration of specific industries in LAFTA.[2]

The generally vague conception among Latin American economies of the losses and gains involved in lowering trade barriers for manufactured products led the participating institutes to study the absolute advantage of LAFTA members in selected industries. The specific aim of this research was to indicate minimum cost locations and size of plants in selected industries within a potential regional common market in 1975 and to estimate the benefits to be derived from the regional integration of these industries.

Six product groups were selected for the study but not all of them are strategic for economic integration: some member countries that have little possibility of competing in important industries may have an absolute advantage in producing other types of products. In order to include institutes from as many countries as possible in the preparation of cost studies, some less important products (from an integration

[2] The discussion which follows is based on ECIEL, *Industrialization in a Latin American Common Market*, ed. Martin Carnoy, Washington, D.C., Brookings Institution, forthcoming.

point of view) were included in the project. The selected products are (a) nitrogenous fertilizers—ammonia, ammonium nitrate, ammonium sulphate, and urea; (b) methanol and formaldehyde; (c) kraft paper, kraft pulp, and newsprint; (d) agricultural tractors; (e) universal parallel lathes; and (f) milk products—powdered milk and cheese.

Methodology

The work was divided into four stages: (a) estimation for each LAFTA member of the demand for the given product in 1975; (b) estimation of costs of production of the selected products in various countries; (c) estimation of the costs of transportation of the selected products between points of production and points of consumption, and, where there was more than one stage of production involved, between points of production of primary-stage products and points of production of secondary-stage products (also, estimation of transport costs between United States production points and LAFTA consumption points in order to compare importation with area production); (d) combination of the previous three estimates to find the optimum location of plant(s) in LAFTA for each product or product group. This optimum minimizes the total cost to the area of meeting the projected 1975 demand.

The basic unifying analytical tool which incorporates the demand projections, cost analyses, transportation cost assumptions, and exchange rate assumptions is a modified linear programing model which was used to calculate the optimum production locations to satisfy projected 1975 demands for every product studied in all countries of the Latin American Free Trade Association, assuming all customs tariffs are eliminated for goods produced within the region. Essentially what the model does is to find the cheapest way of supplying the projected demand from within the area, balancing the economies of scale possible, as production at any one point increases, against the increasing transport costs of serving ever more distant markets.

Using this model it was also possible to calculate both the costs of producing the selected commodities at locations other than the optimum production sites, and the costs for each particular country of buying from different locations. The first kind of analysis estimates how much it would cost the common market region to deviate from

one or more minimum-cost locations (the optimum may include more than one production point). The second represents a welfare analysis in which an attempt is made to measure the benefits or costs to the consumers in each country of buying the particular product from different locations. The estimates were made by comparing costs to national consumers for the alternatives of (a) producing the products studied nationally instead of buying from the regional optimum location, and (b) importing from the United States instead of buying from the regional optimum.

Limitations

The difficulties in this project are quite apparent, especially since no precedents for such studies exist either for the European Economic Community or any other area. First of all, information is limited. Basic data may simply not exist or if they do, they may be deficient and unreliable. Then there are the problems inherent in making projections. The impossibility of foreseeing all sorts of changes and indirect effects poses a particular problem in developing countries. Production processes and technology will not remain the same, relative prices will differ, and other factors will be modified in directions which are difficult to predict.

Furthermore, the study has the limitation of dealing with only a few specific industries rather than with the economy as a whole, thus constituting a "partial equilibrium" analysis. Ideally, all industries and segments of the economy should be considered within the framework of a "general equilibrium" analysis, in order to measure both the direct and indirect impacts of economic integration. The partial equilibrium approach used really estimates which countries, given a certain set of assumptions, are likely to have absolute advantages in producing a specified product. If the country which would produce it under the partial equilibrium estimates of minimum-cost location would have still greater advantages in producing other goods, it might not be the optimum site in which to locate production of the goods under study.

The implication is that the results do not give locations that can be properly called "optimum" but rather "minimum cost." Obtaining the optimum requires a general equilibrium which considers all the

interrelations in an economy, including limitations on total resources available in each area and in the region as a whole. To do this in a comprehensive fashion is not yet feasible because of computational problems, not to speak of the impossibility of getting all the necessary data. Present economic techniques do permit undertaking a highly aggregative type of analysis in some developed countries, but such global studies say almost nothing about specific products or industries, and would therefore not have served the purposes of the study, even leaving aside the probability that in developing countries this kind of aggregative analysis might abstract from reality more than the partial equilibrium analysis employed.

Conclusions

Whatever the shortcomings of data and theory may have been, several important conclusions may be drawn from this project apart from the specific determination of the minimum-cost locations and welfare gains and costs from the integration of certain industries. For integration policy in particular, there are three main general conclusions:

a. While there may be only one economic minimum-cost set of production points for an industry in a regional common market, in each of the industries studied there are at least several other possible combinations which would not seriously violate economic precepts of efficiency. As defined here the economic optimum is that pattern of location of a particular industry where the costs of production and transportation to the regional markets are at a minimum. Consequently, the meaning of the foregoing conclusion is that there are alternative locations where costs are not much higher than at the optimum. On the other hand, there always are many other possible production patterns whose deviations from the optimum would be very expensive. The existence of several relatively efficient locations has significant implications for policy formulation because it permits a sufficient leeway for making politically acceptable decisions without incurring excessive economic costs.

b. A related but distinct conclusion is that there are many countries in Latin America which would benefit directly from economic union and that not all industrialization due to integration would concentrate in those countries which already have a large industrial plant.

The fear that, because of the unequal development levels existing in the region, industrial investment will tend to be polarized in a few of the larger and richer countries, has restrained Latin American governments and businessmen from moving boldly toward a common market. The results of this study suggest that, at least in the case of the industries examined, this fear is not well founded. This appraisal is reinforced by the inference of the first conclusion which indicates that in some cases weaker countries could be included in regional investment programs without a serious misallocation of resources.

c. The results also show that Latin American production for a regional market at the optimum (minimum-cost) or near-optimum locations would be competitive with imports from developed countries in most of the industries studied. The notion that Latin American manufacturing could never compete with goods from the United States and other highly industrialized countries has also been a deterrent in the regional integration movement. The study suggests that whenever output levels are large enough to take advantage of the benefits of large-scale production (economies of scale), as they would be in the case of many commodities in a Latin American common market, and transportation costs are significant, then Latin American production costs would permit competition with imports from developed countries even without tariff protection.

III. THE INDIFFERENCE RATE OF EXCHANGE

The chief problem in bringing together the cost estimates prepared by the individual institutes for a particular product was the difficulty of comparing value data in different monetary units. Thus an important criticism of any study of this kind is that its results depend on the rates of exchange in the countries studied. The prevailing rates may not be the "correct" ones to use because of under- or overvaluation of the currency and other biases.

The costs of production were estimated for each producing country in terms of local currency. Imported inputs were specified in dollars (or other foreign currencies) and for some purposes were converted to the national monetary unit at the rate of exchange of an indicated date. To compare production costs of a given product among various locations, some specified rates of exchange must be used to convert the national currencies involved. Thus the rate of exchange between

two countries is a crucial variable in determining the optimal location of production.

The Concept

As a first approximation to a sensitivity analysis, the "free" rate was used in addition to the official rate where it was suspected that the official exchange rates were highly overvalued. The free rate used was the "grey market" rate prevailing for tourist and other nontrade transactions. Thus the probable equilibrium rate under existing trade policies would lie between the official and free rates. Since the study deals only with six industry groups, it was clearly impossible to determine either equilibrium or parity exchange rates from the results of the analysis.

In order to go beyond the limited analysis of using two rates of exchange, a second approximation was made to estimate the sensitivity of the minimum-cost production pattern for each product to variations in exchange rates at each major location of production in the region. A new concept of "indifference rates of exchange" was introduced, defined as that rate between the currencies of B and C at which the importing country A in the region is indifferent between buying good X from country B or country C. Thus if X costs 4 pesos or 10 cruzeiros in A, importers in A are indifferent to buying from B in pesos or C in cruzeiros as long as the exchange rate in A is 2.5 Cr/peso. If the two currencies have an exchange rate of 2.0 Cr/peso in A, A's importers will buy X from B; if the exchange rate is 3.0 Cr/peso, they will buy X from C.[3] In other words, the indifference rate is that rate between two

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[3] The exchange rates refer to the relationship between the currencies of countries B and C in country A. A simple example will clarify this. The three cases mentioned in the text can be illustrated as follows (The currency in country A is the "escudo," in country B, the "peso," and in country C, the "cruzeiro"):

	Rates of Exchange	Ratio of Cruzeiro to Peso
(1)	1 escudo = 4 pesos = 10 cruzeiros	2.5
(2)	1 escudo = 4 pesos = 8 cruzeiros	2
(3)	1 escudo = 4 pesos = 12 cruzeiros	3

If product X costs 4 pesos or 10 cruzeiros A will be indifferent between buying in B or C only in case (1), because in either place it would have to spend one escudo. In case (2) X would cost more than one escudo when bought from C but again only one escudo when bought in B. A will buy from C in case (3) because the cost is less than one escudo while it is one escudo when bought in B.

currencies which reduces the advantage of a given location over a competitor to zero; these "indifference rates" are intended to indicate the switchover points in competitive position (based on average costs in decreasing cost industries and marginal costs in increasing cost industries).

Bias

The indifference method contains some biases in estimating the switchover points. The more important source of bias might be that part of the cost of the products studied, particularly transport and imported capital cost, is originally in U.S. dollars or other foreign currency and is converted to the national currency at given exchange rates.

The indifference rates of exchange were calculated on the basis of the following expression:

$$R_{ij} = c_i(1 + a_i X_i)/c_j(1 + a_j X_j)$$

where R_{ij} is the indifference rate between country i and j, c is the domestic production cost in national currency in country i or j, a is the ratio of transport and imported capital cost in foreign currency to production cost, and X_i and X_j are the exchange rates used to convert foreign costs to the national currencies in countries i and j respectively. It is clear that the more unrepresentative of the equilibrium rates of exchange the X's are, the greater the possible bias in the calculated indifference rates of exchange could be. If the aX's are small in both countries, the bias will be insignificant. Even if the X's are very distorted, the bias may be small when, say, the currencies of both countries are overvalued by a similar degree. Only in the extreme and probably rare case in which a_i is very different from a_j, and the distortion in X_i very different from the distortion in X_j, can the bias be substantial.[4]

Results

Despite the biases in the indifference rate method, the estimates of the indifference rates show approximately how sensitive the minimum-

[4] In the ECIEL industrialization study it was estimated that the maximum bias was about 20 per cent (see ECIEL, *Industrialization*, Chap. II).

cost-location estimates are to the choice of exchange rate used. Some countries cannot compete in any product studied when their official and free rates of exchange are used in the calculations, while other countries are consistently low-cost producers at their prevailing official and free exchange rates. In some cases, a small change in exchange rates changes the minimum-cost location; in other cases, the minimum-cost location is quite insensitive to such rate changes. In industries where only small differences in costs of production exist between countries, the sensitivity is greater than in industries where the advantage of one country over others is large.

In Table 1 an example is drawn from the ECIEL industrialization study to illustrate the meaning of the indifference rates of exchange. The table indicates the estimated 1975 cost of universal parallel lathes of a certain standard in six Latin American countries when purchased from each one of the producing countries, Argentina, Brazil, and Chile. The estimates were made under the "low" assumption of

TABLE 1

Delivered U.S. Dollar Cost of Universal Parallel Lathes in
Six Latin American Countries, Produced in Argentina,
Brazil, and Chile, and Implicit Indifference
Exchange Rates Projected to 1975

Country of Consumption	Country of Production			Indifference Exchange Rates		
	Argentina	Brazil	Chile	P/E	Cr/E	Cr/P
Argentina	$2,962	$3,986	$2,775	33.2	634	19.0
Brazil	3,042	3,929	2,860	32.8	603	18.3
Chile	3,014	4,042	2,726	33.8	651	19.0
Colombia	3,270	4,264	3,006	33.8	625	18.5
Mexico	3,315	4,297	3,050	33.8	620	18.5
Paraguay	2,897	3,997	2,806	32.8	625	19.0

NOTE: Exchange rate per U.S. dollar used for conversion to dollar costs: Argentina, 155 pesos (P); Brazil, 2,200 cruzeiros (Cr); Chile, 5 escudos (E). Ratio of exchange rates: P/E = 31.0, Cr/E = 420.0, Cr/P = 14.2.

SOURCE: ECIEL, *Industrialization in a Common Market*, ed., Martin Carnoy, Washington, D.C., Brookings Institution, forthcoming, Chap. VII, Table 4.

transportation costs, and production costs were converted at the "free" (brokers') rates of exchange prevailing in 1963. (For the purposes of this table only one production point in each of the producing countries was considered.) The table also shows the implicit indifference rates of exchange. For example, the indifference rate of exchange between Argentina and Chile was calculated by converting the dollar costs in columns (1) and (3) back into the respective national currencies and dividing (1) by (3) [or, simplified, (1) ÷ (3) × 31; 31 is the ratio of the Argentine rate to the dollar (155) to the Chilean rate to the dollar (5)].

The table indicates that at the free rate of exchange Chile would be competitive with Argentina and Brazil in all six countries in the production of lathes: The indifference rates are above the free exchange rates of 31 pesos and 420 cruzeiros to the escudo. But the indifference rate of exchange with Argentina in each case is less than 10 per cent above the ratio of the free rates of the two countries. Thus Chile would not be competitive with Argentina in any of the countries at the official rate of 3.5 escudos to the dollar, even if the Argentine rate were set at the official one of 140 pesos to the dollar (the indifference rates would be below the official exchange rates of 40 pesos to the escudo). At the official rate (3.5 escudos to the dollar or 629 cruzeiros to the escudo) Chile could still, but barely, compete with Brazil in four of the six countries. Argentine lathes cost less than their Brazilian counterparts in all countries at the free rate of exchange as well as at the official Argentine rate of 140 pesos to the dollar (or 15.7 cruzeiros to the peso).

While indifference rates of exchange must not be confused with equilibrium rates of exchange, because they refer only to rates between two countries for a given product in the purchasing countries, they are indicative of the sensitivity of minimum-cost points to exchange rates. For the purposes of sensitivity analysis the use of two exchange rates, the official and free ones, could be considered a first approximation; the use of indifference rates, a second approximation.

It was in the effort to approximate more closely a "true" set of rates of exchange that the ECIEL group embarked upon the project of international price comparisons which will be examined below. In the attempt to arrive at a set of exchange rates which would permit a

better comparison of values than the use of either the official or free rates of exchange, the price comparison study constitutes a further approximation. This study is not geared to the comparisons of industrial costs as dealt with in the first ECIEL project, but the study is expected to go a long way toward making possible reasonable comparisons of values among Latin American countries and between them and several third countries.

IV. INTERCOUNTRY VALUE COMPARISONS—SOME ALTERNATIVES

If comparisons of value figures in different currency units are to enlighten rather than confuse, it is necessary to have a set of rates equating these values in real terms. For example, if labor income is to be compared between two countries, it is necessary to equate the values in a way that would permit the comparisons to be carried out in terms of goods and services actually consumed in each country. In undertaking such value comparisons, several methods have been used. It would be useful to review them and ponder briefly about their appropriateness.

Official, Free, and Equilibrium Exchange Rates

The use of official exchange rates to convert value data from different countries into a common currency unit presents a host of problems. First, in many countries it is impossible to determine the official exchange rate because a number of rates exist for different foreign trade transactions. It can be argued that a weighted average of these rates is an appropriate estimate of the official exchange rate, but such a computation would require detailed information on foreign transactions. In many cases such data are difficult to obtain.

Second, even if an average could be computed or the official exchange rate determined, it would be found that for most countries these rates would either be undervalued or overvalued. This means that the internal prices of goods are either too low or too high in comparison with their international prices. In countries where the rate of increase in prices is significant and exchange rates are fixed, currencies tend to become overvalued. This is especially true if adjustments to these rates are infrequent and usually take place after they are overdue. In contrast, countries with stable prices and fixed exchange rates will tend

to have undervalued currencies. Overvaluation of the exchange rate is also implicit whenever exchange controls are in effect and other restraints to foreign trade are severe.   .

Where the exchange rate is over- or undervalued, its use in value comparisons introduces distortions. If an overvalued exchange rate is used, the data will be inflated when converted into a common currency. The opposite will be the case if the exchange rate is undervalued. Given that overvaluation is typical in Latin America, the use of official rates in value comparisons is inappropriate. These complications and distortions affecting official exchange rates also prevail in other developing nations, and affect many of the developed countries as well. Thus, the problem is a general one.

In some cases, it is possible to estimate adjusted exchange rates based on par values during a particular period in which free trade was prevalent, with an adjustment tied to the movement of national price indexes. In making national income and gross product comparisons the United Nations, in its yearbooks on national accounts statistics, has converted the data of particular countries by using this method. These adjustments are clumsy, and chances of error are high in the selection of the initial period and in the time series adjustment.

This method is a specific application of the purchasing power parity doctrine put forth by Gustav Cassell.[5] As some writers have pointed out recently, there are several versions of this doctrine. The adjusted exchange rate approach is based on what Balassa has called the "relative" purchasing power parity doctrine.[6] Any relative purchasing power par calculation is affected by the difficulties noted above with regard to adjusted exchange rates. Even if the initial par values are not over- and undervalued, the movement of wholesale or consumer price indexes in the countries involved generally does not run parallel to changes in their equilibrium exchange rates.[7]

[5] See Gustav Cassell, "Abnormal Deviations in International Exchanges," *Economic Journal*, September 1918; Cassell, *The World's Monetary Problems*, London, 1921; and other works by the same author.

[6] Bela Balassa, "The Purchasing-Power Parity Doctrine: A Reappraisal," *Journal of Political Economy*, December 1964, p. 591.

[7] See Leland Yeager, "A Rehabilitation of Purchasing-Power Parity," *Journal of Political Economy*, December 1958; Gottfried Haberler, *A Survey of International Trade Theory*, Special Papers in International Economics 1, Princeton, 1961, pp. 45–51; Balassa, "Parity."

In countries where foreign exchange markets are government controlled, "free" rate quotations rather than official ones could be used.[8] Free rates probably reflect more accurately than adjusted ones the degree of over- or undervaluation of the official rate, since they are somehow determined by the market. But free rates are still poor approximations of equilibrium exchange rates. Generally, free rates are determined in parallel markets and are greatly influenced by particular types of transactions (capital movements, tourism, special imports, etc.). Thus, the degree of under- or overvaluation involved in the use of these rates would still be uncertain. Therefore, it seems that available exchange rates or those that could be easily derived from published data cannot be used in a straightforward manner for value comparisons.

The degree of under- or overvaluation should be judged only relative to a certain set of conditions. These concepts have been used in connection with the traditional concept of an equilibrium rate of exchange.[9] This is the exchange rate that would obtain within a framework of unrestricted trade, full employment of labor, and the absence of short-term capital movements. Recently, a new concept of equilibrium rates has been suggested: those rates that would equilibrate international payments within the existing structure of monetary, fiscal, and trade policies.[10] The latter definition will be termed the "actual" equilibrium rate of exchange, and the former one will be called the "free trade" equilibrium rate of exchange. According to Balassa and Schydlowsky, the prevailing exchange rate is frequently a good estimate of the "actual" equilibrium rate of exchange under existing policy conditions. However, this would not be the case if temporary capital movements are taking place or foreign exchange reserves are changing involuntarily.

The "actual" equilibrium rate can be expected to differ significantly

[8] In developing countries free rates are usually determined in the "black," "street," or so-called grey markets, which involve only certain kinds of transactions, primarily tourism and capital movements.

[9] See Ragnar Nurkse, "Conditions of International Monetary Equilibrium," *Essays in International Finance*, No. 4, Spring 1945 (International Finance Section, Princeton University).

[10] See Bela Balassa and Daniel M. Schydlowsky, "Effective Tariff, Domestic Cost of Foreign Exchange, and the Equilibrium Exchange Rate," *Journal of Political Economy*, May-June 1968, pp. 356–58.

from the equilibrium rate of exchange that would hold under free trade conditions. If restrictive trade policies influence value figures to a degree that varies from country to country, any deviation from free trade values would bias international comparisons. For example, take two countries similar in every respect and with the same rate of exchange with respect to the dollar. In one country there are no trade restrictions, while the other has a 10 per cent ad valorem general tariff which is required to balance its international payments. The tariff would inflate value figures in the latter country, and the use of the identical rates would bias the comparisons.

Only the equilibrium exchange rates under free trade conditions reflect the "true" internal and external purchasing power of the currencies involved and would seem to be appropriate for value comparison. Among the rates that could be obtained without much difficulty, free rates of exchange appear to be the best approximation of "free trade" equilibrium rates.[11] Given the complexities involved in calculating equilibrium exchange rates, it would be useful to explore in greater detail the circumstances under which free rates could be considered acceptable approximations to equilibrium ones.

In developed economies free rates and official rates usually coincide.[12] Given that exchange rates are generally officially determined and upheld by government intervention in the foreign exchange markets, they may coexist with nontransitory disequilibriums in the balance of payments, concealing a divergence even from the "actual" equilibrium rate of exchange, let alone from free trade equilibrium. Recent cases in point have been the experience with the U.S. dollar, the German mark, and the Japanese yen.

In a limited number of developed countries, either the degree of government intervention in the foreign exchange market is small or rates are permitted to fluctuate freely. Under these circumstances prevailing rates can be considered good approximations of the equilibrium rate of exchange under the existing set of trade and other policies. But

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[11] In fact, adjusted exchange rates based on the "relative" purchasing power parity doctrine may be further away from equilibrium exchange rates than official rates, as will be shown in section VI.

[12] In certain developing countries official rates can also be considered equivalent to free rates. This is the case with certain convertible or "strong" currencies like the Mexican peso and the Venezuelan bolivar.

still the disparity in relation to free trade equilibrium is probably large. In developing economies, where free rates are determined in marginal markets and in which the level and variety of trade restrictions is considerable, the divergence is much larger.

But there would also be objections to the use of even "free trade" equilibrium exchange rates in value comparisons, assuming they could be properly estimated. The fact is that equilibrium rates, like the other exchange rates discussed above, equilibrate all international flows and not just those on traded goods and services. An equilibrium rate is based not only on intercountry price relatives (free of the effects of trade restrictions not including transportation costs) of tradable goods and their trade volumes, but also on other current and capital account transactions. A country with a substantial amount of capital inflows, for example, would have a higher-valued currency than if its exchange rate were determined only on the basis of trade flows. The opposite would be the case if large profit remittances flowed out of the country. This in effect disconnects the internal from the external level and structure of prices. As a result the equilibrium rate is not a good measure of the internal purchasing power of the currencies.

Moreover, not all goods and services in the economy enter into the determination of the equilibrium rates. Only tradable goods do. The currency of a country in which services are particularly cheap will have a higher relative purchasing power if all goods and services are considered rather than just tradables. It appears then that the usefulness of "free trade" equilibrium rates for value comparisons is limited because such rates are basically pertinent only to foreign transactions.

Implicit Rates

Other solutions to the value comparison problem have been based on the relationship of certain types of prices in different countries at a given date.[13] This is the case of what Balassa calls the "absolute" version of the purchasing power parity doctrine. Traditionally the calculation of purchasing power parities has been based on prices taken from the consumer or wholesale price indexes.[14] However, if a currency

[13] For example, the relationship of Argentine to Chilean prices for the same set of commodities, expressed in their respective local currencies in a given year.
[14] See Balassa, "Parity," and the other references cited in footnotes.

converter generally applicable to value figures is needed, it should be based on prices from all the different sectors of the economy. One way of doing this would be to cover the different sectors of gross domestic product or gross national product. The calculation of "absolute" purchasing power parity rates based on the concept of gross product deflators should provide parity rates that are more representative and widely applicable than those based on consumer or wholesale price indexes.[15]

In order to distinguish among the different purchasing power concepts used in the literature and mentioned in this study, the "absolute" purchasing power parity rates calculated on the basis of gross domestic product or gross national product deflators will be referred to in this paper as "implicit rates."

While gross product deflators are better than purchasing power parity rates based on consumer and wholesale price indexes, there are other problems. Gross product deflators are not available in many developing countries. Moreover, they are aggregated indexes and risky to use in international work because of the difficulty in comparing the quality of the goods and services among different countries.[16] With new developments in the field of index number computation [17] and with the increasing usefulness of value comparisons, it seems worthwhile to calculate implicit rates on the basis of price information specifically collected for such purposes.

If purchasing power parity rates are calculated covering the different sector components of the economies involved and are based on special price collections, they would appear to be the most adequate solution to the problem of value comparisons. They are not limited to particular sets of commodities and are not directly influenced by in-

[15] For criticisms of the use of cost-of-living or consumer price indexes and wholesale price indexes in the calculation of purchasing power parities see the Balassa articles cited above, and Haberler, *Trade Theory*, pp. 49–50.

[16] One of the main criticisms of both the "absolute" and "relative" versions of the purchasing power doctrine deals with the detailed statistical problems involved in the calculation of parity rates (see Yeager, "A Rehabilitation").

[17] Considerable redundancy has been found among the baskets of goods used in the calculation of price indexes. Thus, subsets of these lists have been found to replicate with a high degree of accuracy the results of larger lists. Richard and Nancy Ruggles have been working on these aspects at Yale University (see Richard Ruggles, "Price Indices and International Price Comparisons," in *Ten Economic Studies in the Tradition of Irving Fisher*, New York, 1967, pp. 180–81).

visible items in the balance of payments. On the other hand they are based on the internal purchasing power of the currencies involved, thus constituting an appropriate basis for international valuation.

These rates can be calculated from the production side or from the expenditure side of the gross product accounts. Both of them are valid, each being specially suited to particular kinds of comparisons. The production side presents problems which are very difficult to handle, although the data that could be generated would be very useful. Much more experience exists with the expenditure side, and the problems of data gathering are simpler.

It is important to point out, however, that when cost or price comparisons are undertaken primarily for the purpose of analyzing trade possibilities, equilibrium rates of exchange rather than implicit rates are appropriate. In this case the question asked is not, for example, if the wage levels in one country really represent a higher standard of living in real terms than in another, but rather whether labor costs are low enough in one of the countries for specialization in labor-intensive goods.

V. THE CALCULATION OF IMPLICIT EXCHANGE RATES

In its project on international price comparisons the ECIEL joint research program,[18] which is based on comparative studies, focuses on the analysis of implicit rates in the LAFTA countries.[19] Prices were specially collected for this purpose in each country to constitute a Latin American basket of goods and services classified according to the categories and subcategories of the gross domestic product. Because of the difficulties involved in calculations based on the product side, the study followed the expenditure-side approach.

The basis for accurate value comparisons across countries lies in "normalizing" the influence of prices in the value figures. This requires

[18] See Appendix C for a list of the ECIEL institutes participating in the international price study.

[19] The ECIEL study builds upon the pioneering study in Latin America by the U.N. Economic Commission for Latin America (ECLA), "A Measurement of Price Levels and the Purchasing Power of Currencies in Latin America, 1960–62," mimeo, Santiago, Chile, 1963. However, the methodology of both the ECLA study and the present study follow in important respects the pathbreaking work of Milton Gilbert and Irving Kravis, *An International Comparison of National Products and the Purchasing Power of Currencies,* Paris, 1954.

their proper deflation. An overall implicit rate is not appropriate for this purpose. For each type of value comparison there is a particular set of prices to be considered. Therefore the volume of information to be collected in the study was designed to make possible the calculation of implicit rates or equivalences at low levels of aggregation, not only for sectors, such as capital formation, government consumption, etc., but also for subsectors, such as food, services, meat, tropical fruit, etc. Such detail makes possible a larger number of value comparisons.

Methodology ,

The national accounting concept chosen for the study was the gross domestic product. Its breakdown by expenditure category is shown in Appendix A. This concept was preferred to gross national product because the latter is less amenable to international comparisons, in that the item "net factor incomes received from or paid abroad" varies substantially from country to country. Furthermore, the gross domestic product estimates are in greater use in Latin America.

The Selection of Prices. A set of goods was selected to represent each of the expenditure categories in Appendix A. These were chosen according to procedures described below. Final purchasers' (market) prices were collected for these commodities and services in the countries included in the comparison, keeping the characteristics of the outlets and transactors as homogeneous as possible across countries.

Implicit rates could alternatively be calculated on the basis of factor costs. Given the number of goods included in the study and the amount of information required in the calculation of their factor costs, this would constitute an undertaking far beyond the resources of the ECIEL program. On the other hand, implicit rates calculated from factor costs differ from those calculated at market prices only if the structure of taxes, subsidies, tariffs, etc., among the countries involved is dissimilar. In this study it is assumed that the implicit rates cal ulated on the basis of market prices would not differ significantly from the rates calculated at factor costs. To test this assumption, a detailed study on the impact of government controls on market prices will be attempted as a by-product of the research described here.

The prices obtained are for May 1968. For seasonal goods, prices refer either to the month of heaviest sales or to the month of lowest

prices, adjusted by the price change to correspond to May 1968. Goods affected by abnormalities in supply or demand during May 1968 were priced when "normalcy" was restored, with the prices adjusted to May 1968.

After some experimentation it was found that the relation of prices to size of container, volume, etc., was approximately linear in most cases, and the relationship did not appear to change much from country to country. Thus, each country was mainly priced on the basis of the uniform units of measurement specified in the price inquiry. Whenever such units were atypical, the most common size was selected in the country in question and the price adjusted on the basis of a linear extrapolation.

These and other similar factors divide the market for each product into several compartments. An agricultural product at the peak of production is different from an agricultural product traded during the off-season; a commodity bought from the small grocery store cannot be considered the same as an identical commodity bought from a large supermarket; a transaction involving one orange is not the same as a transaction involving two dozen oranges. In order to determine these differences several alternatives have been priced in some cases; in others, a specific alternative was priced on a uniform basis in all countries.

Prices were collected in either the capital or the most important city in each of the LAFTA countries. It is expected that the implicit rates calculated from these prices would not differ significantly from those calculated from national price averages. (This assumption will be tested in the future. If rejected, the prices collected will be adjusted to correspond to national averages.)

The goods selected for pricing were common to all participating countries. Experimentation with the existing data (price indexes, family budget studies, national accounts data, apparent consumption estimates, etc.) suggests that the products included in the common list of goods are quite representative of the expenditure patterns of each of the countries involved. This is not to deny that there are important goods that appear only in a particular nation.[20] However, it was always

[20] The experience of the ECLA study indicated that these goods would not present significant problems (see ECLA, "Measurement," pp. 65–67).

possible to find a similar good whose price behavior resembled that of the unique good and which could be found in the other countries. In such cases the weights corresponding to the unique goods were allocated to these similar items. On the other hand, whenever a good included in the common list was missing in two or three countries, the prices of substitute goods were included. If no appropriate substitutes for the product in question could be found, a price was imputed from the prices of similar products.[21] If none of these alternatives was suitable, the good was dropped from the common list. The prices are expressed in terms of the respective national currency units of each country.

Indeterminacy of the Results. It is well known that the weighting schemes used affect the calculation of the implicit rates. In fact, in determining the implicit rates between two countries, two legitimate answers are generated by alternatively using one country's weights and then the other country's weights. The true implicit rate would generally lie between these two rates,[22] and several formulas have been suggested to estimate it. These formulations result in a single rate basically as a result of crossing either the two rates or the weights of the countries *ab initio*. This study will calculate implicit rates for each pair of countries in the binary fashion described above, and it will also attempt to determine an unequivocal set of implicit rates that could be used for value comparisons within the LAFTA region.

For the latter purpose it is necessary to have a common list of goods and an average set of weights for the region as a whole. An alternative is to estimate the implicit rates from the whole set of binary rates, as Kloek and Theil have suggested.[23] The preliminary results presented below are based on a uniform list of goods and on an average (or crossed) set of weights for all Latin American countries.

Several index number formulas can be used to combine and weight the prices of the different products and countries, producing an average price relationship. This average price ratio constitutes the implicit

[21] This procedure is equivalent to attributing the weights of those goods that are missing to similar goods for which prices exist.

[22] On this point see International Labour Office, *International Comparisons of Wages,* Geneva, 1956, pp. 34–37.

[23] T. Kloek and H. Theil, "International Comparison of Prices and Quantities Consumed," *Econometrica,* July 1965.

rate for the countries involved. The varied index number formulations that will be computed and compared in this study are reviewed in Appendix B.

The Expenditure Weights Used. As pointed out above expenditure weights are used in this survey. Not only are these more stable across time and countries, but they constitute a better measure of the importance of each product. Moreover, with the basic exception of food, quantity data are very hard to obtain.

The starting point for the weights is the national accounting framework of the different countries. Data on the expenditure categories of GNP are being collected for every country involved, but a more detailed breakdown of these categories is needed in most cases. A common set of definitions and a uniform classification were determined following in the main the U.N. system of national accounts (SNA). They diverge from the SNA because (a) the national account practices that are most common in Latin America had to be followed; (b) the classification had to be made more flexible for specific research objectives; and (c) the nature of government consumption had to be redefined to exclude the value of those goods and services that most evidently have counterparts in private consumption (basically expenditures on education and health).

Whenever the ECIEL classification differed from the SNA, the following criteria were used in determining the way in which GDP categories and subcategories would be further disaggregated:

a. The importance of the items, subdivisions, and subcategories in the LAFTA countries, as indicated by price index weights, family budget studies, apparent consumption data, etc.

b. The similarity in market behavior of items and groups of items.[24] Goods with similar market behavior were grouped together as much as possible, so as to minimize price dispersion within subcategories and other subdivisions. This also facilitates the replacement of certain

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[24] Goods with similar demand and supply characteristics which are affected by changes in demand and supply conditions in more or less the same manner are defined as having the same market behavior. For example, all meats have a relatively high income elasticity, but there would be significant differences between pork and beef. On the other hand bread and cereals do not have a high income elasticity. However, there are differences between wheat and bakery products.

goods not found in particular countries by other products in the same grouping.

c. The division of the categories (in terms of subcategories and subdivisions) into parts of approximately equal importance. This is quite helpful in making the results of the calculations within each category, subcategory, or subdivision not dependent on just a small number of crucial groupings. No grouping within a particular subdivision should be of so little importance as to be irrelevant or so large as to be crucial.

The data required to implement such an ambitious attempt at subclassification are obtained from several sources. Unpublished estimates available at the national accounting offices in the participating countries are used to supplement published data. In the private consumption sector, the results of a series of family budget studies undertaken by the ECIEL program are being used to provide detailed weights at the item level. These item weights are then combined to derive weights at higher levels of aggregation. For capital formation the additional data needed in breaking down the categories come from estimates of apparent consumption in value terms. Special data are also being gathered to provide for more detailed subcategories on construction expenditures. Government expenditure figures and government budgets are being used to provide a finer breakdown of the national accounts estimates of government consumption.

Expenditure data would initially refer to 1967, as generally there is a three-year lag in their publication in Latin America. Although it can be assumed that there would be no radical change in relative terms in the expenditure data between 1967 and 1968, the year of the price collection, it is planned to use 1968 data if they can be obtained in time for publication.

The Construction of a Representative Basket of Goods and Services for LAFTA Countries. In 1960–62, the Economic Commission for Latin America (ECLA) undertook a study which constitutes the forerunner to the one described here. Although significant changes were introduced in the methodology of the present study, it was considered important to ensure the comparability of both surveys as much as possible, not only to permit a direct comparison of the results, but also (a) to test the use of price indexes in the extrapolation of implicit rates,

given that ECLA has updated its survey in this fashion; and (b) to permit a sounder selection, through regression methods, of a subset of goods that could be priced regularly in Latin America, for the purpose of calculating on a periodic basis the implicit rates among these countries.

Thus in the construction of a representative basket for LAFTA countries, the ECLA experience and the ECLA lists were the starting point. Also considered were the post allowances lists compiled by the United Nations, the U.S. State Department, and the German Foreign Office. Yet, the real determining elements in the construction of the ECIEL basket were the expenditure patterns of each of the countries involved. This required a careful review of the information contained in price indexes, family budget studies, national accounts data, and other pertinent sources.

Certain guidelines were followed in the selection of the items. The number of items selected in each subdivision was made dependent on the expenditure in the particular subdivision relative to total expenditure in the countries involved. The heterogeneity of the subdivision was also a determining factor. Ceteris paribus, a heterogeneous subcategory requires larger representation than a homogeneous one. Unique goods were avoided as much as possible (things like *tortillas* in Mexico, *hallacas* in Venezuela, *sopa paraguaya* in Paraguay), but the basic ingredients used in the manufacture of these goods (for example, corn) were included if the unique goods were important. Goods which could not be specified in a simple and straightforward manner were also avoided. Thus a tentative basket was constructed.

Each country checked the specifications of the goods included in this tentative basket against the goods used in their own price indexes and specifications. The weights of the goods whose specifications in the tentative basket and in the consumer price index of each country were considered to be close were added up country by country. These weights were found to represent over 75 per cent of the total consumer price index weights in almost every one of the countries included. Moreover, the price movement of the goods with close specifications seemed to simulate quite well the movement of the consumer price indexes in the different countries over recent years. Submitted to this

sort of checking procedures, the tentative basket was changed several times until a final satisfactory listing was reached. The final list of goods was then put through pilot tests in several countries to determine its practical applicability.

It has been previously noted that in the calculation of sets of rates for value conversion it is important that the prices used refer as much as possible to goods of the same quality in the different countries. A standard of quality must be provided. Although specifications are quite helpful, they are not sufficient. It is necessary to supplement them by the selection of a country to serve as a point of reference for quality comparisons. For private consumption, Chile was selected as the base. This meant that a close survey of Chilean qualities was made, and comparable qualities (brands, models, types, varieties, etc.) were selected in the other countries. Brazil was selected as the base country for investment goods.

The Price Collection. Although the ECIEL seminars serve to determine the procedures to be followed and to ensure their understanding on the part of the participants, a visiting committee of members of the participating institutes, Brookings, and ECLA traveled to each country just prior to the price collection. Its principal mission was to help train interviewers, to ensure quality comparability, and to conduct a final check on methodology and procedures. The committee carried out the quality surveys in Chile and Brazil and developed a set of common practices. The institutes tested the questionnaires, worked on the application of the sample design (choosing the neighborhoods, selecting the outlets, etc.), and trained the interviewers and supervisors.

The committee checked all these aspects in the field. In particular, its members visited the stores, together with the supervisors and interviewers, to determine the brands, models, varieties, types, etc., that had to be priced in each country, thus ascertaining comparability with particular qualities in the base countries. They also made sure that the stores and neighborhoods selected were comparable. The prices collected correspond to those paid by the middle-income levels in these countries. These levels were defined as the six middle deciles in the distribution of families by income in each country.

The Processing of the Data. Special consistency sheets were designed

at Brookings to facilitate a preliminary checking of the surveys in the field. Thereafter, the basic information was recorded on special coding sheets. These coding forms, together with copies of the questionnaires and consistency sheets, were sent to Brookings toward the end of 1968. At Brookings the data were thoroughly verified. First, the question-naires were reviewed together with the consistency and coding sheets. After some preliminary corrections, adjustments, and editing, the data were punched on cards and run through a series of tests of extreme values. Listings of these cards were examined in great detail and checked against price index information from the different countries and against extrapolated prices from the ECLA survey. As a result of this battery of tests further verification on quality classification, extreme prices, units of measurement, and other matters was requested from the field. The cards were then given a final editing in accordance with the response from the field and were recorded on tapes (unedited records were also kept). A final checking was undertaken based on an examination of unweighted intercountry price relatives for all the qualities and products included in the survey.

After editing, a price file was created, consisting of two tapes. One tape contained the prices listed consecutively. The other registered these prices according to their characteristics or attributes. This second tape included all the lists that could be formed by classifying prices according to attributes. For example, all prices gathered in big super-markets were in one list; all prices from Chile, in another list, etc.

This setup permits an easy access to the data file and facilitates tabulations across several attributes. For example, the intersection of the Chile, large supermarkets, and good-quality lists defines an inter-secting list of good-quality prices for large supermarkets in Chile. The intersection of the Colombia, large supermarkets, and good-quality lists determines a similar intersecting list. From these two intersecting lists, implicit rates or equivalences on the basis of good-quality prod-ucts priced in large supermarkets in Chile and Colombia can be com-puted. In similar fashion different types of comparisons can be worked out by combining the different lists in various ways.

The expenditure data, following the breakdown indicated in Ap-pendix A, are being put together at Brookings from information sent from the field. The checking to which these data are submitted is not

as strict as that given to the prices, because the latter are directly generated in this study while expenditures are based on existing data.[25]

VI. SOME PRELIMINARY RESULTS

The implicit rates presented in this section cover only private consumption. Results on the other sectors of GDP are not yet available. Implicit rates for private consumption can be considered as reasonable approximations to those corresponding to all GDP sectors.[26]

Expenditure data from the ECIEL consumer surveys, which are needed for a breakdown of private consumption expenditures, are not yet available. Therefore, average Latin American expenditure weights derived from 1960 ECLA data are used in this paper.[27]

A matrix of implicit exchange rates, calculated within the limitations noted above, is presented in Table 2. The countries appearing as denominators are the base countries. Each row is the set of implicit rates when that particular row country is used as a base. For example, the implicit rate of the Argentinian peso with respect to the Brazilian currency would be 90.05 pesos per new cruzeiro; the implicit rate of the Chilean escudo would be 2.39 escudos to one new cruzeiro, and so on.

All rates presented in this paper have been calculated by using the

[25] Exceptions are the data originating in the ECIEL private consumption expenditure surveys, which are thoroughly checked at Brookings. These studies also cover the LAFTA countries.

[26] Private consumption expenditures average close to 75 per cent of total expenditure in Latin American countries. The findings of ECLA indicate that implicit rates based on private consumption are relatively close to those calculated from total GDP (see ECLA, "Measurement," p. 190).

[27] Richard Ruggles kindly supplied these expenditure weights calculated on the basis of ECLA price and quantity information. The ECLA data cover all of Latin America, not only the LAFTA countries. But it is expected that LAFTA weights would not differ significantly from Latin American weights. Most of the materials from the 1960–62 ECLA survey used in this study refer to 1960, the year in which most of the data were collected. The 1962 ECLA data are based primarily on extrapolation.

Although the most recent expenditure surveys in the countries involved could have been used, it was felt that expenditure weights did not vary greatly between 1960 and the date of the most recent survey, which, in the majority of the countries, is already several years old. Furthermore, it has been shown that as long as the same set of weights applies to the different countries, even significant changes in expenditure weighting systems do not make much difference in the results (see Ruggles, "Comparison," pp. 187–91). It is planned to use the expenditure weights derived from the ECIEL consumption study in the final publication of this project.

Role of the Price Structure

TABLE 2

Matrix of Implicit Rates on the Basis of Private Consumption Expenditures, May 1968 [a]

| Denomi-nator | Numerator | | | | | | | | | | |
	Argen-tina	Bo-livia	Bra-zil	Chile	Colom-bia	Ecua-dor	Mex-ico	Para-guay	Peru	Uru-guay	Vene-zuela
Argen-tina	1.00	0.04	0.01	0.03	0.05	0.05	0.04	0.36	0.13	0.57	0.01
Bolivia	23.18	1.00	0.26	0.62	1.12	1.25	1.03	8.33	3.08	13.30	0.45
Brazil	90.05	3.86	1.00	2.39	4.32	4.84	3.97	32.15	11.93	51.58	1.73
Chile	37.29	1.61	0.42	1.00	1.81	2.03	1.66	13.50	4.97	21.55	0.72
Colom-bia	20.64	0.89	0.23	0.55	1.00	1.12	0.92	7.46	2.75	11.94	0.40
Ecuador	18.48	0.80	0.21	0.49	0.89	1.00	0.82	6.66	2.46	10.66	0.36
Mexico	22.58	0.97	0.25	0.60	1.09	1.22	1.00	8.08	3.00	12.95	0.44
Para-guay	2.79	0.12	0.03	0.07	0.13	0.15	0.12	1.00	0.37	1.60	0.05
Peru	7.55	0.32	0.08	0.20	0.36	0.41	0.33	2.70	1.00	4.32	0.15
Uru-guay	1.75	0.08	0.02	0.05	0.08	0.09	0.08	0.63	0.23	1.00	0.03
Vene-zuela	51.68	2.23	0.58	1.39	2.51	2.81	2.29	18.73	6.87	29.97	1.00

[a] The weights used are 1960 expenditure weights derived by Richard Ruggles from unpublished ECLA data. They are Latin American averages.

Walsh geometric index formulation (Appendix B, formula 6). Thus the weights are the same irrespective of the country used as the base. Since this formula is circular or transitive, the results are invariant to changes in the base country.

Comparison of Implicit and Exchange Rates

In section IV it was argued that while exchange rates cannot be used for value conversion, implicit rates can be. Also the proposition advanced by Gustav Cassell, referring to the closeness of these two kinds of rates, was rejected by implication. The question then arises as to what sort of relationship could be expected between exchange rates and implicit rates.

Bela Balassa attempts to answer such a question. For this purpose he specifies a two-country, three-good model with one of the goods not traded. The model is also based on the assumptions of labor as a limit-

ing factor, constant input coefficients and costs, small productivity differences in the production of the nontraded good, and equalization of the prices of traded goods. In his model "the currency of the country with the higher productivity levels will appear to be overvalued in terms of purchasing-power parity." [28] In the next sentence Balassa writes: "If per capita incomes are taken as representative of levels of productivity, the ratio of purchasing-power parity to the exchange rate will thus be an increasing function of income levels." [29]

The Relationship of Implicit Rates and Official Exchange Rates. It would be useful to look at the relationship between exchange rates and implicit rates as a first step in testing Balassa's proposition, which was derived from data for developed countries, within the Latin American context. Let us then compare the official exchange rates of the LAFTA countries with the implicit rates arising from the ECLA study of 1960–62. The latter have been updated by extrapolation through the use of national price indexes.

The ECLA implicit rates adjusted to May 1968 appear in Table 3. In the same table, the official exchange rates corresponding to May 1968 are also shown. Both sets of rates are expressed in terms of the U.S. dollar. The ECLA rates are based only on private consumption expenditures. Glancing at the figures in Table 3, it appears that the implicit rates for Latin American currencies are lower than the official exchange rates. In the terminology of Balassa's article, these currencies were undervalued in terms of the implicit rates in May 1968.[30]

[28] Balassa, "Parity," pp. 585, 586.

[29] Here the term "purchasing-power parity" as used by Balassa pertains to the "absolute" version of the doctrine and can be considered equivalent to implicit rates.

[30] The use of the concepts of over- and undervaluation in this context may create misunderstandings. They derive from the often unstated assumption in articles written in this area of international trade that implicit rates resulting from a comparison of prices across countries actually indicate the extent of over- and undervaluation, because they are approximations to the equilibrium exchange rate. Actually the concepts of over- and undervaluation are relative ones and have been applied in accordance with different standards. For example, these concepts can be tied to the balance of payments situation, the "actual" equilibrium exchange rate, or the "free trade" equilibrium exchange rate.

In this section the concepts of over- and undervaluation shall be used relative to the implicit rate in order easily to link the results presented with Balassa's framework and terminology. Clearly, no policy recommendations should be drawn from the use of such terms in this article. (For a recent specific instance in which "absolute" purchasing power parities have been used to recommend devaluation or appreciation see H. Houthakker, "Exchange Rate Adjustment," in Joint Economic Committee, *Factors Affecting the U.S. Balance of Payments,* 88th Cong., 2nd sess., December 1964.)

Role of the Price Structure

TABLE 3

Comparison of Official Exchange Rates and ECLA
Adjusted Implicit Rates, May 1968 [a]

(in national currencies per dollar)

	Official Exchange Rates	ECLA Rates
Argentina	350.00	231.34
Bolivia	11.88	8.29
Brazil	3.22	2.44
Chile	6.66	4.30
Colombia	16.30	8.74
Ecuador	18.18	11.97
Mexico	12.50	7.19
Paraguay	126.00	78.56
Peru	38.70	26.80
Uruguay	250.00	126.61
Venezuela	4.50	3.63

[a] ECLA rates are implicit rates for 1960–62 brought up to date by the use of national price indexes. They are based on private consumption expenditures only.

In order to make the comparison with the ECIEL results, it is necessary to link the set of implicit rates (presented in Table 2) to the dollar by estimating the implicit rate of a particular LAFTA country relative to the U.S. dollar. The lower the estimated rate beween the currency of the selected LAFTA country and the U.S. dollar, the lower will be the implicit rates between the other LAFTA countries and the United States, and vice versa.

Because this estimated implicit rate between the selected LAFTA country and the United States is a rough estimate, it is wise to work with a range of values rather than a single one. Assume that the lower bound of this range is the adjusted implicit rate between the selected country and the United States as calculated by ECLA (Table 3). Take the official exchange rate as the upper bound on the assumption that the implicit rate could not be higher, because if it were it would suggest that the currency is not undervalued but overvalued with respect to the U.S. dollar. As the implicit rates obtained for the other LAFTA countries are dependent on this range, it would be useful to select as a

pivot the LAFTA country whose implicit and official exchange rates in relation to the U.S. dollar differed least in May 1968.

Venezuela meets this condition, as can be seen from Table 3, and was selected as the link between the United States and the rest of LAFTA. Two sets of implicit rates between the LAFTA currencies and the dollar were calculated for May 1968. One set was based on the official rate of 4.50 bolivars to the dollar; the other used the adjusted ECLA rate of 3.63 bolivars to the dollar as the link. It is expected that the true implicit rate between Venezuela and the United States will be somewhere within this range or very close to its lower limit. The two sets of implicit rates are given in Table 4.

If the results in Table 4 are compared with the official exchange rates shown in Table 3, the apparent conclusion that all LAFTA countries had undervalued exchange rates on May 1968 is corroborated. This result holds even under the upper-bound assumption for the

TABLE 4

Implicit Rates per U.S. Dollar for LAFTA Countries
as Calculated from ECIEL Rates Under
Different Assumptions, May 1968 [a]
(in national currencies per dollar)

	Assumed Implicit Rate	
	4.50 Bolivars per Dollar	3.63 Bolivars per Dollar
Argentina	232.55	187.59
Bolivia	10.03	8.09
Brazil	2.60	2.10
Chile	6.25	5.04
Colombia	11.28	9.10
Ecuador	12.65	10.21
Mexico	10.32	8.33
Paraguay	84.29	67.99
Peru	30.93	24.95
Uruguay	134.85	108.78

[a] Implicit rates calculated on the basis of private consumption expenditures only. Venezuela is not included.

bolivar-dollar implicit rate. The implicit rate would have to be much higher for these results to be generally reversed. Thus, in relating Latin American countries to the United States, the results presented in this paper agree with the propositions derived from Balassa's model.

The Effects of Economic Development. These findings are not surprising, granted the level of economic development of the Latin American countries compared with the United States. The calculation of implicit rates involves a price comparison, not only of tradable goods, but also of purely domestic goods which do not normally enter into international trade. As Harrod indicated in the 1957 edition of his *International Economics,* the latter "are likely to be more expensive in more efficient countries." [31] On the other hand, international trade will tend to produce equality in the prices of tradable goods in the different countries after transportation costs and protective measures are taken into account.[32]

To further test Balassa's proposition, that the ratio of purchasing power parity to the exchange rate is an increasing function of income levels, within the Latin American area, the ratios suggested by him were computed by relating the ECIEL implicit rates for May 1968 to the corresponding official exchange rates (see Table 5). The ratios were calculated in terms of the Venezuelan bolivar, as no direct implicit rates with respect to the U.S. dollar were computed in the ECIEL study. Nevertheless, the results obtained would have been the same if the dollar had been taken as the base currency, because this would only involve multiplying the ratios for the different countries by the same set of constants.[33] The per capita income figures used are those published by the Inter-American Development Bank, as U.N. figures for 1968 have not yet been published. The ratios and income levels are

[31] Roy F. Harrod, *International Economics,* University of Chicago Press, p. 75.
[32] Although the results obtained in tables 3 and 4 tend to confirm some of the findings of Balassa, they are not consistent with other findings. For example, Balassa states in the article cited above that the relationship between purchasing power parities and exchange rates provides clues as to the degree of overvaluation or undervaluation of a currency. In the case of LAFTA countries this does not appear to be true. Almost all of these currencies were considered to be overvalued in 1968 at the official exchange rates indicated in Table 3. This is in direct contradiction to the situation suggested from the comparisons in tables 3 and 4. In this instance official exchange rates appear closer to equilibrium exchange rates than implicit rates.
[33] In this case the constant would be the ratio of the implicit rate of the bolivar with respect to the dollar to the official rate of exchange between these currencies.

TABLE 5

Ratio of Implicit Rates to Official Exchange Rates
Related to Per Capita Gross Domestic
Product, LAFTA Countries, 1968 [a]

(base country: Venezuela)

	Ratio of Implicit to Official Exchange Rates	Ranking of Countries by Ratios	Per Capita GDP in 1963 U.S. Dollars [b]	Ranking of Countries by Per Capita GDP
Argentina	.66	(9)	660	(1)
Bolivia	.84	(2)	135	(10)
Brazil	.80	(4.5) [c]	290	(6)
Chile	.94	(1)	360	(4)
Colombia	.69	(7)	280	(7)
Ecuador	.70	(6)	215	(8.5) [c]
Mexico	.82	(3)	470	(3)
Paraguay	.67	(8)	215	(8.5) [c]
Peru	.80	(4.5) [c]	300	(5)
Uruguay	.54	(10)	530	(2)

[a] Implicit rates are those calculated under the ECIEL program on the basis of private consumption expenditures.

[b] From figures presented in Inter-American Development Bank, *Socio-Economic Progress in Latin America,* Washington, D.C., 1969.

[c] In case of ties the countries are assigned rankings equal to the average of the rank they would have had if the tie had not occurred.

shown in Table 5, with the countries being ranked according to their values.

It is immediately apparent that no pattern emerges between these two sets of statistics. Argentina and Uruguay, the countries with the highest levels of income per capita among LAFTA countries (with Venezuela excluded) have the lowest ratios; Bolivia, with the lowest per capita income, has the third highest ratio. In fact, the rank correlation coefficient is very low and negative (-0.27).[34]

[34] Actually, the income variable should be expressed in real terms. However, this would not alter the conclusions. In fact, with the per capita incomes of Argentina and Uruguay being relatively larger in real terms, and the Bolivian one smaller, the hypothesis tested would appear to hold even less in real terms.

Since there are, in some of these countries, significant divergences between official and free exchange rates, additional testing was done on the basis of the ratios of implicit rates to free rates. The data are presented in Table 6 with the countries ranked as previously. The coefficient of rank correlation was again negative and quite small (−0.30). It appears that without further manipulation Latin American data are not consistent with the Balassa hypothesis and that therefore there are, in this respect, significant differences between the developing and developed countries which Balassa examined. The Balassa hypothesis might also hold in comparisons among broad groups of countries classified according to geopolitical area and level of economic development, but there is doubt that they would apply to countries within

TABLE 6

Ratio of Implicit Rates to Free Exchange Rates Related to Per Capita Gross Domestic Product, LAFTA Countries, 1968 [a]

(base country: Venezuela)

	Ratio of Implicit to Free Exchange Rates	Ranking of Countries by Ratios	Per Capita GDP in 1963 U.S. Dollars [b]	Ranking of Countries by Per Capita GDP
Argentina	.66 [c]	(8)	660	(1)
Bolivia	.84 [c]	(1)	135	(10)
Brazil	.71	(3)	290	(6)
Chile	.69	(4.5) [d]	360	(4)
Colombia	.69	(4.5) [d]	280	(7)
Ecuador	.57	(9)	215	(8.5) [d]
Mexico	.82 [c]	(2)	470	(3)
Paraguay	.67 [c]	(7)	215	(8.5) [d]
Peru	.68	(6)	300	(5)
Uruguay	.54 [c]	(10)	530	(2)

[a] Implicit rates are those calculated under the ECIEL program on the basis of private consumption expenditures.

[b] From figures presented in Inter-American Development Bank, *Socio-Economic Progress in Latin America,* Washington, D.C., 1969.

[c] For these countries the official and free exchange rates coincide.

[d] In case of ties the countries are assigned rankings equal to the average of the ranks they would have had if the tie had not occurred.

TABLE 7

Implicit Rates Calculated by ECLA, June 1960

(Peruvian sol = 1.00)

Argentina	3.08	Ecuador	0.68
Bolivia	0.44	Mexico	0.50
Brazil	0.01[a]	Paraguay	4.54
Chile	0.06	Uruguay	0.40
Colombia	0.29	Venezuela	0.29

SOURCE: U.N. Economic Commission for Latin America, "A Measurement of Price Levels and the Purchasing Power of Currencies in Latin America, 1960–62," mimeo, Santiago, Chile, 1963, p. 186.

[a] This figure has been adjusted to take into account the change to the new cruzeiro.

some of those groupings. Thus, the systematic relationship between implicit rates and exchange rates derived from Balassa's model does not appear to be generally applicable.[35]

Results of the 1960 and 1968 Surveys Compared

There have been sharp changes in implicit rates among LAFTA countries between 1960 and 1968 (compare tables 2 and 7).[36] With the Peruvian sol as point of reference, the implicit rate for the Brazilian currency was eleven times higher in 1968 than in 1960.[37] This means that the purchasing power of the cruzeiro relative to the sol was eleven times lower in 1968 than in 1960. Uruguay presents a similar situation. The currencies of Chile, followed by Argentina, have also depreciated considerably, although not as much as those of Brazil and Uruguay.

[35] Further work in this area would be quite fruitful. Balassa worked with a one-factor model. Christopher Clague and Vito Tanzi argue in a recent paper that the introduction of other productive factors is required to establish a relationship between implicit rates and exchange rates that would be applicable to different types of countries (see Christopher Clague and Vito Tanzi, "Human Capital, Natural Resources and the Purchasing-Power Parity Doctrine: Some Empirical Results," 1969, mimeo). Relaxing some of the assumptions of Balassa's model appears to be another promising avenue for research.

[36] This analysis is again based on implicit rates corresponding to private consumption expenditures. It is more convenient to take Peru rather than Venezuela as the base in this section because its experience from 1960 to 1968 can be considered as a representative average of all LAFTA countries. Venezuela, with a very stable currency, is an extreme case.

[37] Due to rounding in tables 2 and 7 the Brazilian currency appears to be only eight times higher between the two dates.

These countries have experienced the most virulent inflation in Latin America.

On the other hand, the implicit rates relative to the sol have become much lower for other countries. Thus, the purchasing power of the Mexican peso appreciated with respect to the sol. In the case of Bolivia, the rate improved from 0.44 to 0.32 pesos bolivianos to a sol. More pronounced was the change in Ecuador, going from 0.68 to 0.41 sucres for a unit of Peruvian currency. In the case of Paraguay the appreciation was higher still. In 1960 the implicit rate of exchange was 4.54 guaranies per sol; by 1968 the purchasing power of the guarani had improved relatively and stood at 2.70 guaranies for one sol. The Venezuelan bolivar experienced the largest relative appreciation of all (from 0.29 to 0.15 bolivars per sol). These are the countries that have been most successful in controlling price increases throughout this period.

The only country whose implicit rate has not changed considerably with respect to the Peruvian sol has been Colombia. Both Peru and Colombia are in the middle tier of LAFTA countries with respect to the degree of inflation.

The radical changes in the implicit rates among the Latin American countries over time indicate the importance of recalculating these rates regularly.[38] Table 8 shows the set of implicit equivalences for different subcategories of private consumption, with Peru as a base, in 1968.

VII. PRICE RELATIONSHIPS AMONG LAFTA COUNTRIES

The ECIEL data have been used also to compute international price indexes. These have been calculated on the basis of the rates generally used by traders, that is, the official exchange rates. The indexes are shown in Table 9 in the form of a matrix, with every country presented alternatively as a base.

In Table 10 similar results are presented, but using the adjusted implicit ECLA rates as exchange rates. These rates have been estimated solely on the basis of private consumption expenditures and refer to May 1968.

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[38] The Economic Commission for Latin America found that for LAFTA countries the rates changed significantly between 1960 and 1962. See ECLA, "Measurement," pp. 76–78.

TABLE 8

Implicit Equivalencies for Private Consumption Subcategories, 1968 [a]
(Peruvian sol = 1.00)

	Argentina	Bolivia	Brazil	Chile	Colombia	Ecuador	Mexico	Paraguay	Peru	Uruguay	Venezuela
ood	7.46	.33	.08	.18	.43	.43	.36	2.62	1.00	4.62	.15
Beverages	6.09	.31	.05	.17	.36	.45	.32	1.87	1.00	3.95	.17
Tobacco	11.06	.38	.09	.24	.21	.36	.23	3.04	1.00	9.81	.17
Clothing	8.71	.33	.09	.23	.40	.40	.41	2.74	1.00	5.65	.14
Rent	6.33	.39	.10	.26	.44	.41	.38	2.62	1.00	3.90	.17
Utilities	13.65	.19	.11	.23	.08	.33	.08	4.74	1.00	0.72	.09
Durables	8.12	.29	.06	.23	.33	.38	.30	2.86	1.00	5.94	.11
Non-durables	6.56	.37	.07	.16	.32	.40	.26	3.00	1.00	5.21	.11
Services	7.07	.26	.09	.19	.25	.34	.31	2.69	1.00	3.37	.15

[a] Same weights as in preceding tables.

In comparing the preliminary results presented in these tables, significant differences stand out. On the basis of the official exchange rates, Venezuela has the highest prices, Chile the second, and Bolivia the third highest. But if ECLA rates are used, these places are occupied by Chile, Mexico, and Colombia, in that order. The countries that rank lowest in intercountry price relatives based on official exchange rates are Uruguay, Paraguay, and Argentina in that order. With the ECLA rates, the lowest-priced countries are Argentina, Ecuador, Brazil, and Uruguay.

These comparisons reflect two basic facts. First, price differences will vary with the exchange rate used. In price (or cost) comparisons for an examination of prospective trade allocation the equilibrium exchange rates are the most appropriate. Depending on the purpose and assumptions of the comparison either the "actual" or the "free trade" equilibrium rates would be utilized. But if the objective is to utilize price advantages assuming that present policies are unchanged, then official exchange rates should be used, as in Table 9. On the other hand, for checking the extrapolation of international price indexes over time the implicit rates are most pertinent (see Table 10).

Second, the calculation of implicit rates on the basis of extrapolating benchmark calculations by using national price index information,

Role of the Price Structure

TABLE 9

Matrix of International Price Indexes for Private Consumption
on the Basis of Official Exchange Rates, 1968 [a]

Denomi-nator	Numerator										
	Argen-tina	Bo-livia	Bra-zil	Chile	Co-lom-bia	Ecua-dor	Mex-ico	Para-guay	Peru	Uru-guay	Vene-zuela
Argen-tina	1.00	1.23	1.16	1.35	1.00	1.01	1.20	0.97	1.17	0.79	1.44
Bolivia	0.81	1.00	0.95	1.10	0.82	0.82	0.98	0.79	0.95	0.64	1.18
Brazil	0.86	1.05	1.00	1.16	0.86	0.87	1.03	0.83	1.00	0.68	1.24
Chile	0.74	0.91	0.86	1.00	0.74	0.74	0.89	0.72	0.86	0.58	1.06
Colom-bia	1.00	1.22	1.16	1.35	1.00	1.01	1.20	0.97	1.16	0.79	1.44
Ecuador	0.99	1.22	1.15	1.34	0.99	1.00	1.19	0.96	1.16	0.78	1.43
Mexico	0.83	1.02	0.97	1.13	0.84	0.84	1.00	0.81	0.97	0.66	1.20
Para-guay	1.03	1.26	1.20	1.40	1.03	1.04	1.23	1.00	1.20	0.81	1.49
Peru	0.86	1.05	1.00	1.16	0.86	0.86	1.03	0.83	1.00	0.68	1.24
Uru-guay	1.27	1.55	1.47	1.72	1.27	1.28	1.52	1.23	1.48	1.00	1.83
Vene-zuela	0.69	0.85	0.81	0.94	0.69	0.70	0.83	0.67	0.81	0.55	1.00

[a] The weights used are 1960 expenditure weights derived by Richard Ruggles from unpublished ECLA data. They are Latin American averages.

does not appear to be sufficiently accurate. If the updating of the ECLA rates were precise, all the entries in Table 10 would be close to 1.00. This follows by definition, given that the implicit rate between two countries is that which equalizes their prices or the internal purchasing power of their currencies.

In interpreting the results in this section it should be kept in mind that these comparisons are based on market prices rather than factor costs, under the assumption that the results would not differ significantly between them. Also, some of the goods priced in the different countries are imported, although to a very large extent the final goods for the consumer market are domestically produced in most of the countries (Bolivia, Paraguay, and Ecuador are the exceptions). Thus, in certain instances a price advantage might just be due to low-priced imports entering final consumption in particular countries.

TABLE 10

Matrix of International Price Indexes for Private Consumption on
the Basis of Adjusted Implicit Rates Calculated by ECLA, 1968 [a]

Denomi-nator	Numerator										
	Argen-tina	Bo-livia	Bra-zil	Chile	Co-lom-bia	Ecua-dor	Mex-ico	Para-guay	Peru	Uru-guay	Vene-zuela
Argen-tina	1.00	1.19	1.04	1.41	1.26	1.03	1.40	1.05	1.14	1.04	1.21
Bolivia	0.84	1.00	0.87	1.19	1.06	0.87	1.18	0.89	0.96	0.87	1.02
Brazil	0.97	1.14	1.00	1.36	1.22	1.00	1.36	1.02	1.10	1.00	1.17
Chile	0.71	0.84	0.73	1.00	0.89	0.73	1.00	0.74	0.81	0.73	0.85
Colom-bia	0.79	0.94	0.82	1.12	1.00	0.82	1.11	0.84	0.90	0.82	0.96
Ecuador	0.97	1.15	1.00	1.37	1.22	1.00	1.36	1.02	1.10	1.00	1.17
Mexico	0.71	0.84	0.74	1.00	0.90	0.73	1.00	0.75	0.81	0.74	0.86
Para-guay	0.95	1.13	0.98	1.34	1.20	0.98	1.33	1.00	1.08	0.98	1.15
Peru	0.88	1.04	0.91	1.24	1.11	0.91	1.23	0.92	1.00	0.91	1.06
Uru-guay	0.97	1.14	1.00	1.37	1.22	1.00	1.35	1.02	1.10	1.00	1.17
Vene-zuela	0.83	0.98	0.86	1.17	1.04	0.86	1.16	0.87	0.94	0.86	1.00

[a] The weights used are 1960 expenditure weights derived by Richard Ruggles from unpublished
ECLA data. They are Latin American averages.

Comparison Based on the Overall Price Indexes

One important conclusion can be drawn from a comparison of the
results presented in Table 9, referring to 1968 and similar 1960 cal-
culations based on ECLA data. Venezuela's 1964 devaluation, to-
gether with a low rate of price increase from 1960 to 1968, appear to
have brought the price level in that nation much more in line with
those of other Latin American countries. Given that the price com-
parisons presented here refer only to private consumer goods, Vene-
zuela's heavy reliance on imports of producers durables at low nominal
tariffs could bring down its general price level relative to other
LAFTA countries even further.[39]

[39] This is under the assumption that Venezuelan prices for construction goods
and public consumption goods bear the same relationship to Latin American
averages as private consumer goods do.

In his recent experiment with 1960 ECLA data Richard Ruggles calculated the relationship between Venezuelan and Argentinian prices to be much higher than in the ECIEL study (compare tables 9 and 11). The indexes are shown with Argentina equal to 100 and are computed using Walsh's index with geometric expenditure weights. (This is also the formula used in the present study.)

In Table 11 the results obtained by ECLA using average Latin American quantity weights are also presented. Mexico is used as a base, and the results also refer to 1960. Venezuelan prices are 110 per cent higher than Mexican prices in the ECLA index. Following Venezuela, Chile has the highest prices. In 1968 (Table 9), Chile had the same ranking as in the ECLA calculations in Table 11, although Chilean prices have also experienced a decline relative to the rest of LAFTA. Bolivian prices seem to have risen faster in relation to changes in the exchange rates than prices in other LAFTA countries. In 1960 Bolivian

TABLE 11

International Price Indexes for Private Consumption on the
Basis of Official Exchange Rates, 1960

	ECLA (Mexico = 100)	Ruggles (Argentina = 100)
Argentina	90	100
Bolivia	99	99
Brazil	91	99
Chile	144	145
Colombia	112	118
Ecuador	100	102
Mexico	100	107
Paraguay	93	92
Peru	96	103
Uruguay	86	85
Venezuela	210	228

SOURCE: U.N. Economic Commission for Latin America, "A Measurement of Price Levels and the Purchasing Power of Currencies in Latin America, 1960–62," mimeo, Santiago, Chile, 1963, p. 191; Richard Ruggles, "Price Indexes and International Price Comparisons," in *Ten Economic Studies in the Tradition of Irving Fisher,* New York, 1967, p. 189.

prices were in the middle range for LAFTA countries, whereas in 1968 that country had the third highest price level.

Uruguay continued to be the lowest-priced country in Latin America in 1968, having widened somewhat its price advantage with respect to both Argentina and Mexico since 1960. Paraguayan prices declined further in relative terms reaching the second lowest position in 1968. Argentina, Colombia, and Ecuador follow in the 1968 survey, the three of them having very similar relative price levels. The most notable changes among the low-priced countries were in Colombia, whose international price relatives appear to have fallen considerably since 1960, and in Brazil, whose price relatives have risen.

Comparisons Based on Subindexes

Uruguay, Paraguay, Argentina, and Brazil had the lowest prices in food and beverages in 1968 as can be seen in Table 12. Venezuelan prices were high in these subcategories, with Chile, Bolivia, and Mexico being next. The ECLA results for 1960 for the low-priced countries were quite similar, as Table 13 shows. Again, Argentina,

TABLE 12

International Price Indexes for Private Consumption
Subcategories on the Basis of Official
Exchange Rates, 1968 [a]

(Peruvian sol = 1.00)

	Argen-tina	Bo-livia	Bra-zil	Chile	Co-lom-bia	Ecua-dor	Mex-ico	Para-guay	Uru-guay	Vene-zuela
Food	0.86	1.06	0.96	1.05	1.00	.91	1.11	0.81	0.73	1.07
Beverages	0.68	1.01	0.61	0.99	0.86	.95	0.98	0.57	0.61	1.44
Tobacco	1.24	1.24	1.06	1.41	0.49	.76	0.73	0.93	1.52	1.43
Clothing	0.98	1.06	1.14	1.32	0.96	.84	1.27	0.84	0.88	1.25
Rent	0.71	1.28	1.17	1.49	1.04	.88	1.19	0.80	0.60	1.42
Utilities	1.53	0.61	1.27	1.36	0.19	.70	0.25	1.45	0.11	0.80
Durables	0.91	0.93	0.78	1.36	0.78	.82	0.94	0.87	0.92	0.97
Non-durables	0.74	1.21	0.80	0.93	0.76	.85	0.81	0.92	0.81	0.99
Services	0.81	0.84	1.07	1.05	0.59	.73	0.93	0.83	0.53	1.23

[a] See notes to preceding tables.

TABLE 13

International Price Indexes for Private Consumption
Subcategories on the Basis of Prevailing
Exchange Rates, 1960

(Mexico = 100)

	Argen-tina	Bo-livia	Brazil	Co-lom-bia	Chile	Ecua-dor	Mex-ico	Para-guay	Peru	Uru-guay	·Vene-zuela
Food	72	92	78	116	112	98	100	82	86	79	197
Beverages	79	150	66	159	112	120	100	108	98	81	270
Clothing	86	85	86	73	156	71	100	87	90	84	150
Rent	163	146	208	183	223	90	100	80	129	78	316
Transport, communication	133	92	142	139	122	141	100	114	113	94	237
Personal care	88	105	83	108	161	112	100	112	114	102	277
Recreation, entertainment	102	89	90	116	164	109	100	112	132	78	261

SOURCE: U.N. Economic Commission for Latin America, "A Measurement of Price Levels and the Pur
chasing Power of Currencies in Latin America, 1960-62," mimeo, Santiago, Chile, 1963, p. 198.

Brazil, Uruguay, and Paraguay had the lowest prices in food and
beverages. The position of Venezuela as the highest-priced country
was even more salient in 1960, and Chile was next. But in 1968
Colombia had been supplanted by Mexico as the third highest priced
country in these subcategories.

In clothing and textiles, the cheapest countries in LAFTA in 1960
were Ecuador, Colombia, Uruguay, and Bolivia. In the 1968 com-
parisons Ecuador, Paraguay, and Uruguay were the cheapest, with
Colombia a distant fourth. Chile and Venezuela were the highest-
priced countries in 1960. This was true again in 1968, with Mexico
also having high intercountry price relatives.

In rent, Venezuela had prices three times those of Mexico in 1960,
while Chile's and Brazil's were twice as high. In 1968 Chile had the
highest relative rent prices, followed by Venezuela, Bolivia, and
Brazil (Table 12). Uruguay, Paraguay, and Ecuador had the lowest
rents in 1960. In 1968 the ranking was Uruguay, Argentina, Paraguay,
and Ecuador.

A comparison between the other ECLA subcategories presented in

Table 13, and the rest of the subcategories resulting from the present study, shown in Table 12, is not strictly possible. Nevertheless, even though in each subcategory there are slight differences in composition between the ECLA and ECIEL studies, taken together these subcategories cover more or less the same kinds of goods and services.[40] Thus it would seem that some global comparisons can be attempted. In general it appears that for these subcategories taken as a whole, Uruguay and Brazil are consistently lower priced in the ECLA 1960 results, with Colombia and Uruguay enjoying a similar position in 1968. Among high-priced countries, as usual Venezuela and Chile stand out in the 1960 ECLA survey. No definite pattern of high-priced countries appears in the 1968 survey.

General Conclusions Resulting from the Price Comparisons

Two basic general conclusions can be derived from these comparisons:

a. In relative terms the results of the 1960 and 1968 surveys bear a striking resemblance to each other. The high- and low-priced countries in 1960 generally were in the same position at the end of the period.

b. On the other hand, a definite contraction in the intercountry price relatives has occurred at both ends of the scale. The range of price variation within LAFTA has narrowed. In fact the coefficient of variation declined from 0.33 to 0.15 between 1960 and 1968. The drop in the coefficient is strongly influenced by the decline in Venezuelan prices relative to the Latin American average.

The first fact confirms the validity of the relative ranking of countries in both the ECLA and ECIEL surveys. The reductions in price dispersion apparent in 1968 might be partly due to the methodological innovations introduced in the ECIEL survey, and specifically to the collection of many more observations per product in 1968 than in 1960. However, there is reason to believe that most of the reduction in price dispersion can be attributed to more realistic exchange rate policies

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[40] The subcategories in question here are durable consumer goods, nondurable consumer goods, and consumer services in the ECIEL classification; transport and communication, personal care, and recreation and entertainment in ECLA's classification. The ECIEL categories could be rearranged to fit the ECLA classification.

and/or wider and more effective use of monetary and fiscal policies in controlling the price level on the part of many LAFTA countries between 1960 and 1968. Increasing official and unofficial trade and migration in the LAFTA region probably has also been a contributing factor.

Venezuela is a case in point. While official par values have remained relatively fixed, more sophisticated use of policy instruments has been made for the control of inflation. In many countries, however, the exchange rate has been kept much more flexible, with the use of frequent (sometimes monthly and even bimonthly) devaluations to better relate internal to international prices. Finally, greater trade and economic contacts and competition in world markets also appear to have aided in bringing the price structure of these countries closer together.

Implications for Trade Among Latin American Countries

Within the entire LAFTA region, Uruguay, Paraguay, Argentina, Colombia, and Ecuador are the lowest-priced countries (Table 12). The River Plate countries (Argentina, Uruguay, and Paraguay) have a price advantage over Colombia and Ecuador in food and beverages, but higher prices in tobacco and durables, and similar price levels in clothing and nondurables. In relation to the other Andean countries (Bolivia, Peru, and Venezuela), the River Plate price advantage extends to all tradable subcategories with the exception of tobacco.

Brazil, Mexico, and Peru seem to be located in the middle tier of LAFTA countries with respect to price levels. Brazil has lower consumer durable prices than any of the other countries. Mexico does not have an overall price advantage in any particular subcategory, but has lower tobacco prices than any country except Colombia.

Important implications of the results of Table 12 concern the Andean Common Market countries, Colombia, Ecuador, Bolivia, Peru, and Chile, which as pointed out in an earlier section, show promise of greater dynamism in the Latin American integration movement. Venezuela is still considering becoming a member of the group. Her trade possibilities now appear much more promising than in 1960. If Chile, with high relative price levels, can compete with the other Andean countries, it would seem that Venezuela would also have as good a chance of gaining from Andean economic integration. This is especially

true if it is noted that Venezuela has a definite comparative advantage in some intermediate petrochemicals and investment goods.

Colombia and Ecuador seem to be the countries with a price advantage in the Andean Group, as Table 9 shows, with Peru and Bolivia in an intermediate position. Their advantage holds throughout the different subcategories examined in Table 12. Some interesting patterns appear for the high-priced countries.[41] In food and beverages the Venezuelan prices are decidedly the highest, with Chilean prices being below those of Bolivia. On the other hand, Chile has the highest prices in clothing and textiles, with Venezuela the second highest, followed by Bolivia. Chile has a very high price disadvantage in consumer durables, while Venezuela and Bolivia are below Peru in this subcategory. In the nondurable consumer goods sector Bolivia has the highest prices, followed by Peru, with Venezuela and Chile next.

Trade is determined by comparative advantage rather than absolute price advantage. Money costs can be influenced by changes in the levels of factor payments and changes in efficiency. These factors operate in the medium and long run. However, government policy can affect money costs in the short run through exchange rate variation, subsidies, and protective measures.

The final purchasers' or retail prices used in this study include the costs of certain nontraded services. The appropriate prices to use in an analysis of possible trading patterns are potential f.o.b. export prices in each country rather than retail prices. Moreover, these calculations should be made in terms of value added and refer to factor costs rather than market prices. Nevertheless, given the obstacles involved in making such estimates, the patterns implied above are useful as an indication of potential trade relationships.

APPENDIX A. EXPENDITURE CLASSIFICATION

I. Private consumption
  A. Foodstuffs
    1. Meats: Beef, lamb, pork, poultry, various meats
    2. Fish and seafood
    3. Dairy products and eggs: Milk, dairy products, eggs
    4. Bread and cereals: Rice, corn, wheat, food pastes, bakery products, other cereals

[41] In the analysis that follows, Venezuela is considered part of the Andean Group.

     5. Fruits: Citrus fruits, melons, other temperate fruits, other sub-
       tropical fruits, other tropical fruits, dried fruits, juices and canned
       fruits
     6. Vegetables: Potatoes and similar roots, other root vegetables, beans
       and vine vegetables, head and stalk vegetables, dried beans, canned
       vegetables
     7. Sugar and preserves: Sugar, preserves
     8. Fats and oils.
     9. Other foodstuffs: Prepared soups, baby food, hot beverages, spices
       and condiments, candy and other sweets, purchased meals.
B. Beverages: Nonalcoholic, alcoholic, purchased alcoholic beverages
C. Tobacco
D. Clothing and textiles
     1. Men's and boys' clothing: Overcoats, suits, trousers, shirts, under-
       wear, hosiery, fabrics and knitting materials, tailoring, other men's
       and boys' clothing
     2. Women's and girls' clothing: Overcoats, suits and dresses, blouses
       and skirts, underwear, hosiery, sweaters, fabrics for dressmaking,
       dressmaking-seamstress, other women's and girls' clothing
     3. Infants' clothing
     4. Household textiles: Household fabrics, semidurable household tex-
       tiles, durable household textiles
     5. Sewing notions
     6. Footwear: Men's and boys' footwear, women's and girls' footwear,
       infants' footwear
E. Rent
F. Fuels and utilities: Gas, electricity, water, other fuels
G. Durable consumer goods
     1. Durable housewares: China and glassware, cutlery, cooking utensils
     2. Furniture: Beds, chairs and tables
     3. Large home appliances
     4. Small home appliances
     5. Radio and television
     6. Tools
     7. Automobile parts and accessories
     8. Therapeutic appliances and equipment
     9. Other durable goods
H. Nondurable consumer goods
     1. Household supplies: Soaps and detergents, miscellaneous supplies
     2. Toiletries and personal care: Cosmetics, toiletries, other personal
       care supplies
     3. Pharmaceuticals
     4. Educational and reading materials: Textbooks and notebooks,

books, newspapers and magazines, writing supplies, other educational materials

    5. Recreational materials: sporting goods, toys, other recreational materials

  I. Services

    1. Transportation: Public transportation, private transportation, school transportation

    2. Communications: Telephone, mail and telegram

    3. Health services: Physician's services, dentist's services, surgery and other services, hospital expenses

    4. Other professional services

    5. Domestic services: domestic help, laundry and dry-cleaning

    6. Personal services

    7. Educational services

    8. Recreation: Public entertainment, other recreational services

    9. Other services

II. Government consumption

  A. Purchases of current goods and services (by ministry): Foodstuffs, beverages and tobacco, clothing and textiles, rent, utilities and fuel, transportation and communications, other goods, other services

  B. Wages and salaries (by ministry): Administrative personnel, technical personnel

III. Gross fixed capital formation

  A. Construction

    1. Dwellings: Residential buildings, workingclass houses, other houses

    2. Nonresidential buildings

    3. Other construction and works

  B. Machinery and equipment

    1. Transport equipment

    2. Other machinery and equipment: Agricultural machinery, tractors, machinery for construction and mining, electrical machinery, motors, machine tools, other machinery, office equipment, office furniture

IV. Increase in stocks

 V. Exports of goods and services

VI. Less: Imports of goods and services

APPENDIX B. INDEX NUMBER FORMULAS USED

First there are binary-type formulas using alternatively the base country's set of weights and then the other country's weights. For international comparisons a base country replaces a base period and so the Laspeyres formulation in terms of price relatives and expenditure weights is:

(1) $$\Sigma(p_{jm}/p_{jl})V_{jl}$$

where the range of summation is from $j = 1$ to n; $V_{jl} = p_{jl}q_{jl}/\Sigma p_{jl}q_{jl}$, with the same range of summation; and p = prices, q = quantities, l and m = countries, and j = goods.

The Paasche formulation instead of using the base country's weights uses the other country's weights. The price relative formulation with expenditure weights is:

(2) $$1/\Sigma(p_{jl}/p_{jm})V_{jm},$$

where $V_{jm} = p_{jm}q_{jm}/\Sigma p_{jm}q_{jm}$, and the range of summation is the same as in (1).

The Palgrave index, the reciprocal of the Paasche with countries reversed, produces results that are much closer to those of the Laspeyres index than are the Paasche results. This is because when prices change across countries, quantity weights are considerably affected while expenditure weights are not. The Palgrave formulation (over the range of summation $j = 1, \ldots, n$) is:

(3) $$\Sigma(p_{jm}/p_{jl})V_{jm}$$

These indexes will be used in the computation of implicit rates in a binary fashion, that is, for each pair of countries the implicit rates will be calculated first under the Laspeyres formulation and then under the Paasche formulation. The Laspeyres and Palgrave results will also be compared.

Yet, a set of unambiguous conversion rates is required for value comparisons. Fisher's ideal index, crossing the Laspeyres and Paasche formulations, provides a way of estimating such a set of rates:

(4) $$\sqrt{[\Sigma(p_{jm}/p_{jl})V_{jl}]\,[1/\Sigma(p_{jl}/p_{jm})V_{jm}]},$$

where the range of summation is as in the foregoing formulations. So does the index suggested by Theil, based on a crossing of the Laspeyres and Palgrave formulations:

(5) $$\Pi(p_{jm}/p_{jl})^a,$$

where $a = (V_{jl} + V_{jm})/2$, and the range of Π is from $j = 1$ to n. These indexes satisfy the country reversal test, which means that the implicit rate of country A with country B as a base is the reciprocal of the implicit rate for country B with country A as a base. On the other hand, these indexes are not circular. The set of rates they produce is not consistent. If they were, the implicit rate for country A with country B as a base would coincide with the implicit rate resulting from the product of the implicit rate of country A with country C as a base and the implicit rate of country C with country B as a base [A/B should be the same as $(A/C) \times (C/B)$].

In order to satisfy the circularity test it is possible to compute a single consistent scale of implicit rates from the whole set of binary comparison

rates. Theil "recommends that the geometric average of all binary comparisons between two countries be computed in order to produce a single scale." [42]

A less cumbersome alternative is to calculate the implicit rates by using the same set of weights for all the countries involved. This could be achieved by crossing the weights of the different countries, thus arriving at average weights for all countries included. The Walsh index provides such a formulation. The formula below is the geometric version of the index.

(6) $$\Pi(p_{jm}/p_{jl})^b$$

where Π is taken from $j = 1$ to n; and $b = V_{jy} = (\Pi V_{ji})^{1/s}/\Sigma[(\Pi V_{jl})^{1/s}]$, with Π taken from $i = 1$ to s and Σ taken, as before, from $j = 1$ to n. Here l, m, i, and s represent countries, and y is the average of the countries included. This index satisfies both the circularity and country reversal tests.

There are other ways of producing a common set of weights applicable to the countries compared. First, the Walsh index can also be computed using an arithmetic instead of a geometric average of the weights corresponding to the different countries. Then an average of quantity weights for the countries involved could be used, following the market basket rather than the price relative approach. This was the formula used by ECLA in their study:

(7) $$\Sigma p_{jm} q_{jy}/\Sigma p_{jl} q_{jy}$$

where the range of the summation is from $j = 1$ to n and $q_{jy} = (1/s)\Sigma q_{ji}$, and the range of Σ is from $i = 1$ to s. These formulations also meet the country reversal and circularity tests.

The geometric variant of the Walsh index is the formulation utilized in this preliminary paper. However, Richard Ruggles has shown that the results obtained in using the approach suggested by Kloek and Theil are very close to those derived from the application of a common set of average weights, while the results obtained by different ways of calculating or applying these uniform average weights are very similar to each other.[43] One of the by-products of the ECIEL study will be the testing of some of these findings, using the data gathered in 1968.

APPENDIX C. LIST OF LATIN AMERICAN RESEARCH INSTITUTIONS PARTICIPATING IN THE STUDY ON INTERNATIONAL PRICE COMPARISONS

Argentina: Fundación de Investigaciones Económicas Latinoamericanas (FIEL)

[42] Ruggles, "Comparisons," p. 191.
[43] See *ibid.*, pp. 189–201.

Bolivia: Instituto de Investigaciones Económicas–Universidad Mayor de San Andrés

Brazil: Instituto Brasileiro de Economia–Fundação Getulio Vargas

Chile: Instituto de Economía y Planificación–Universidad de Chile

Colombia: Centro de Estudios sobre Desarrollo Económico (CEDE)–Universidad de Los Andes

Ecuador: Junta de Planificación y Coordinación

Mexico: El Colegio de Mexico

Paraguay: Centro Paraguayo de Estudios de Desarrollo Económico y Social (CEPADES)

Peru: Centro de Investigaciónes Sociales, Económicas, Políticas y Antropológicas (CISEPA)–Universidad Católica del Perú

Uruguay: Instituto de Estadística–Universidad de la República del Uruguay

Venezuela: Banco Central de Venezuela; Centro de Desarrollo de la Universidad Central (CENDES)

COMMENT
Robert M. Williams and R. Hal Mason

While we are in sympathy with the desire to provide a vehicle for making intercountry price and value comparisons, we do find parts of the Grunwald and Salazar paper to be somewhat confusing. Early in their paper they review the work done by ECIEL. Unfortunately, one is left with the impression that Grunwald and Salazar are attempting to provide a valuation method which can be used in studies of comparative costs and locational decisions. This is not in fact the case. Their objective is much less ambitious, but it is not clearly stated. Their objective is simply to use a price parity approach to develop a set of conversion rates, so that various national account data can be compared from country to country on a uniform basis. They note that "it is important to point out that when strict cost or price comparisons are undertaken for the purposes of determining trade possibilities and trade patterns, the equilibrium rates of exchange, rather than implicit rates, should be used." They fail fully to disclose the usefulness of the implicit rates they have calculated. A strong statement on this point combined with several examples would have been helpful to the reader.

The study conducted by ECIEL is perhaps one of the most complete

of its type to date. It nevertheless suffers from the same weaknesses all such studies inherently confront. These are, of course, the problem of which set of weights to use on the basic data, selection of sample cities in which to generate data, differences in government policies relative to different types of consumption, selection of a common bundle of goods and services for study, the shifting composition of gross domestic product, and the differing levels of development of the countries involved. The authors are aware of these difficulties and the problems of bias which attend this type of research. Again, it would have been useful had they drawn out in greater detail the difficulties encountered, so that future researchers could have the full benefit of their field experience.

To get around some of these problems several rather critical assumptions were made which can affect applications of the technique and be misleading if too much reliance is placed on these initial data. The authors point out that their assumptions will be tested in future work. However, it would be useful in a document of this sort to have a clearer understanding of the biases which could result if these assumptions are not met, so that other researchers do not misuse the data.

For the record we should like to indicate some of the potential pitfalls of using implicit exchange rates as calculated in this first effort.

Although the authors have conducted some tests, as a matter of expediency they selected either the capitol or the most important city as the site for collecting price data for the sample of common goods and services in each country. Insofar as the selected city is representative of urban consumption in general, they are probably on safe ground. However, we expect they will find that national price averages will diverge from single-city indexes and by amounts that differ from one country to another. In general, the prices of manufactured goods are lower and the cost of services higher in large cities than in smaller ones and in rural areas. Moreover, the LAFTA countries differ greatly in degree of urbanization and, therefore, in the extent to which prices in one city are representative of the national price structure. The more urbanized countries would tend to yield implicit rates which would make existing exchange rates appear to be overvalued in relation to those in less urbanized countries, when in fact they are not. Grunwald and Salazar argue that this is not a serious problem in Latin America,

i.e., that there is little relation between the ratio of implicit to official exchange rates and level of development (which usually is a surrogate for level of urbanization).

When we rank their ratios, which reflect the extent of overvaluation, and correlate them with per capita product (their Table 5), we obtain a Spearman's rank correlation coefficient of 0.336. While this is not significant at the 0.05 level, it does indicate that the relationship is in the expected positive direction. In Table 1 we offer data which show a rather substantial range in the level of urbanization of the countries under study.

As might be expected, there also appears to be a strong relation between the level of economic development (as measured by per capita product) and the level of urbanization. We obtain a Spearman's rank correlation coefficient of 0.904, which is highly significant. This indicates that the more highly developed countries are more highly urbanized and hence that the major city may not be very representative of the consumption patterns and price relationships of the less urbanized ones. Thus, it may prove rather hazardous to make intercountry comparisons of value data without adjustment for differing levels of urbanization. We hope the authors will tackle this problem early in their continuing research.

Grunwald and Salazar present some basic data on international price comparisons in tables 12 and 13 of their paper, and these are followed by a section entitled General Conclusions Resulting from the Price

TABLE 1

Urban Population as a Percentage of
Total Population, 1968

Argentina	n.a.	Mexico	50.7
Bolivia	n.a.	Paraguay	36.1
Brazil	46.3	Peru	47.4
Chile	68.2	Uruguay	82.2
Colombia	52.0	Venezuela	67.4
Ecuador	35.8		

SOURCE: *Statistical Abstract of Latin America, 1968,* University of California at Los Angeles, Latin American Studies Center, 1969 (compiled from United Nations and national sources).

TABLE 2

A Comparison of International Price Indexes for
Consumption Goods in 1960 and 1968

Category	1960				1968			
	Lowest Value	Country	Highest Value	Country	Lowest Value	Country	Highest Value	Country
Food	72	Argentina	116	Colombia	73	Uruguay	111	Mexico
Beverages	66	Brazil	159	Colombia	57	Paraguay	101	Bolivia
Clothing	71	Ecuador	156	Chile	84	Paraguay	132	Chile
Rent	78	Uruguay	223	Chile	60	Uruguay	149	Chile
Transport, com-								
munications	92	Bolivia	141	Ecuador				
Personal care	83	Brazil	161	Chile				
Recreation, en-								
tertainment	78	Uruguay	164	Chile				
Tobacco					49	Colombia	152	Uruguay
Utilities					11	Uruguay	153	Argentina
Durables					78	Brazil & Colombia	136	Chile
Nondurables					74	Argentina	121	Bolivia
Services					53	Uruguay	107	Brazil

SOURCE: Grunwald and Salazar: 1960 data from their Table 13 (Mexico = 100), 1968 data from their Table 12 (Peru = 100); data for Venezuela are omitted in both years.

Comparisons. In this section they state that the two surveys, the first in 1960 by ECLA and the second in 1968 by ECIEL and Brookings (1) "bear a striking resemblance" in that the same patterns of high- and low-priced countries are observed, but that (2) the range of price variation within LAFTA narrowed from 1960 to 1968. As they admit, however, much of the reduced variation resulted from the sharp decline in the relative price level in Venezuela.

To focus attention on some aspects of their analysis our Table 2 summarizes the data in their tables 12 and 13. Our Table 2 lists the lowest and highest price index and identifies the country for each price category in 1960 and 1968. Venezuela, where the relative price indexes were extremely high in 1960, is omitted from our analysis. The two surveys are not strictly comparable in any respect, although four broad categories of goods and services are common to both. In these four categories the range of the price indexes is somewhat less in 1968 than in 1960, although it is still large, especially in the beverages and rent

categories where government subsidies, taxes, etc., may be important price determinants. Similarly, the range of price indexes in 1968 is very wide for tobacco (49 to 152) and even wider for utilities (11 to 153). Moreover, it is interesting to note that Uruguay had the highest price index for tobacco (152) and the lowest for utilities (11).

While it may be true that there was some narrowing of the range of price indexes between 1960 and 1968 among the countries for which there are comparable data, it is also nevertheless true that there was significant alteration in the rankings of countries. This would seem to indicate either significantly different patterns of demand development or significantly different rates of price inflation or both. We suggest again that this is a problem which needs additional research. We need to have an assessment of the biases introduced by the shifting composition of demand and differential rates of price change across various consumption items under study.

In summary, we consider this a useful effort but one fraught with problems of sampling and statistical bias. We look forward to further research and suggestions for techniques designed to cope with these difficulties.

REPLY by Grunwald and Salazar

The three major points in the comment by Robert M. Williams and R. Hal Mason refer to the scope of our paper, and the representativeness and interpretation of the results. Regarding the scope let us restate the content of our paper in order to clear up any doubts. We discussed two ECIEL studies. In section II of our paper we briefly reviewed the first one, which has been completed and deals among other things with cost comparisons. In section III we outlined a technique used in that study for sensitivity analysis of rates of exchange in making international cost comparisons. The remaining sections, which make up the major part of our paper, deal with value comparisons and rely heavily on another ECIEL study which is still under way. Specifically, a technique is presented which is applied within the context of final expenditure comparisons (and in the paper only for private consump-

tion expenditures). The implicit rates of conversion which derive from this technique make possible comparisons of consumption patterns, factors underlying living standards, investment, public expenditures, income, and other important variables in international studies.[1]

Regarding the representativeness of our findings, it is clear, as we indicated, that certain biases will be introduced if one wishes to generalize from the results of international comparisons of urban centers to relationships among countries in which the cities studied are located. While there seem to be significant differences in levels of urbanization among LAFTA countries as measured by the proportion of population living in places of more than 2,000 inhabitants, there are substantial discrepancies between data from different sources.[2] However, for the purposes of our study the relevant variable is not the proportion of urban population (which in LAFTA is generally high and increasing) but the proportion of urban expenditures in total expenditures. These ratios will tend to be even higher and have a lower dispersion than population ratios.[3] Therefore, we believe results from urban comparisons to be fairly good approximations of results that would be obtained

[1] Although we did not propose to use implicit rates for cost comparisons, they could be used as rough approximations.

[2] For example, Ecuador has the lowest urbanization rate in Table 1 of the Williams and Mason comment, 35.8 per cent (based on UCLA's *Statistical Abstract of Latin America, 1968*). Estimates by the United Nations Economic Commission for Latin America (ECLA) indicate a rate of 48.3 per cent ("Indicadores demográficos, sociales y económicos," in *Notas sobre la economia y el desarrollo de América Latina,* January 1971, p. 2). During the last decade the dispersion of urbanization levels has been diminishing considerably with the much more rapid movement of population from rural to urban areas in the poorer countries compared to the more developed countries in LAFTA.

[3] Urban per capita incomes are generally higher than rural per capita incomes in LAFTA countries. Using income as a proxy for expenditures, the urban expenditure proportion will be higher than the corresponding population ratios.

Per capita incomes originating in rural areas will tend to be higher relative to urban incomes in LAFTA countries with a relatively small rural population than in countries with a relatively large rural population. For example, in Chile and Venezuela, some high-productivity activities, such as copper and petroleum production respectively take place in rural areas but these countries have a relatively small rural population. Likewise in Argentina and Uruguay, also with relatively small rural populations, the productivity of agriculture (a rural economic activity) is higher in relation to services and manufacturing (urban activities) than in the poorer countries with a large rural population ratio. (See U.N. Food and Agricultural Organization, *Monthly Bulletin of Agricultural Economics and Statistics,* June 1967, Table 2, p. 3). These factors will tend to offset the dispersion of the urban population proportions among LAFTA countries.

from countrywide comparisons, but only further research can settle this empirical question.[4]

Regarding the comparisons of the data in our tables 12 and 13, we indicated that similar patterns of high- and low-priced countries can be observed between the two surveys (1960 and 1968). For example, in the food category, Argentina and Uruguay are relatively low-priced countries and Colombia and Mexico are relatively high-priced ones in both years. Similar relationships hold true for other categories examined.[5]

[4] According to Williams and Mason, "the more urbanized countries would tend to yield implicit rates which would make existing exchange rates appear to be overvalued in relation to those in less urbanized countries, when in fact they are not." The meaning of this statement is not clear, but in any case not much can be said about the bias in implicit rates and over- or undervaluation due to differences in urbanization levels unless much more is known than the relative price differentials indicated in the Williams and Mason Comment.

[5] We calculated the correlation of the country rankings between the two years for total private consumption and obtained a high positive relationship $(r = 0.69)$.