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Toward an Explanation of National Price Levels

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1 INTRODUCTION

It would be only a slight exaggeration to claim that a theory of comparative price levels does not exist. Most theoretical discussions assume that price levels tend toward equality. They have thus directed attention toward what have been regarded as temporary divergences from equal price levels and diverted attention from the large and systematic differences in price levels that actually exist. The main purpose of this Study is to call attention to the need for a theory of comparative national price levels and to explore some of the elements that should be included.

The reality and extent of the differences in national price levels can be seen in the data presented in Table 1 on the following page, which indicate that 1975 price levels in high-income countries were more than double those in countries with very low incomes. We suggest here that price levels are affected not only by the short-run factors that have received the most attention from economists but also, and to an important degree, by long-run structural factors. The levels of the structural characteristics of the individual countries—and possibly even the structural relationships with price levels—change, albeit slowly. Because they change, and because price levels and exchange rates are interdependent, these long-run factors should be taken into account in explaining changes in exchange rates and competitiveness. This Study is a beginning in that direction.

The research reported on is part of the National Bureau of Economic Research program in international studies. Earlier versions of this paper were prepared for the International Association for Research in Income and Wealth Special Conference on Purchasing Power Parities, held in Luxembourg in September 1982, and for an unpublished NBER working paper. It is part of the NBER's studies of U.S. Trade Policy, Competitiveness, and Capital Mobility in the World Economy (NSF Grant No. PRA-8116459) and draws to a substantial extent also on work done under NSF Grant No. SES-7913980-A01 to the University of Pennsylvania. We have had the benefit of helpful comments from Arthur Bloomfield and are indebted to Martin Shanin, Robert Levinson, and Linda Molinari for statistical assistance and to Kathleen Conway and James Hayes for the preparation of the manuscript. Any opinions expressed are those of the authors and do not necessarily represent those of the National Bureau of Economic Research or the National Science Foundation.

TABLE 1

NATIONAL PRICE LEVELS FOR 34 COUNTRIES CLASSIFIED BY REAL GDP PER CAPITA, 1975

(*U.S. = 100*)

Income Class [a]	*No. of Countries* (1)	*Real GDP per Capita*[b] *Range* (2)	*Mean* (3)	*Nominal GDP per Capita (Mean)*[c] (4)	*GDP Price Level (Mean)*[d] (5)
1	8	Less than 15	9.0	3.7	40.7
2	6	15-29.9	23.1	12.1	51.7
3	6	30-44.9	37.3	24.2	64.5
4	4	45-59.9	52.4	38.7	73.6
5	9	60-89.9	76.0	82.3	107.4
6	1	90 & over	100.0	100.0	100.0

[a] The countries in each class are:

1. Malawi, Kenya, India, Pakistan, Sri Lanka, Zambia, Thailand, Philippines
2. Korea, Malaysia, Colombia, Jamaica, Syria, Brazil
3. Romania, Mexico, Yugoslavia, Iran, Uruguay, Ireland
4. Hungary, Poland, Italy, Spain
5. U.K., Japan, Austria, Netherlands, Belgium, France, Luxembourg, Denmark, Germany
6. U.S.

[b] GDP converted to dollars at purchasing power parities.

[c] GDP converted to dollars at exchange rates.

[d] PPP for GDP divided by the exchange rate. See Chap. 3 below. Means of columns (3) to (5) are simple arithmetic averages.

SOURCE: Kravis, Heston, and Summers (1982); hereafter, KHS (1982).

2 ANTECEDENTS

Most discussions of price levels by economists have assumed that price-level differences are evidence of disequilibrium and have been concerned with the mechanism by which deviations from equilibrium are erased. David Hume's exposition of the factors determining the distribution of specie is an early treatment of price levels along these lines. Hume concentrated more on the mechanism by which disequilibrium differences in price levels would be adjusted than on an effort to describe the nature of the equilibrium levels themselves. Indeed, he was sufficiently vague to have been subsequently interpreted by some writers as an early advocate of the law of one price and by others as describing changes in relative price levels as part of the adjustment process (see Collery, 1971, pp. 25-26, for an example of the latter).

In the very large literature on the adjustment mechanism that relies on price elasticities, which may be regarded as a logical outgrowth of Hume's work, the nature of the world price structure has seldom, if ever, been clearly specified. In much of this work, the basic assumption has been that changes in exchange rates could alter the prices of one country's goods relative to those of another country and consequently produce changes in the balance of trade. But it has been rarely, if ever, specified whether prices for identical goods do or do not have to be the same (after allowance for transfer costs) in different countries (Kravis and Lipsey, 1978).

Price levels also play a prominent role in the purchasing-power-parity theory of exchange rates. Since the main thrust of the theory is that exchange rates will adjust so as to equalize price levels (or changes in price levels), price-level differences are regarded as deviations from normal conditions. It is true that Cassel recognized that exchange rates could deviate from purchasing power parity (PPP) owing to the unequal impact of the trade restrictions imposed by different countries on exports and imports, and, in the short run, to capital movements and expectations (Cassel, 1922, pp. 147-162; Holmes, 1967). But PPPs remained as the "normal" exchange rates (Cassel, 1922, p. 156), and even these qualifications were often lost sight of by subsequent supporters of the theory.

In recent years, the PPP theory has been revived as part of the monetary approach to the theory of the balance of payments. Once again,

the main purpose of the theory was not to explain price levels. Rather, a "law of one price" was invoked to help demonstrate the dominant role of the supply of money in determining balance-of-payments deficits and surpluses and exchange-rate changes. The law of one price, it may be noted, has usually been held to apply particularly among the more industrialized countries and particularly to tradable goods. In some versions of the monetary approach, differences in the relative prices of home goods were given a crucial, though transient, role in the adjustment mechanism (Frenkel and Johnson, eds., 1976; Whitman, 1975).

There is a very different literature in which contrary assumptions were made about the possibility of price-level differences. The reference here is to writings on export-led growth, particularly for advanced industrial countries. In one variant, the idea of export-led growth for such countries, with their varied exports, rests on the assumption that relative national price levels are not necessarily determined as endogenous variables but can be used as policy instruments. A widely held interpretation of the rapid recovery and growth of Western Europe after World War II was based on a reading of events along these lines (Lamfalussy, 1963). Alternatively, cost-reducing technological change may improve a country's price competitiveness. Though the price level is not held down as a matter of deliberate policy, the result, under a system of fixed exchange rates, may be price-induced export-led growth. For example, "a favourable export position requires, above all, that exports be 'competitive' " and competitiveness is "basically a question of price and technological superiority" (Beckerman, 1965, p. 46).

Despite the dominant tendency to treat price levels as an incidental facet of balance-of-payments and exchange-rate problems, structural explanations of price-level differences did appear. The kernel of the idea that price levels might be a function of real per capita income is found in a statement by Ricardo (1817, p. 87) that home goods would be more expensive "in those countries where manufactures flourish." A reasonably full account of a real theory of comparative national price levels was set out by Harrod (1939), in a chapter entitled "Comparative Price Levels," and restated by Balassa (1964).

These writers assumed that, at least as a first approximation, internationally tradable goods would tend to obey the law of one price. That is, local-currency prices of tradable goods were proportional to exchange rates. Each set out some version of what has been called the "differential

productivity model" (KHS, 1978). The essence of the model lies in differences in price formation and in productivity for tradable and nontradable goods. Prices for tradable goods are set in world markets, while prices for nontradable goods are determined in the home market. With similar prices for tradable goods in all countries, wages in the industries producing tradable goods in each country depend on productivity. The wage level established in the tradable-goods industries prevails also in the nontradable-goods industries, but international productivity differences are smaller for the latter. This means that in poor countries the low wages established in the low-productivity tradable-goods industries apply also to the not-so-low-productivity nontradable-goods industries. The consequence is low prices in low-income countries for nontradable goods. Since the price level is a weighted average of prices of tradable and nontradable goods, price levels tend to be lower in low-income than in high-income countries.

Harrod (1939, p. 62) stressed an additional point of great importance: retail prices (and, by implication, final product prices for all commodities) are amalgams of prices of tradable and nontradable goods. Indeed, it is not easy to think of a tradable good that reaches its final purchaser without the addition of nontradable services such as distribution and local transport. This substantially widens the possible gap for differences in national price levels. Jones and Purvis (1981) have recently explored this source of differences in national price levels in a model in which each country transforms imported tradable inputs into final goods by adding nontradable inputs. The imported inputs are obtained in exchange for exports that are used as inputs for the production of final goods in other countries; final products are produced by adding nontradable factors to these imports of intermediate goods. Even if the law of one price is assumed to apply to "middle products"—the tradable inputs—it does not necessarily follow that the same law will hold for final product prices.

Balassa (1964) and Clague and Tanzi (1972) were among the first to draw on new statistical studies of purchasing power and comparative levels of real per capita GDP that provided direct comparisons of price levels. These studies began to appear in the 1950s (Gilbert and Kravis, 1954; Gilbert and associates, 1958); the most recent is the source of the data in Table 1 (KHS, 1982). For the most part, this work concentrated on the empirical problems of measurement rather than on explanation

of the differences observed, although some analysis of price and quantity relationships was included.[1]

[1] A skeptical view of the existence of a relationship between income levels and what are referred to here as price levels was presented in an article by Officer (1976) challenging Balassa's (1964) finding of a "productivity bias" in "purchasing power parity as a measure of the equilibrium exchange rate." While the emphasis of Officer's article on purchasing power parity and on changes over time was different from the concerns of this Study, it did include cross-section results that gave little support to the relationship so clearly found here between price levels and income levels. There seem to be several reasons for the differences in results. One is that, at the time he wrote, Officer did not have the results that are now available for 16 benchmark countries for 1970 and 1973 and 34 for 1975 from the United Nations International Comparison Project. He therefore had to rely on dubious PPP comparisons or fit equations to very small numbers of observations. The latter problem was particularly acute because he excluded developing countries from his equations, for reasons that do not seem relevant to the present purpose. With a larger number and wider range of countries, including or excluding the United States, a very strong positive relationship is found between price levels and real per capita GDP.

It may be added that Officer's procedure of eliminating the base country from the regressions destroys the transitivity that is built into the price measures. As long as the base country is always included, the results of regressions will be the same no matter which country is used as the base. If the base country is excluded, the choice of the base will affect the conclusions—a strong argument against that procedure.

3 DEFINING NATIONAL PRICE LEVELS FOR COMPARATIVE PURPOSES

The basic approach to international income and product comparisons of Gilbert and Kravis (1954) and all the major ensuing studies rests on the identity: price (P) times quantity (Q) equals expenditure (PQ). For a pair of countries (the asterisk indicating the numeraire country), for a single good,

$$\frac{P}{P^*} \times \frac{Q}{Q^*} = \frac{PQ}{P^*Q^*},$$

where the Ps are in each country's own currency. The ratios PQ/P^*Q^* for detailed categories of goods are obtained from national-accounts data. The P/P^* ratios are from a sample of goods in each category obtained from existing or special-purpose price collections in which the quality of each item in the price comparisons is carefully matched across countries. The Q/Q^* ratios are then derived from the other two ratios. Quantity comparisons could, in principle, be made in lieu of or in addition to price comparisons, but their sampling variance is likely to be higher and the data more difficult to obtain.

The use of the national-accounts framework in these comparative studies provides the answers to some important conceptual questions that plagued earlier efforts to produce an operational definition of the "general price level" (Snyder, 1928; Keynes, 1930, pp. 76-94). What prices to include and what weights to assign to each price fall into place once it is decided to base the comparisons on the national-accounts concept of final expenditure on GDP. Each price is, in principle, the weighted national average price; that is, it is the P that is embedded in the national-accounts expenditure figure PQ. In other words, the weights are determined by relative importance in expenditures on GDP. There are, to be sure, problems about how the weights of the different countries will enter into the weights used in the comparison, but at least the conceptual problem of what data to start with at the country level is clearly resolved.[1]

[1] It is not unusual to find consumer price indexes and wholesale price indexes used in empirical work on the determination of exchange rates, often in a context in which the explanatory theory is couched in terms of tradable and nontradable goods. Sometimes the relative movements of tradable- and nontradable-goods prices are inferred from the differ-

In the absence of such a comparative price study, the Ps and Qs are unknown, and all that can be done for comparative purposes is to convert the expenditures to a common currency via the exchange rate. For example, where PQ = GDP in own currency, and e is the number of units of a country's currency required to buy one unit of the numeraire currency on the foreign-exchange market, a GDP comparison (n) is obtained by

$$\frac{PQ}{\Sigma\, P^*Q^*} \div e = n\ .$$

This, indeed, is still the most common way of comparing GDP among countries; it is used, for example, in the standard compilations of comparative GDPs such as World Bank (1982). This approach implicitly assumes that average $P/P^* = e$; that is, the relative purchasing powers of the currencies are reflected in the exchange rate.

If the latter equality held, exchange-rate-converted prices in the two countries would be equal; there would be only a world price level, and national price levels would all be the same. In fact, the equality does not hold; the purchasing power of a currency relative to a numeraire currency may be two or three times the exchange rate (see Table 1), and comparisons based on exchange-rate conversions are often far from the correct relationship. If average $P/P^* > e$, the country's prices are higher than those of the numeraire country and an exchange-rate conversion will overstate its real GDP relative to the numeraire country. If average $P/P^* < e$, an exchange-rate conversion will understate the country's real GDP.

If P/P^* is known for every category of GDP, a country's relative real GDP can be obtained from

$$\frac{\Sigma\, PQ}{\Sigma\, P^*Q^*} \div PPP = r\ ,$$

---

ences in the behavior of these two indexes, on the ground that the wholesale price index is more heavily weighted with tradable goods. Reasons have been given elsewhere for preferring GDP implicit deflators over consumer and wholesale price indexes as measures of the changes in the price level (Kravis and Lipsey, 1978, pp. 199-201). On the other hand, the price comparisons used in this Study are calculated on the basis of products in final expenditures on GDP. Their computation thus does not involve intermediate products, which are so important in international trade. In principle, however, the estimate of the relative purchasing power of two currencies should be the same whether prices are compared on the basis of final products or on the basis of outputs originating in each industry.

where r is the country's real GDP relative to the numeraire country and PPP is an appropriately weighted average of the P/P^*s. PPP is expressed in terms of units of a country's currency per unit of the currency of the numeraire country. Price levels may be more conveniently compared by dividing the PPPs by the exchange rates:

$$PPP \div e = PL ,$$

where PL is a country's price level relative to that of the numeraire country. PL can be compared both for detailed category levels and for aggregations such as GDP.

The fact that national price levels can be compared only by converting prices to a common currency by means of exchange rates calls attention to the connection between price levels and exchange rates. In the literature on the determination of exchange rates, as well as in that dealing with PPP theory, the term "real exchange rate" is often used to refer to an index of exchange-rate changes corrected for relative-price changes.[2] The real exchange rate is the reciprocal of the *change* in PL.[3]

Our decision to use the United States rather than some other country as the numeraire country for the purposes of the calculations in this Study does not affect the results except in a trivial scaling sense.

[2] In models based on small-country assumptions, in which all tradables prices are determined outside the country, the only possible effect on relative prices of a small country's devaluation stems from a change in tradables prices relative to nontradables prices within the country. That change itself is sometimes described as the "real rate of exchange" in balance-of-payments models (see, e.g., Berglas and Razin, 1973, and Bruno, 1976). The relationship between that definition and the one used here, which involves no assumptions about the fixity of price relationships, depends on the movement of tradables prices and nontradables prices in the rest of the world and on the share of nontradables in the country being observed.

[3] The index of the real exchange rate (IRE) in the year t, taking year 0 as a base, is $IRE_t = e_t/e_0 \div (P_t/P_0 \div P^*_t/P^*_0)$, where the asterisk refers to the numeraire country. The change in PL, which is an index of the movement in the domestic price level adjusted for exchange-rate changes (IPL), may be formulated as $IPL = (P_t/P_0 \div e_t/e_0) \div P^*_t/P^*_0$. The numerator terms in this expression, were they available in absolute rather than index-number form, could be used to form PL, that is, $PL_t = (P_t \div e_t) \div P^*_t$. In order to simplify these expressions, the fact that the prices and price relatives must be weighted averages has been ignored. Frenkel (1981a) has used the price terms in the form of intertemporal indexes to test the absolute version of the PPP theory. But this procedure does not permit the comparison of absolute price levels that is contemplated in this version of the theory.

4 ELEMENTS IN A THEORY OF NATIONAL PRICE LEVELS

The elements that determine differences in national price levels at a given time may be classified in different ways. A distinction might be made, for example, between real and monetary factors or between long-run and short-run influences. Another possible classification would divide the influences according to which of the two factors that enter into the formula for the price level ($PPP/e = PL$) they affect—that is, whether they operate on the relative domestic price level (PPP) or through the exchange rate (e). From a general-equilibrium standpoint, however, this may be viewed as a misleading dichotomy, since PPPs and exchange rates jointly determine relative price levels and are jointly determined by them in an interdependent set of relationships. Our position is that the best research strategy is to focus on the explanation of the price level. We argue that it is possible to identify a long-run equilibrium price level toward which the combination of the price level in domestic currency and the exchange rate must tend.

The simple monetary approach to the balance of payments assumes that price levels are the same everywhere (with exceptions for nontradables, in some versions). The world price level is the controlling parameter. A policy designed to alter the domestic-currency price level will merely produce compensating changes in the exchange rate. It has already been established, however, that in the real world price levels are not the same in different countries, and it is preferable to avoid imposing a fixed, or nearly fixed, offsetting relationship between domestic-currency prices and the exchange rate. It is now generally accepted that prices in goods markets adjust more slowly than exchange rates: the possibility should be left open that some influences operate on exchange rates, with an incomplete or delayed adjustment in domestic-currency price levels, and others on domestic-currency price levels, with an incomplete, more than complete, or delayed adjustment in exchange rates.

In the exploratory empirical work that follows, influences on the price level (PL) are viewed as consisting of long-run factors that determine the underlying price level and short-run factors that cause deviations from the basic level. The long-run factors are regarded as real variables, and the short-run factors as mainly monetary variables.[1]

[1] Mussa (forthcoming, 1984) suggests that monetary models are useful in explaining nom-

Long-Run Structural Factors

The long-run factors are structural variables that characterize the comparative economic framework of the country. One key structural variable, real per capita GDP, has already been shown to be positively correlated with the price level. Other structural characteristics that merit examination for possible links to price levels are the industrial composition of GDP, including the distribution of the labor force across industries, and factor endowments, including the skill composition of the labor force. The size of the country and the influence this has in leading it to more or less participation in international trade are also relevant. These variables are, for the most part, long run in character in the sense that they change only gradually over time.

As we pointed out in our discussion of the productivity-differential model, some of these factors affect the price level primarily through a differential impact on the prices of tradable and nontradable goods. The distinction between these two with respect to price behavior is similar to that in "Scandinavian" models of price- and wage-setting behavior between "exposed" and "sheltered" sectors of the economy (Aukrust, 1970). Prices in the exposed sector are set in international markets and determine wage levels in all sectors, and prices in sheltered sectors are set by markups over cost. The exposed sectors are essentially tradables, and the sheltered sectors essentially nontradables.

It has long been a matter of casual empirical observation that services and nontradables generally are relatively cheap in low-income countries. This is confirmed in the results of the UN International Comparison Project (ICP). The price indexes for tradable and nontradable goods for the 34 countries included in the 1975 ICP benchmark study are classified by increasing income levels in Table 2.

Of course, if tradable-goods prices are linked more or less closely to world price levels but nontradables are cheap in low-income countries, the low-income countries will be characterized by low price levels for GDP as a whole, again a finding of the ICP studies that is evident in Table 2.

The productivity-differential model ascribes low nontradable-goods prices to relatively high productivity in the poor countries' service industries, which account for most nontradable goods (KHS, 1978, 1982). That is, although the productivity of poor countries is low relative to that of rich

inal exchange rates and that models taking balance-of-payments equilibrium as the final determinant of exchange rates are most relevant to real exchange rates.