GLOBAL EDITION

International Finance

Theory and Policy

12th Edition

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THEORY & POLICY

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Figure 5-2 illustrates relative PPP's weakness by plotting both the yen/dollar exchange rate, $E_{¥/\$}$, and the ratio of the Japanese and U.S. price levels, P_J/P_{US}, through 2019. Price levels are indexes reported by the Japanese and U.S. governments.[7]

Relative PPP predicts that $E_{¥/\$}$ and P_J/P_{US} will move in proportion, but clearly they do not. In the early 1980s, there was a steep appreciation of the dollar against the yen even though, with Japan's price level consistently falling relative to that in the United States, relative PPP suggests that the dollar should have *de*preciated instead. The same inflation trends continued after the mid-1980s, but the yen then appreciated by far more than the amount that PPP would have predicted, before returning to the PPP trend around 2000. Only over fairly long periods is relative PPP approximately satisfied. In view of the lengthy departures from PPP in between, however, that theory appears to be of limited use even as a long-run explanation.

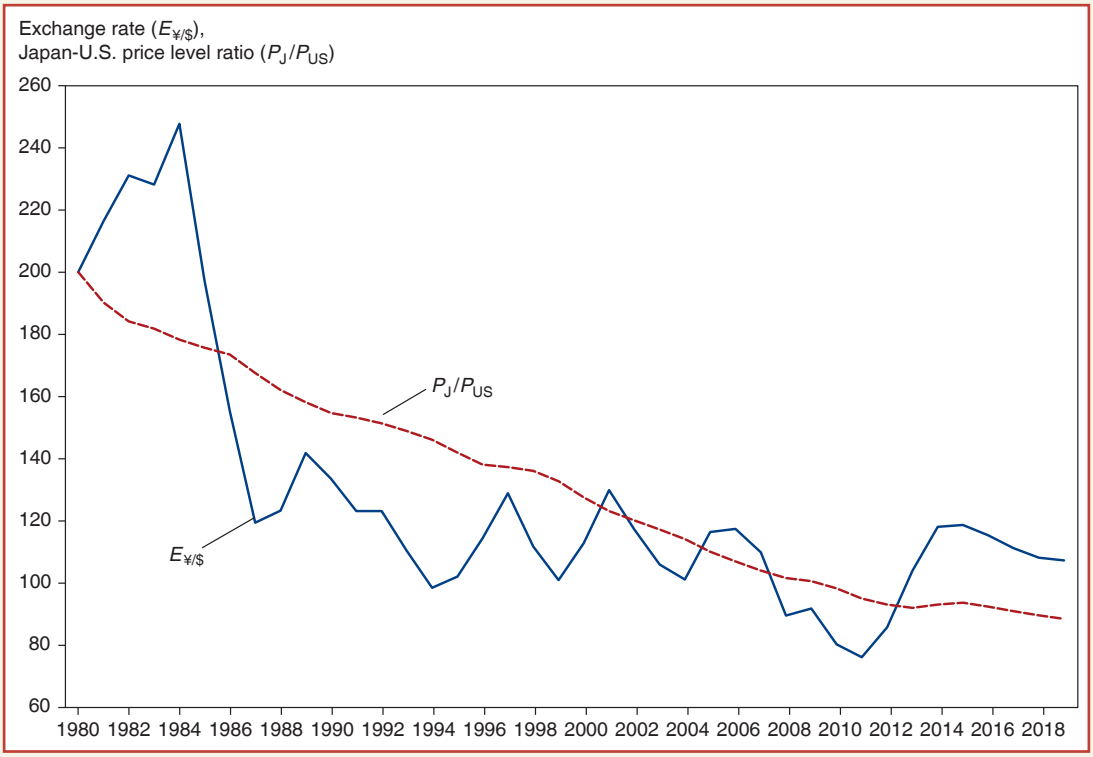


FIGURE 5-2

The Yen/Dollar Exchange Rate and Relative Japan–U.S. Price Levels, 1980–2019

The graph shows that relative PPP does not track the yen/dollar exchange rate during 1980–2015.

Source: IMF, *International Financial Statistics*. Exchange rates and price levels are end-of-year data.

[7]The price level measures in Figure 5-2 are index numbers, not dollar amounts. For example, the U.S. consumer price index (CPI) was 100 in the base year 2000 and only about 50 in 1980, so the dollar price of a reference commodity basket of typical U.S. consumption purchases doubled between 1980 and 2000. For Figure 5-2, base years for the U.S. and Japanese price indexes were chosen so that their 1980 ratio would equal the 1980 exchange rate, but this imposed equality does not mean that absolute PPP held in 1980. Although Figure 5-2 uses CPIs, other price indexes lead to similar pictures.

Studies of other currencies largely confirm the results in Figure 5-2. Relative PPP has not held up well.[8] As you will learn later in this book, between the end of World War II in 1945 and the early 1970s, exchange rates were fixed within narrow, internationally agreed-upon margins through the intervention of central banks in the foreign exchange market. During that period of fixed exchange rates, PPP did not do too badly. However, during the first half of the 1920s, when many exchange rates were market-determined as in the 1970s and after, important deviations from relative PPP occurred, just as in recent decades.[9]

Explaining the Problems with PPP

What explains the negative empirical results described in the previous section? There are several immediate problems with our rationale for the PPP theory of exchange rates, which was based on the law of one price:

1. Contrary to the assumption of the law of one price, transport costs and restrictions on trade certainly do exist. These trade barriers may be high enough to prevent some goods and services from being traded between countries.
2. Monopolistic or oligopolistic practices in goods markets may interact with transport costs and other trade barriers to weaken further the link between the prices of similar goods sold in different countries.
3. Because the inflation data reported in different countries are based on different commodity baskets, there is no reason for exchange rate changes to offset official measures of inflation differences, even when there are no barriers to trade and all products are tradable.

Trade Barriers and Nontradables

Transport costs and governmental trade restrictions make it expensive to move goods between markets located in different countries and therefore weaken the law of one price mechanism underlying PPP. Suppose once again that the same sweater sells for $45 in New York and for £30 in London but that it costs $2 to ship a sweater between the two cities. At an exchange rate of $1.45 per pound, the dollar price of a London sweater is ($1.45 per pound) × (£30) = $43.50, but an American importer would have to pay $43.50 + $2 = $45.50 to purchase the sweater in London and get it to New York. At an exchange rate of $1.45 per pound, it therefore would not pay to ship sweaters from London to New York even though their dollar price would be higher in the latter location. Similarly, at an exchange rate of $1.55 per pound, an American exporter would lose money by shipping sweaters from New York to London even though the New York price of $45 would then be below the dollar price of the sweater in London, $46.50.

The lesson of this example is that transport costs sever the close link between exchange rates and goods prices implied by the law of one price. The greater the transport costs, the greater the range over which the exchange rate can move, given goods prices in different countries. Official trade restrictions such as tariffs have a similar effect because a fee paid to the customs inspector affects the importer's profit in the same way as an equivalent shipping fee. Either type of trade impediment weakens the basis of PPP by allowing the purchasing power of a given currency to differ more widely from country to country. For

[8]See, for example, the paper by Taylor and Taylor in this chapter's Further Readings.

[9]See Paul R. Krugman, "Purchasing Power Parity and Exchange Rates: Another Look at the Evidence," *Journal of International Economics* 8 (August 1978), pp. 397–407; Paul De Grauwe, Marc Janssens, and Hilde Leliaert, *Real-Exchange-Rate Variability from 1920 to 1926 and 1973 to 1982*, Princeton Studies in International Finance 56 (International Finance Section, Department of Economics, Princeton University, September 1985); and Hans Genberg, "Purchasing Power Parity under Fixed and Flexible Exchange Rates," *Journal of International Economics* 8 (May 1978), pp. 247–276.

example, in the presence of trade impediments, a dollar need not go as far in London as in Chicago—and it doesn't, as anyone who has ever been to London has found out.

As you will recall from the theory of international trade, transport costs may be so large relative to the cost of producing some goods and services that those items can never be traded internationally at a profit. Such goods and services are called *nontradables*. The time-honored classroom example of a nontradable is the haircut. A Frenchman desiring an American haircut would have to transport himself to the United States or transport an American barber to France; in either case, the cost of transport is so large relative to the price of the service being purchased that (tourists excepted) French haircuts are consumed only by residents of France while American haircuts are consumed only by residents of the United States.

The existence in all countries of nontraded goods and services, whose prices are not linked internationally, allows systematic deviations even from relative PPP. Because the price of a nontradable is determined entirely by its *domestic* supply and demand curves, shifts in those curves may cause the domestic price of a broad commodity basket to change relative to the foreign price of the same basket. Other things equal, a rise in the price of a country's nontradables will raise its price level relative to foreign price levels (measuring all countries' price levels in terms of a single currency). Looked at another way, the purchasing power of any given currency will fall in countries where the prices of nontradables rise.

Each country's price level includes a wide variety of nontradables, including (along with haircuts) routine medical treatment, dance instruction, and housing, among others. Broadly speaking, we can identify traded goods with manufactured products, raw materials, and agricultural products. Nontradables are primarily services and the outputs of the construction industry. There are, naturally, exceptions to this rule. For example, financial services provided by banks and brokerage houses often can be traded internationally. (The rise of the Internet, in particular, has expanded the range of tradable services.) In addition, trade restrictions, if sufficiently severe, can cause goods that would normally be traded to become nontraded. Thus, in most countries, some manufactures are nontraded.

We can get a rough idea of the importance of nontradables in the American economy by looking at the contribution of the service industries to U.S. GNP. In recent years, services have accounted for around three-quarters of the value of U.S. output. While services tend to have smaller shares in poorer economies, nontradables make up an important component of GNP everywhere. Nontradables help explain the wide departures from relative PPP illustrated by Figure 5-2.

Departures from Free Competition

When trade barriers and imperfectly competitive market structures occur together, linkages between national price levels are weakened further. An extreme case occurs when a single firm sells a commodity for different prices in different markets.

When a firm sells the same product for different prices in different markets, we say that it is practicing **pricing to market**. Pricing to market may reflect different demand conditions in different countries. For example, countries where demand is more price-inelastic will tend to be charged higher markups over a monopolistic seller's production cost. Empirical studies of firm-level export data have yielded strong evidence of pervasive pricing to market in manufacturing trade.[10]

[10]For detailed reviews, see the papers by Goldberg and Knetter and by Burstein and Gopinath in this chapter's Further Readings. Classic theoretical contributions on pricing to market include Rudiger Dornbusch, "Exchange Rates and Prices," *American Economic Review* 77 (March 1987), pp. 93–106; Paul R. Krugman, "Pricing to Market When the Exchange Rate Changes," in Sven W. Arndt and J. David Richardson, eds., *Real-Financial Linkages among Open Economies* (Cambridge, MA: MIT Press, 1987); and Andrew Atkeson and Ariel Burstein, "Pricing-to-Market, Trade Costs, and International Relative Prices," *American Economic Review* 98 (December 2008), pp. 1998–2031.

In 2016, for example, a Volkswagen Polo cost $4,000 more in Ireland than in Austria despite those countries' shared currency (the euro) and despite the European Union's efforts over many years to remove intra-European trade barriers (see Chapter 10). Such price differentials would be difficult to enforce if it were not costly for consumers to buy autos in Austria and drive or ship them to Ireland or if consumers viewed cheaper cars available in Ireland as good substitutes for the Polo. The combination of product differentiation and segmented markets, however, leads to large violations of the law of one price and absolute PPP. Shifts in market structure and demand over time can invalidate relative PPP.

Differences in Consumption Patterns and Price Level Measurement

Government measures of the price level differ from country to country. One reason for these differences is that people living in different countries spend their incomes in different ways. In general, people consume relatively higher proportions of their own country's products—including its tradable products—than of foreign-made products. The average Norwegian consumes more reindeer meat than her American counterpart, the average Japanese more sushi, and the average Indian more chutney. In constructing a reference commodity basket to measure purchasing power, it is therefore likely that the Norwegian government will put a relatively high weight on reindeer, the Japanese government a high weight on sushi, and the Indian government a high weight on chutney.

Because relative PPP makes predictions about price *changes* rather than price *levels*, it is a sensible concept regardless of the baskets used to define price levels in the countries being compared. If all U.S. prices increase by 10 percent and the dollar depreciates against foreign currencies by 10 percent, relative PPP will be satisfied (assuming there are no changes abroad) for any domestic and foreign choices of price level indexes.

MEASURING AND COMPARING COUNTRIES' WEALTH WORLDWIDE: THE INTERNATIONAL COMPARISON PROGRAM (ICP)

If you want to compute reliable purchasing power parities (PPPs), you need data on the local prices of a large number of goods and services consumed in an economy and compare it with that of other countries. Collecting and organizing such data would obviously be quite challenging.

One of the primary challenges in calculating PPP is the inadequacy of using exchange rates. While exchange rates can be used to express GDPs in a common currency, they do not factor in the relative purchasing power of currencies because they are determined by demand and supply of currencies and are influenced by interest rates, capital flows, government intervention, currency speculation, and so on. For this reason, exchange rates do not value GDPs at a common price level.

Another challenge is the determination of the prices of traded and non-traded commodities. While the prices of traded products can be globally determined by the law of one price, the prices of non-traded products (buildings, health, education, and government services) are influenced by domestic factors, especially wages and salaries, which are usually higher in high-income countries.

The International Comparison Program (ICP) was set up as a research effort in the 1960s in an effort to provide PPP data to policy makers and international organizations. Hosted by the World Bank, the ICP Global Office works with the United Nations Regional Commissions, the OECD, Eurostat, and regional development banks. It has also established regional ICP offices, which collect and validate data. The ICP uses PPP to offer comparability among GDP figures and their components by calculating national data using a common price level as base and expressing it in a common currency.

Many major international agencies, such as the World Bank, International Monetary Fund, the

World Health Organization, the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Development Program (UNDP), the OECD, the European Union, as well as domestic policymakers and other stakeholders use ICP data to compare GDP, growth rates, and poverty levels across countries.

METHODOLOGY

The ICP conducts worldwide surveys every six years to collect data on prices and expenditure on the entire set of final goods and services that constitute the final expenditure on GDP.

There are two ways in which price level differences across economies are reconciled: either by directly observing volumes or by using relative prices to derive the volumes. PPPs are then calculated in two stages. In the first stage, PPPs are estimated for individual goods and services, which account for the difference in price levels for traded products and nontraded products. In the second stage, PPPs are estimated for groups of products. Finally, the various levels are aggregated to make up the GDP. The composition of the baskets of good and services to compare purchasing powers across economies varies and reflects differences in preferences, cultures, climates, prices, product availability, and incomes, but each basket will effectively provide comparable or equivalent utility or consumer satisfaction.

GDP is first broken down into 155 basic headings. These basic headings are the lowest level at which expenditure estimates are required. They are essentially the product groups into which individual goods or services are categorized for pricing. There are three categories of basic headings:

1. Commodities purchased by consumers in various markets.
2. House rents, healthcare, education, government services, and equipment.
3. Commodities for which prices are not available, such as narcotics.

Comparable data for commodities under the second and third categories may be too difficult or expensive to obtain and is usually beyond the scope of data collected through market surveys.

Once all commodities have been placed into a category, PPPs are calculated and compared at the individual product level for each basic heading for every pair of economies. On the other hand, multilateral PPPs are calculated on the basis of transitivity and country invariance. Transitivity occurs when the PPP between two countries is the same, irrespective of whether it is calculated directly or through another country. Country invariance occurs when the PPP between two countries is the same irrespective of the base country.

The last survey of the ICP, *ICP 2011 Purchasing Power Parities and the Real Size of World Economies,* was published on October 28, 2014. It includes 199 countries from seven (plus one statistical area) world regions after several years of intense work (the previous one is called ICP 2005).

WORLD GDP

The report found that, compared to real expenditures in ICR 2005 PPPs, the share of low and middle income economies (developing countries) has now increased to about half of the world's GDP.

The following figure shows the distribution of global GDP by ICP region and compares their shares based on PPP to those based on exchange rates. According to the PPP-based distribution, while the Asia and the Pacific regions accounted for over 30 percent of world GDP in 2011, the Eurostat-OECD region is significantly smaller. The report pointed out that while the largest 12 countries of the world account for two-thirds of the global economy and 59 percent of global population, six of these 12 economies are in the middle income category. When PPP is factored, the U.S. remains the largest economy, but the GDP shares of China and India, the second and third largest economies, more than doubles relative to the U.S. since 2005.

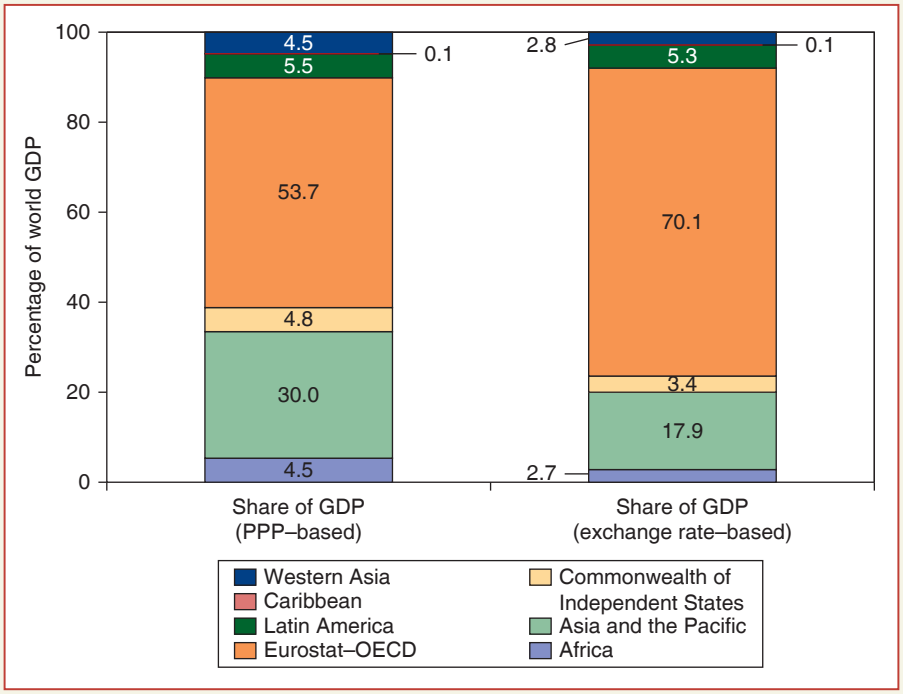
The report also reveals that the consumption is shared differently according to category an economy is placed in.

THE INTERNATIONAL POVERTY LINE

In October 2015, the World Bank Group announced its first updated international poverty line using 2011 PPPs in almost a decade.

Using the new 2011 PPP data, the updated $1.90 poverty line can be converted from local currency into U.S. dollars. The average value of these lines in 2011 is approximately $1.90, which is the updated international extreme poverty line.

Apart from comparing GDPs and poverty levels on a global level by the IMF and the World Bank, ICP data is used for several other purposes by international organizations. For example, the United Nations Development Program (UNDP) uses this data to calculate the human development index and formulate gender empowerment



PPP-Based and Exchange Rate-Based GDP Regional Shares (World = 100), ICP 2011

Source: ICP, http://icp.worldbank.org/.

measures, the World Health Organization compares health inequality across countries, and the UNESCO assesses per capita expenditure on education by various economies.

LIMITATIONS

All data should be treated with caution. The ICP report comes with the following caveats:

Countries with significant non-observed economies may have an underestimated GDP. For such reasons, GDP measurement is not uniform across all countries.

PPPs based on prices of services are not as precise for those based on prices of services. This is largely because services such as health and housing would have greater error components.

While PPPs represent the overall price level of an economy, they do not capture differences in prices within the economy.

For these reasons, the ICP report estimates an error component of plus or minus 15 percent for economies such as China, India, and Brazil, which have significant differences in price and economic structures.

The final caveat is that PPPs should not be equated to equilibrium exchange rates because the ICP PPPs do not capture the undervaluation or overvaluation of currencies.[11]

[11]See "Purchasing Power Parities and the Real Size of World Economies: A Comprehensive Report of the 2011 International Comparison Program," the World Bank Group, ICP 2011, http://siteresources. worldbank.org/ICPEXT/Resources/ICP-2011-report.pdf; and Mario Cruz, James Foster, Bryce Quillin, and Philip Schellekens, "Ending Extreme Poverty and Sharing Prosperity: Progress and Policies," *Development Economics*, World Bank Group, October 2015, http://pubdocs.worldbank. org/en/109701443800596288/PRN03Oct2015TwinGoals.pdf.