

Purchasing Power Parity (PPP) Theory

The PPP theory developed by Gustav Cassell, a Swedish economist in the early 1900s describes the relationship between the average price levels in a country and its exchange rates.

The PPP theory states that the home currency price of a commodity in different countries, when converted into a common currency at the spot exchange rate, is the same in all countries across the world. In other words, a currency should have the same purchasing power in all countries.

The PPP theory has its roots in the law of one price. The law of one price postulates that identical goods or services must always sell at the same price.

The PPP rate is the rate at which the currency of one country would have to be converted into that of another country to buy the same amount of goods and services in each country. In other words, the exchange rate should reflect the relative purchasing powers of the currencies.

Example, if a standard basket of goods costs \$100 in USA and CHF 130 in Switzerland, then the exchange rate between USD and CHF is $130/100 = 1.30$. That is, $USD/CHF = 1.30$

There are two versions of the PPP theory:

1. The Absolute Version and
2. The Relative Version

1. The Absolute Form of PPP

The law of one price, the basis for absolute form of PPP, states that the price of a commodity or a standard basket of goods sold in two different markets expressed in terms of a common currency should be the same.

In other words, the price of a commodity or a standard basket of goods in different countries should be the same when measured in a common currency (if the markets are perfect).

If the price is not the same in two different markets or countries, arbitrageurs and genuine buyers will exploit the situation and equalize the prices between the markets.

Determining the PPP Rate

Let us assume that the price of a standard basket of goods and services in India as represented by its price index is P_{INR} . The price of the same basket of goods and services in the USA as represented by its price index is P_{US}

Then, the spot exchange rate (S_0) between INR and USD is expressed as

$$S_0 = P_{INR} / P_{US}$$

Example, The general price index in the US is at 530 and the general price index in UK is at 435.

Therefore, the equilibrium ER between the USD and the GBP is $530/435 = 1.2184$

Therefore, $USD/GBP = 1.2184$

Thus, the exchange rate between two currencies equals the ratio of the general price indices of the two countries. This rule is known as the absolute version of PPP/static form of PPP.

The absolute form of PPP holds only when the markets are perfect. That is when there are no frictions such as transportation costs, transaction costs, quotas and tariff barriers. In reality, however, such frictions are bound to exist.

2. The Relative Form of PPP

In view of serious limitations of the absolute form of PPP, an alternative version, known as the relative version or dynamic form of PPP, is used. The relative form of PPP is considered better determinant of exchange rates.

The relative form of PPP states that the percentage change in the exchange rate between the domestic currency and the foreign currency should equal the percentage change in the ratio of price indices in the two countries. That is, the exchange rate would change to offset the difference in the inflation rates between the two countries. If the exchange rate would change to offset the difference in the inflation rates between the two countries, the relative purchasing power is the same between countries.

The foreign currency depreciates when the inflation rate in the foreign country is more than the domestic inflation rate and the foreign currency appreciates when the inflation rate in the domestic country is more than the foreign country's inflation rate. This means that the currency of a country with a high rate of inflation should depreciate relative to the currency of a country with a lower rate of inflation.

The relative form of PPP holds good even in the presence of market imperfections such as transaction costs, transportation costs and tariff barriers.

Example, suppose the inflation rate in India is 6% and 4% in the US. Therefore, INR value of the USD must rise by about 2% (6% - 4%) **Then, the INR price of goods in two countries will be equal.**

If $1\$ = ₹70$, then it should be $1\$ = ₹71.4$

The PPP theory mainly contends that consumers will switch over to domestic goods or services whenever imports are costlier and will switch over to foreign goods whenever imports are cheaper. This process will influence the exchange rate.

Where the inflation differential is greater or lower than the appreciation or depreciation of home currency, a situation of disequilibrium exists. However, the arbitrage process will ultimately bring the exchange rates in line with the inflation differential.

Advantages of PPP Theory

- **PPP exchange rates are stable compared with the market:** PPP exchange rates stay relatively stable when compared with financial world market rates. Comparing GDP using market rates can mean more volatility in comparisons, even when the individual countries' markets are stable.
- **It accounts for non-traded goods:** GDP measures a country's economic productivity as it relates to the sale of tangible, internationally traded goods. However, PPP accounts for the cost of non-traded goods and services—like haircuts or massages—which also speaks to the productivity of a given economy.
- **It provides real-world examples of living costs and standards:** Every year, The Economist releases a comparative list of what 55 countries around the world charge for a McDonald's Big Mac called the Big Mac Index. This example of PPP uses a recognizable good as a point of comparison between the living costs around the world. Laypeople can look at the PPP of different goods in different places, and get a sense of how expensive or affordable their current home economy is.

Criticism of PPP Theory

- This theory rests on the assumption of free international trade. It means the government does not resort to tariff or non-tariff restrictions upon trade. These assumptions do not hold valid in actual reality. There is frequent use of tariffs, quotas and other controls by the governments in both advanced and poor countries.
- Non-traded items such as immovable goods (e.g. land and buildings), highly perishable commodities (e.g. milk and vegetables) and hospitality services may cause departures from PPP. This is because they cannot be moved from one country to another to cash in on the price differential between the countries.
- The inherent limitations of price indices as a measure of price-level changes also make PPP an approximate measure. Different countries may use different baskets of goods and services in the construction of the price index. The price indices of different countries may be different in terms of the proportion of commodities used in the construction of the price index.
- There are many factors other than the prices of goods and services which influence exchange rates. Sometimes, other factors may dominate the role of inflation in influencing exchange rates. In such situations, the PPP theory cannot give a correct estimate of exchange rates.
- The PPP theory holds only in the long run. In other words, long run changes in exchange rates are in line with long run differences in inflation rates.

Interest Rate Parity (IRP) Theory

While PPP deals with law of one price in the market of goods and services, IRP deals with law of one price in the financial market.

According to the law of one price, two financial products that are equal to each other must sell for the same price. The law of one price underlying the IRP describes the relationship between forward rates and interest rates.

The IRP theory states that the difference in the interest rates (risk-free) on two currencies should be equal to the difference between the forward exchange rate and the spot exchange rate if there are to be no arbitrage opportunities. What one gains from the interest rate differential is offset by the forward rate differential (difference between the spot rate and forward rate). Therefore, the spread between spot rate and forward rate is influenced by the interest rate differential between the two countries.

IRP theory postulates that the forward rate differential in the exchange rate of two currencies would equal the interest rate differential between the two countries.

For example,

Let, Interest Rate in India is 10% Let, Interest Rate in USA is 6%

Let, Dollar – Rupees spot exchange rate - ₹42.50 per USD

Let, Dollar – Rupees forward exchange rate (90 days) - ₹42.9250 per USD Then, Forward Rate Differential = $42.9250 - 42.50 / 42.50 = 1\%$

Interest Rate Differential (p) = $(1 + 0.10 * 3/12) / (1 + 0.06 * 3/12) - 1$ p = 1.01 - 1

p = 0.01

p = 1%

In the above example, forward rate differential is equal to the interest rate differential.

If there is no parity between the forward rate differential and interest rate differential, opportunities for arbitrage will arise. Arbitrageurs will move funds from one country to another for taking advantage of disparity. In an efficient market, with free flow of capital and negligible transaction cost, continuous arbitrage process will soon restore parity between the forward rate differential and interest rate differential which is called **Covered Interest Arbitration**.

Let us take another example where the forward rate differential is not equal to the interest rate differential.

Interest Rate in India - 12% Interest Rate in USA - 4%

Dollar – Rupees spot exchange rate - ₹42.50 per USD

Dollar – Rupees forward exchange rate (90 days) - ₹43 per USD Investment period - 3 months

Therefore, Forward Rate Differential = $43.00 - 42.50 / 42.50 = 1.176\%$

Interest Rate Differential (p) = $(1 + 0.12 * 3/12) / (1 + 0.04 * 3/12) - 1$

p = 0.0198

p = **1.98%**

In the above example, interest rate differential is higher than the forward rate differential. Arbitrageurs will move funds from one country to another to take advantage of the situation.

Arbitration process:

- Arbitrageurs will borrow \$1000 from US market for a 3 month period @ 4% p.a
- Convert USD into INR at spot exchange rate (1\$ = ₹42.50) and get ₹42,500
- Invest this money for 3 months in India @ 12% p.a

After 3 months,

- The arbitrageur will get ₹43,775 (42,500 + 1,275)
- Convert INR into USD at the forward ER as per the forward contract (1\$ = ₹43). Get USD 1,018
- Repay the US loan by paying USD 1,010 (\$1000 + \$ 10)
- Arbitrageur makes an arbitrage profit of USD 8 (1,018 – 1,010)

This type of situation will impact both interest rates and exchange rates as follows:

- Borrowings more in the US will raise interest rates in US.
- Investing more in India will lower interest rates in India.

As a result of which the Interest Rate Differential will narrow.

- Selling dollars at spot ER will lower the spot ER as demand for forwards is higher.
- Buying dollars at the forward rate will raise the forward ER.

As a result of which the Forward Rate Differential will widen.

Limitations of IRP theory

- **Assumes Perfect Market:** The interest rate parity assumes a perfect market. A perfect market is a market where all information is readily available to the market participants. Perfect markets are also characterized by a high number of transactions, homogenous products, no barriers to entry, and no transaction costs. The perfect market is a theoretical market and does not exist in the real world.
- **Assumes Capital Mobility:** Another limitation of the interest rate parity theory is that it assumes capital is freely mobile. It means that the theory assumes that entities can easily move

the capital from one country to another. This also relates to perfect markets as it also assumes that there are no transaction costs in moving the capital from one country to another. In real world, capital is not freely mobile. To transfer capital from one country to another, entities must bear different type of costs.

- **Assumes Perfect Asset Interchangeability:** The interest rate parity theory also assumes that assets are perfectly interchangeable in two countries. It assumes that entities looking to borrow in one country and invest it in another country can find instruments of the same class and risk in both countries. This is not true in the real-world as different countries do not have the same class of assets with similar risks.
- **Assumes No-arbitrage:** As mentioned, the interest rate parity assumes arbitrage does not exist. This is mainly due to the other assumptions that the theory makes. In the real world, entities exploit market conditions in many ways to achieve arbitrage.

International Fischer's Effect

The Fisher Effect is an economic theory given by Irving Fisher.

Statement

The International Fisher Effect (IFE) is an economic theory stating that the expected disparity between the exchange rate of two currencies is approximately equal to the difference between their countries Real Interest rates.

Assumption

- Free Flow of capital between the countries.
- Inflation rates are equal between the countries.
- Capital markets are integrated.
- No currency controls.

Explanation

Fisher classifies interest rates into 2 types-

1. **Nominal Interest rates-** The nominal interest rate is the interest rate quoted on savings accounts and loans borrowed.
2. **Real Interest Rates-** A real interest rate is adjusted nominal rates where inflation is considered on bond or loan.

Fischer was of an opinion that there is a positive correlation between nominal interest rates and expected inflation. And investors will be willing to invest in such investments whose returns are higher and likely to compensate the appreciation in the currency during the time of currency exchange. He suggests postponement of consumption is not effective when there are high rates of inflation.

Consider the example, Suppose Mr. X's has a savings of Rs. 200,000 on 1st January, 2020 and he invests this in Mutual fund for two years and gets 12% per annum. His total wealth at the end of the second year (31st December 2021) will be Rs. 250880. Suppose he wants to construct a house, requires Rs. 200,000 for constructing the house on 1st January, 2020 and for constructing the same home on 31st December 2021, he will require Rs. 300,000. Then whether

the investment is profitable or not? Thus, by not constructing the home on 1st January 2020 and postponing it to 31st December 2021, he incurs loss. When do the investments become profitable?

The return on investment must be more than the price increase (inflation) to ascertain the exact benefit and increase in wealth due to investment, the return on investment must be measured in terms of real rates and not nominal rates. To maximize the wealth of investors, the rate of return on investment must be more than the inflation rates.

Limitations

- There is exchange control.
- Taxation is ignored
- There is no free flow of capital.
- Based on unrealistic assumptions.

Pure Expectations Theory

Pure expectation theory was propounded by John M Muth in 1960s.

Statement

Interest Rates on long term investments will be equal to the average of the short term rates that the people expect over the life of long term bond. i.e, Value of Long Term returns = Average value of short term returns

Assumptions

- Future interest rates are determined by present structure of interest rates.
- Investors want to maximize profits.
- No cost associated with investments.

Explanation

Consider the example, Investor has 2 options, either to invest in a bond for 1 year (Roll Over) or to invest in a bond for 2 years(Lock-in). Interest rates for a bond maturing in 1 year = 3.5% p.a
Interest rates for a bond maturing in 2 year = 4% p.a

As per Pure expectation theory, Value of Long Term returns = Average value of short term returns $(1+0.04)^2 = (1+0.035) \times (1+F1)$ $1.0816 = (1+0.035) \times (1+F1)$ $(1+F1) = 1.0816 / 1.035$
 $F1 = 1.0450 - 1$ $F1 = 4.5\%$ Average returns for 2 years = $3.5 + 4.5 \div 2 = 4\%$ p.a. Therefore, Return on Investment are based on market expectations about forward rates and future long term interest rates can be predicted using current long term interest rates.

Limitations

- Chances of inaccurate predictions.
- Ignores risk factor associated with investments.
- Short term interest rates are difficult to predict