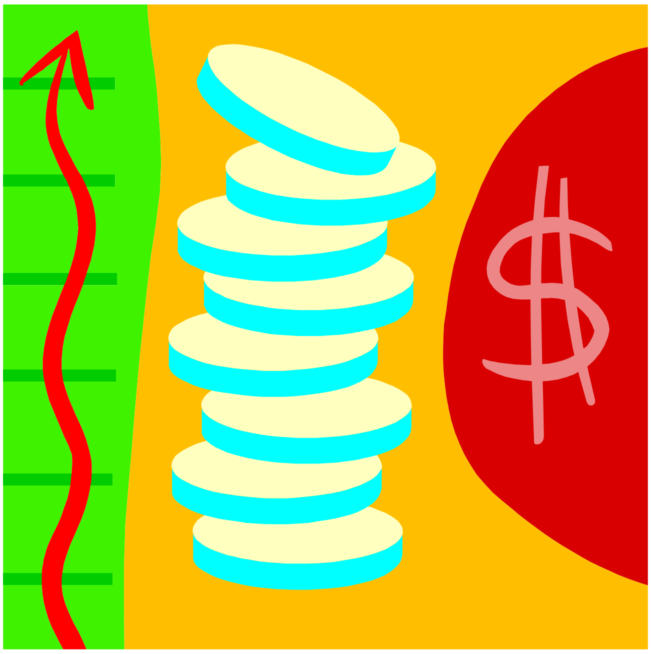
PURCHASING POWER PARITY & INTERNATIONAL FISHER EFFECT

Exercise with Model

Presented by Valuation & Research Specialists (VRS)



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This report has been written on the basis of an exercise and is accompanied with an excel model.

Have been prepared by VRS Research Team.

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PURCHASING POWER PARITY (PPP) & INTERNATIONAL FISHER EFFECT (IFE)

Exercise with Model

QUESTION 1

Find the US inflation rates between 2002 and 2007 from the IMF website and calculate the Purchasing Power Parity (PPP) exchange rates for countries A, B, C and D in the case study. (The inflation rate in country in the case can be calculated from the Consumer Price Index)

To calculate the Purchasing Power Parity (PPP) exchange rates for countries A, B, C and D during the period 2002 – 2007, the following steps are followed:

First, the local inflation rate was calculated based on each country's consumer price index. Secondly, the US inflation rate was found from the "Economic Report of the President, 2011" for the period under consideration. Thus, given each year's actual (spot) exchange rate, the next year's (forward) exchange rate was calculated based on the PPP equation:

Forward Exchange Rate (Y 2003) = [Spot Exchange Rate Y 2002 x (1 + Local Inflation Y 2003)] / (1 + US Inflation Y 2003)

The direct quotation method was used for the exchanges rates (USD/LC) implying local currency units per 1 foreign currency unit (USD).

As an illustration, table 1 presents the inputs and results for country A for years 2003 - 2007. The same steps were taken to calculate PPP based exchange rates for countries B, C and D over the same period.

For example, forward rate in year 2003 for country A was calculated as follows: [3.533 x (1+14.67%)] / (1+2.28%) = (3.533 x 1.1467) / (1.0228) = 3.961

Table1

Country A	Quotation		2002	2003	2004	2005	2006	2007
Foreign Exchange Rate	(USD/LC)		3.533	2.888	2.654	2.340	2.137	2.221
Consumer Price Index			115.9	132.9	141.7	151.4	157.8	161.9
Local Inflation Rate				14.67%	6.62%	6.85%	4.23%	2.60%
US Inflation Rate				2.28%	2.66%	3.39%	3.23%	2.85%
Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)		3.961	2.999	2.743	2.363	2.132

The table 2 presents the aggregate results based on the above calculations. For each country, the first row denotes the spot exchange rate (local currency per 1 USD) and the second row denotes the implied (PPP based) exchange rate (local currency per 1 USD) for years 2003 up to 2007.

Table 2

					2003	2004	2005	2006	2007
Country A	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)		2.888	2.654	2.340	2.137	2.221
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)		3.961	2.999	2.743	2.363	2.132
Country B	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)		29.450	27.748	28.782	26.331	25.816
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)		35.337	31.808	30.229	30.591	27.004
Country C	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)		45.605	43.585	45.065	44.245	40.755
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)		48.783	46.082	43.928	46.208	44.793
Country D	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)		8.277	8.277	8.070	7.809	7.616
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)		8.190	8.373	8.143	7.972	7.781

QUESTION 2

Did Purchasing Power Parity theory hold in these countries? Which currencies are over- or under-valued against the US dollar?

The exchange rates estimated based on PPP (table 2) differ from spot exchange rates for all years and for all countries. For example, in country B for year 2003, the exchange rate based on PPP was calculated at 35.337 local currency units per 1 USD, whereas the actual spot exchange rate was 29.450 local currency units per 1 USD. Therefore it is implied that in year 2003, country B's currency was overvalued.

The following table is an extension of the previous one, with the addition of one row for each country, indicating whether the currency is either over-valued or under-valued against the estimated exchange rate based on PPP for the period 2003 – 2007. As the table illustrates, the PPP theory does not hold for the currencies of these countries during the period examined.

Table 3: PPP based Exchange Rates

				2003	2004	2005	2006	2007
Country A	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	2.888	2.654	2.340	2.137	2.221
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	3.961	2.999	2.743	2.363	2.132
	Local Currency			Overvalued	Overvalued	Overvalued	Overvalued	Undervalued
Country B	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	29.450	27.748	28.782	26.331	25.816
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	35.337	31.808	30.229	30.591	27.004
	Local Currency			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country C	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	45.605	43.585	45.065	44.245	40.755
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	48.783	46.082	43.928	46.208	44.793
	Local Currency			Overvalued	Overvalued	Undervalued	Overvalued	Overvalued
Country D	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	8.277	8.277	8.070	7.809	7.616
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	8.190	8.373	8.143	7.972	7.781
	Local Currency			Undervalued	Overvalued	Overvalued	Overvalued	Overvalued

QUESTION 3

Find the US dollar lending rates (prime rate) between 2002 and 2007 from the IMF website or the US Federal Reserve website and calculate whether International Fisher Effect (IFE) theory held between the exchange rates of Countries A to D and the US dollar.

To calculate whether International Fisher Effect (IFE) theory held between the exchange rates of Countries A to D and the US dollar between 2002 and 2007, the following steps are followed:

First the annual US dollar lending (prime) rates were found from the "Economic Report of the President, 2011". Given the annual local lending rates and each year's actual (spot) exchange rate, the expected next year's exchange rate was calculated based on the IFE theory:

Forward Exchange Rate (Y 2003) = [Spot Exchange Rate Y 2002 x (1 + Local Lending Rate Y 2003)] / (1 + US Lending Rate Y 2003)

The direct quotation method was used for the exchanges rates (USD/LC) implying local currency units per 1 foreign currency unit (USD).

As an illustration, table 4 presents the inputs and results for country A for years 2003 - 2007. The same steps were taken to calculate IFE based exchange rates for countries B, C and D over the same period.

For example, forward rate in year 2003 for country A was calculated as follows: [3.533 x (1+67.08%)] / (1+4.12%) = (3.533 x 1.6708) / (1.0412) = 5.669

Table 4

Country A			2002	2003	2004	2005	2006	2007
	Quotation							
Foreign Exchange Rate	(USD/LC)		3.533	2.888	2.654	2.340	2.137	2.221
Interest Rate Local			62.88%	67.08%	54.93%	55.38%	50.81%	47.20%
Interest Rate US			4.67%	4.12%	4.34%	6.19%	7.96%	8.05%
Exchange Rate based on IFE	(USD/LC)	(LC per 1 USD)		5.669	4.288	3.883	3.269	2.911

Table 5 presents the aggregate results based on the above calculations. For each country, the first row denotes the spot exchange rate (local currency per 1 USD), the second row denotes the implied (IFE based) exchange rate (local currency per 1 USD) and the third row the over- or under-valued currencies for the period 2003 – 2007. As the table illustrates, the IFE theory does not hold either in these countries during the period under consideration.

Table 5: IFE based Exchange Rates

				2003	2004	2005	2006	2007
Country A	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	2.888	2.654	2.340	2.137	2.221
	Exchange Rate based on IFE	(USD/LC)	(LC per 1 USD)	5.669	4.288	3.883	3.269	2.911
	Local Currency			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country B	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	29.450	27.748	28.782	26.331	25.816
	Exchange Rate based on IFE	(USD/LC)	(LC per 1 USD)	34.484	31.443	28.921	29.448	26.782
	Local Currency			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country C	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	45.605	43.585	45.065	44.245	40.755
	Exchange Rate based on IFE	(USD/LC)	(LC per 1 USD)	51.416	48.481	45.457	46.413	46.067
	Local Currency			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country D	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	8.277	8.277	8.070	7.809	7.616
	Exchange Rate based on IFE	(USD/LC)	(LC per 1 USD)	8.372	8.375	8.229	7.932	7.689
	Local Currency			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued

For example, in country C for year 2003, the IFE (implied) exchange rate was calculated at 51.416 local currency units per 1 USD, whereas the actual spot exchange rate was 45.605 local currency units per 1 USD. Therefore it is implied that in year 2003, country C's currency was overvalued.

QUESTION 4

Based on your PPP and IFE calculations above, in which countries do you expect a significant depreciation or appreciation (convergence to the PPP equilibrium rate) in the next three to five years?

The following table presents in aggregate both PPP and IFE based forward exchange rates and the corresponding over- or under-valued currencies for all 4 countries during the period under consideration.

Table 6: PPP and IFE based Exchange Rates

				2003	2004	2005	2006	2007
Country A	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	2.888	2.654	2.340	2.137	2.221
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	3.961	2.999	2.743	2.363	2.132
	Local Currency based on PPP			Overvalued	Overvalued	Overvalued	Overvalued	Undervalued
	Exchange Rate based on IFE			5.669	4.288	3.883	3.269	2.911
	Local Currency based on IFE			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country B	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	29.450	27.748	28.782	26.331	25.816
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	35.337	31.808	30.229	30.591	27.004
	Local Currency based on PPP			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
	Exchange Rate based on IFE			34.484	31.443	28.921	29.448	26.782
	Local Currency based on IFE			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country C	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	45.605	43.585	45.065	44.245	40.755
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	48.783	46.082	43.928	46.208	44.793
	Local Currency based on PPP			Overvalued	Overvalued	Undervalued	Overvalued	Overvalued
	Exchange Rate based on IFE			51.416	48.481	45.457	46.413	46.067
	Local Currency based on IFE			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued
Country D	Spot Foreign Exchange Rate	(USD/LC)	(LC per 1 USD)	8.277	8.277	8.070	7.809	7.616
	Exchange Rate based on PPP	(USD/LC)	(LC per 1 USD)	8.190	8.373	8.143	7.972	7.781
	Local Currency based on PPP			Undervalued	Overvalued	Overvalued	Overvalued	Overvalued
	Exchange Rate based on IFE			8.372	8.375	8.229	7.932	7.689
	Local Currency based on IFE			Overvalued	Overvalued	Overvalued	Overvalued	Overvalued

Based on the above results, in all cases apart from three, local currencies were over-valued as compared to their implied exchange rates based on PPP and IFE theories.

The currencies of countries A, B and C were likely to experience a significant depreciation in their values in the following years, whereas country D's currency was more aligned to its implied exchange rates.

NOTES

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