SESSION 12: CURRENCIES & EXCHANGE RATES

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Inflation across currencies

- In business and investing, we often have to grapple with different currencies. As we move from one currency (say US dollars) to another (say Indonesian Rupiah), looking at the same project or company, the numbers can look very different.
- Those differences do not come from country risk or from business differences, since those do not change, but from different inflation rates in different currencies.
- Those higher inflation rates will affect interest rates that you observe in those currencies as well as your expected nominal growth rates.

And Interest Rates

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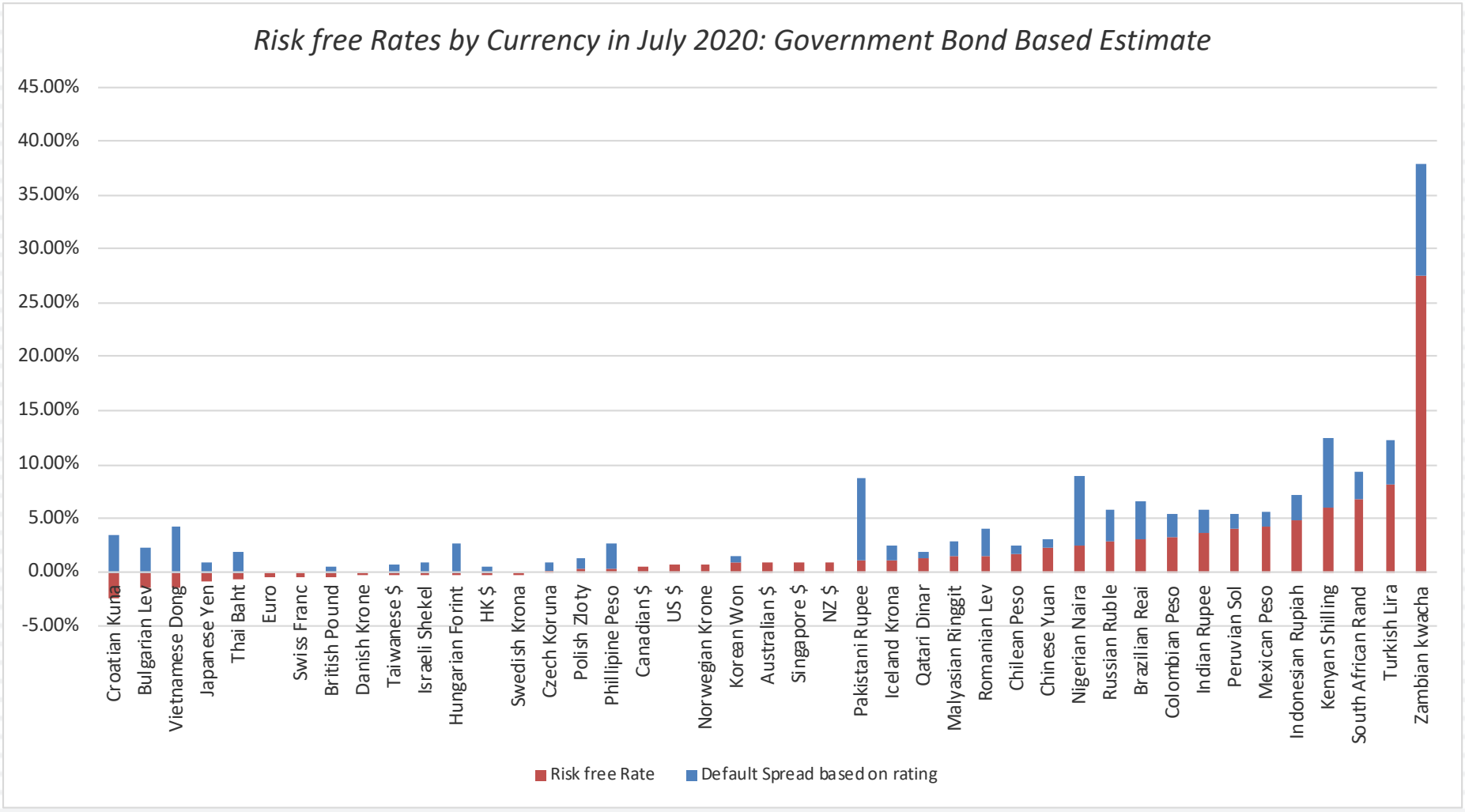
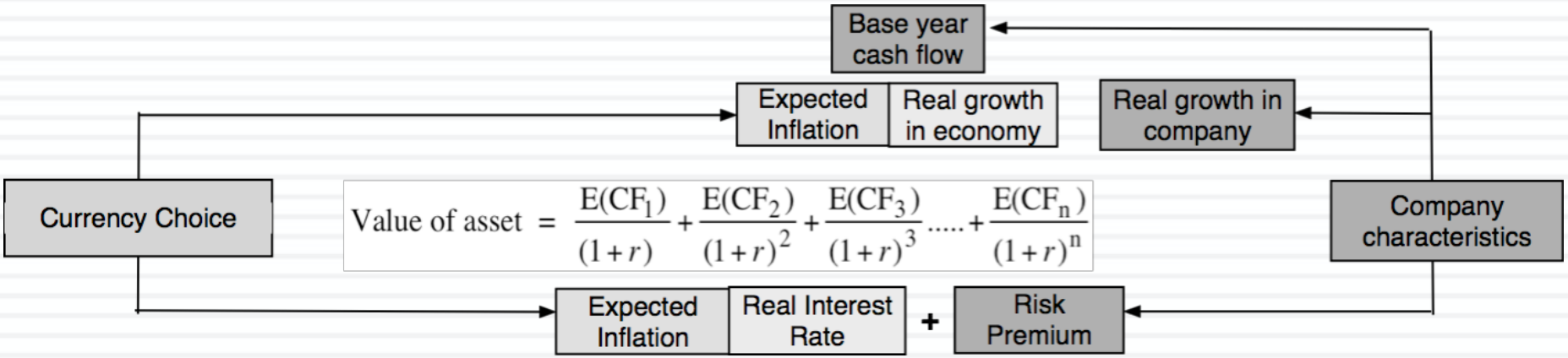


Interest Rates and Inflation

- One simple technique is to use differential inflation and the US dollar risk free rate (simple and compounded):
  - Interest rate in currency = US dollar interest rate + Differential inflation
  - Interest rate in currency = $(1 + US\ \$\ rate)\ \frac{(1+inflation\ rate\ in\ currency)}{(1+inflation\ rate\ in\ US\ \$)} - 1$
- Using this technique on the Egyptian pound in December 2015:
  - Risk free rate in US dollars on 12/31/15 = 2.27%
  - Expected inflation rate in the US = 1.50%
  - Expected inflation rate in Egypt = 9.70%
  - Risk free rate in EGP = (1.0227) * (1.097/1.015) -1 =10.53%
- This is also a good way to check interest rates that you do not trust.

Currency Consistency



Exchange Rates

- If you decide to be currency consistent, you often have to forecast exchange rates.
  - In some currencies, you may be able to find market-based forecasts in the forward/futures markets.
  - In others, you will have to forecast them on your own.
- If you have to forecast exchange rates, there are two simple formulations that can help:
  - Interest rate parity, where exchange rates can be forecast based upon interest rates in the currencies in question.
  - Purchasing power parity, where differences in inflation play out as expected exchange rates.

Forecasting Approaches

- Expert/Personal Forecasts: In this approach, you forecast exchange rates based upon your views on whether a currency is too strong or weak (?) right now, as well as fundamentals.
- Market Forecasts: You use market-set forward or future exchange rates for the currency.
- Parity conditions: You use two parity requirements to forecast exchange rates:
  1. Interest rate parity: Use the differential interest rates between currencies to forecast exchange rates.
  2. Purchasing power parity: Use inflation differentials to forecast changes in exchange rates.

1. Expert/Personal Forecasts

- Exchange rate forecasts, like most other macro economic forecasts, are not done well. Even the very best forecasters barely beat random forecasts.
- Even if you do believe that you have exchange rate forecasting ability (or can hire someone who does), building in your exchange rate forecasts into an analysis (project cash flows or valuation) risks muddying the waters, since your final judgment(on whether to invest) is determined more by your exchange rate forecasts than by what you think about a project or investment.
- Put simply, if you are that good at forecasting exchange rates, there are far easier ways to make money than running a business or investing in companies.

2. Market Forecasts

- Over the last few decades, we have seen the development of forward and futures markets on exchange rates.
- If you are dealing with widely held currencies like the US dollar and the Euro, you can very easily (and at low cost) buy forward contracts that will lock in the exchange rate in a future period (3, 5 or 10 years out).
- In emerging market currencies, it become trickier, since
  - Forward markets may not run past the near term (say one or two years)
  - There may be no market-set rates and you will have to buy customized forward contracts, with a bank setting the rates.

Forward Rates: US $/Euro Forward Rates on 7/24/20

Expiration	Ask	Bid	Mid
Current	1.1662	1.1653	1.1657
Six Months	1.1712	1.1702	1.1707
One Years	1.1756	1.1745	1.1750
Two Years	1.1858	1.1838	1.1848
Three Years	1.1968	1.1948	1.1958
Four Years	1.2098	1.2068	1.2083
Five Years	1.2235	1.2206	1.2220
Six Years	1.2393	1.2343	1.2368
Seven Years	1.2546	1.2496	1.2521
Ten Years	1.3025	1.2935	1.2980

3a. Interest Rate Parity

- Interest rate parity is an arbitrage condition, insofar as deviations from it can be exploited for riskless profit.
- If you have two currencies (say $ and Euros), with a currency exchange rate(XR), and interest rates on the two currencies, the expected future exchange(XRF) rate can be computed as follows:
  - $XRF_{\$,Euro} = XR_{\$,Euro} \frac{(1+Interest\ Rate_{US\ \$})}{(1+Interest\ Rate_{Euro})}$
  - Thus, if the current exchange rate is $1.1662/Euro, and interest rates at 2% in the US and 1% in Euros, the expected exchange rate is:

    $XRF_{\$,Euro} = 1.1662 \frac{(1.02)}{(1.01)}$ = $1.1777/ Euro
- The interest rates have to be matched up to the forecast horizon, one-year rates to forecast one year forward exchange rates, compounded two-year rates to forecast exchange rates two years from now and so on.

3b. Purchasing Power Parity

- Purchasing power parity is built on the principle that currencies will high inflation should depreciate over time, relative to currencies with low inflation, because they will lose purchasing power (on a relative basis).
- If you have two currencies (say $ and Rupees), with a currency exchange rate(XR), and interest rates on the two currencies, the expected future exchange(XRF) rate can be computed as follows:

$$XRF_{\$,Rs} = XR_{\$,Rs} \frac{(1+Inflation\ Rate_{\$})}{(1+Inflation\ Rate_{Rs})}$$

- Thus, if the current exchange rate is $0.013/Rupee, and the expected inflation rate is 10% in India and 1% in the US:

$$XRF_{\$,Rs}\ next\ year = \$0.013_{\$,Rs} \frac{(1.01)}{(1.10)} = \$0.0119$$

$$XRF_{\$,Rs}\ two\ years\ from\ now = \$0.013_{\$,Rs} \frac{1.01^2}{1.10^2} = \$0.0110$$

Put simply, the rupee will depreciate roughly 9% against the dollar in the next year.

An Example

Expected Inflation	6.00%	9.00%	0.50%
	$/Indian Rupee	$/Brazilian Reai	$ Swiss Franc
Current	0.0130	0.1900	1.0900
1	0.0125	0.1778	1.1063
2	0.0120	0.1664	1.1228
3	0.0116	0.1557	1.1395
4	0.0111	0.1457	1.1565
5	0.0107	0.1363	1.1738
6	0.0103	0.1276	1.1913
7	0.0099	0.1194	1.2091
8	0.0096	0.1117	1.2272
9	0.0092	0.1045	1.2455
10	0.0088	0.0978	1.2641

Assume that the expected inflation in the US $ = 2%