What I picked up during the course

EXC3670 Financial Markets and Institutions, BI Norwegian Business School

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I wanted to apply the theory from the course to real numbers and get some practical experience with it. Below are the formulas, with each country's actual data put into them.

Home currency is USD. Exchange rates are ECB reference rates from 6 October 2026, interest rates are 12-month government rates, and inflation is the change in consumer prices over the 12 months to August 2026. France and Germany both use the euro, so they share one row.

1. Direct and indirect quotes

$$\text{Direct quote} = \text{USD per 1 unit of foreign currency} \qquad \text{Indirect quote} = \frac{1}{\text{Direct quote}}$$

Country	USD per EUR ÷ currency per EUR	Direct (USD)	Indirect (per USD)
South Korea	1.1269 / 1,508.67	**0.000747**	1,338.78 KRW
Norway	1.1269 / 10.7780	**0.1046**	9.5643 NOK
United Kingdom	1.1269 / 0.8488	**1.3276**	0.7532 GBP
China	1.1269 / 7.5554	**0.1492**	6.7046 CNY
France / Germany	1.1269 / 1	**1.1269**	0.8874 EUR

2. Cost of borrowing in a foreign currency

$$\text{Cost} = (1 + r_{\text{foreign}}) \times \frac{S_{\text{end}}}{S_{\text{start}}} - 1$$

Problem 9.5 (Bankone): if the real goes to $0.325, the cost is 1.065 × 0.325 / 0.305 − 1 = 13.48%. If it goes to $0.285, the cost is −0.48%.

Real data: a company in each country borrowed dollars for one year, from September 2025 to September 2026, at the US 1-year rate of 3.66%. S is the home currency per USD.

Country	Calculation	Cost
South Korea	1.0366 × 1,358.37 / 1,393.07 − 1	**1.08%**
Norway	1.0366 × 9.3808 / 9.9471 − 1	**−2.24%**
United Kingdom	1.0366 × 0.7453 / 0.7406 − 1	**4.32%**
France / Germany	1.0366 × 0.8686 / 0.8524 − 1	**5.63%**
China	1.0366 × 6.7090 / 7.1245 − 1	**−2.39%**

What I noticed: The dollar fell against NOK and CNY, so Norwegian and Chinese borrowers actually paid less than nothing. European and British borrowers paid more than the 3.66% rate because the dollar rose against them.

3. Net foreign-exchange exposure

$$\text{Net exposure} = (\text{FX assets} - \text{FX liabilities}) + (\text{FX bought} - \text{FX sold})$$

Problem 9.13 (Citibank): (23 − 18) + (5 − 12) = −2 million. Citibank is net short, so it gains if foreign currencies fall.

Real data: I treated a country's dollar export income as an FX asset and its dollar import bills as an FX liability (goods trade 2025, USD billion). Only Korea, France and Germany publish which currency their trade is invoiced in, so the other countries are left out.

Country	USD income − USD bills	Net exposure	If USD rises 10%
South Korea	597.0 − 500.8	**+96.1 (long)**	+9.6
France (trade outside EU)	111.4 − 194.9	**−83.5 (short)**	−8.3
Germany (trade outside EU)	210.2 − 353.9	**−143.8 (short)**	−14.4

What I noticed: Korea earns more dollars than it spends, so a strong dollar helps. France and Germany are the opposite.

4. Fisher effect

$$i = IP + RFR \qquad \Rightarrow \qquad RFR = i - IP$$

I used actual inflation over the past 12 months, so this is the real rate looking back, not the expected one.

Country	Nominal rate − inflation	Real rate
United States	4.47% − 3.40%	**+1.07%**
South Korea	3.74% − 3.09%	**+0.65%**
Norway	4.80% − 3.29%	**+1.51%**
United Kingdom	4.41% − 3.10%	**+1.31%**
France / Germany	2.89% − 3.20%	**−0.31%**
China	1.22% − 0.80%	**+0.42%**

What I noticed: Norway has the highest rate both before and after inflation. The euro area is the only one where the real rate is negative.

5. Purchasing Power Parity

$$IP_{\text{US}} - IP_{\text{foreign}} = \frac{\Delta S}{S}$$

S = USD per 1 unit of foreign currency.

Country	PPP says (inflation gap)	What happened	Difference
South Korea	3.40% − 3.09% = +0.3%	**−0.9%**	−1.2%
Norway	3.40% − 3.29% = +0.1%	**+8.2%**	+8.1%
United Kingdom	3.40% − 3.10% = +0.3%	**+0.7%**	+0.4%
France / Germany	3.40% − 3.20% = +0.2%	**−0.3%**	−0.5%
China	3.40% − 0.80% = +2.6%	**+6.5%**	+3.9%

What happened = change in the monthly average exchange rate from August 2025 to August 2026.

What I noticed: PPP did not explain much over one year. Norway is the clearest case: inflation was almost the same as in the US, but the krone still rose +8.2% against the dollar.

6. Big Mac index

$$\text{Valuation} = \frac{\text{local price / exchange rate}}{\text{US price}} - 1$$

Country	Big Mac in dollars (US price $6.22)	Over / undervalued
South Korea	5,700.00 KRW / 1,485.90 = $3.84	**−38.3%**
Norway	78.00 NOK / 9.6857 = $8.05	**+29.5%**
United Kingdom	5.49 GBP / 0.7419 = $7.40	**+19.0%**
France / Germany	6.19 EUR / 0.8744 = $7.08	**+13.8%**
China	26.50 CNY / 6.7708 = $3.91	**−37.1%**

Prices from The Economist, July 2026.

What I noticed: A Big Mac in Norway costs about $8, the most in the group. In Korea and China it costs under $4.

7. Selling abroad at a fixed dollar price

$$\text{Home revenue} = \text{USD price} \times S$$

Textbook example (Toyota): at ¥80 per dollar the car brings in 23,000 × 80 = ¥1,840,000 instead of ¥2,070,000. To keep ¥2,070,000 the price must go up to 2,070,000 / 80 = $25,875.

Real data: the same idea for an exporter in each country, September 2025 to September 2026.

Country	Calculation	Revenue change	Price change needed
South Korea	1,358.37 / 1,393.07 − 1	**−2.5%**	+2.6%
Norway	9.3808 / 9.9471 − 1	**−5.7%**	+6.0%
United Kingdom	0.7453 / 0.7406 − 1	**+0.6%**	−0.6%
France / Germany	0.8686 / 0.8524 − 1	**+1.9%**	−1.9%
China	6.7090 / 7.1245 − 1	**−5.8%**	+6.2%

8. International Fisher Effect

$$E(S) = S \times \frac{1 + i_{\text{US}}}{1 + i_{\text{foreign}}}$$

Country	Calculation (S = USD per unit)	Expected change in 12 months
South Korea	0.000747 × 1.0447 / 1.0374 = 0.000752	**+0.71%**
Norway	0.1046 × 1.0447 / 1.0480 = 0.1042	**−0.32%**
United Kingdom	1.3276 × 1.0447 / 1.0441 = 1.3285	**+0.06%**
France / Germany	1.1269 × 1.0447 / 1.0289 = 1.1442	**+1.53%**
China	0.1492 × 1.0447 / 1.0122 = 0.1539	**+3.21%**

What I noticed: Norway is the only one with a higher rate than the US, so it is the only currency the theory expects to fall.

9. Covered Interest Rate Parity

$$F = S \times \frac{1 + i_{\text{US}}}{1 + i_{\text{foreign}}} \qquad \text{check}: \quad \frac{i_{\text{US}} - i_{\text{foreign}}}{1 + i_{\text{foreign}}} = \frac{F - S}{S}$$

Country	12-month forward	Check	Premium / discount
South Korea	0.000752	(4.47% − 3.74%) / 1.0374 = +0.71%	**+0.71%**
Norway	0.1042	(4.47% − 4.80%) / 1.0480 = −0.32%	**−0.32%**
United Kingdom	1.3285	(4.47% − 4.41%) / 1.0441 = +0.06%	**+0.06%**
France / Germany	1.1442	(4.47% − 2.89%) / 1.0289 = +1.53%	**+1.53%**
China	0.1539	(4.47% − 1.22%) / 1.0122 = +3.21%	**+3.21%**

What I noticed: Same numbers as the Fisher Effect, but a different idea: the forward price is enforced by arbitrage, while the expected rate is only a guess.

10. Covered interest arbitrage

Textbook example: the parity forward is 1.60 × 1.09 / 1.11 = 1.5712, but the market forward is 1.55, so the pound is too cheap in the forward market.

Step	Calculation	Result
1. Borrow £1,000,000 at 11%	1,000,000 × 1.11	**£1,110,000 to pay back**
2. Change to dollars	1,000,000 × 1.60	**$1,600,000**
3. Invest at 9%	1,600,000 × 1.09	**$1,744,000**
4. Buy the pounds forward	1,110,000 × 1.55	**$1,720,500**
5. Profit	1,744,000 − 1,720,500	**$23,500**

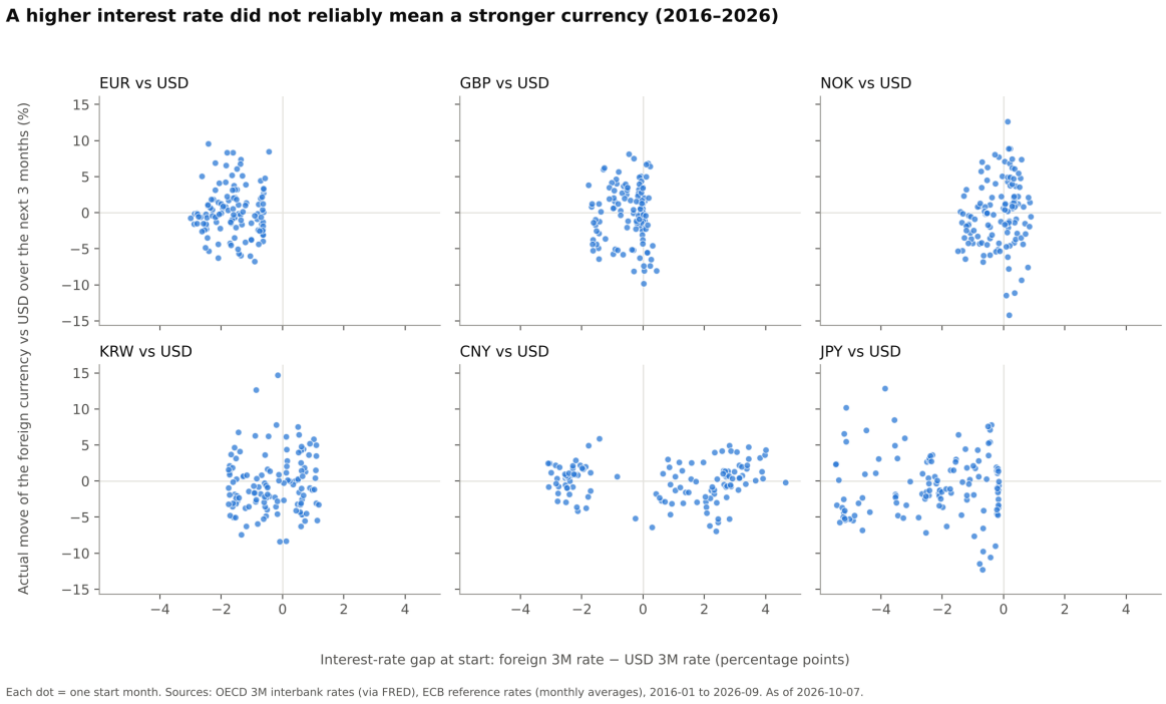
11. So why doesn't a high interest rate make a currency strong?

The theory gives two reasons. A high rate often just reflects high inflation, which pushes the currency down (Fisher effect, PPP). And if you hedge, the forward discount takes away the extra interest (CIRP).

I also checked this on the data: every month since January 2016, I compared the 3-month interest gap against the USD with what each currency did over the next 3 months (OECD 3-month rates and ECB exchange rates).

$$\text{Excess return} = (1 + i_{\text{foreign}})^{3/12} \times \frac{S_{t+3}}{S_t} - (1 + i_{\text{US}})^{3/12}$$

Currency	Avg rate gap vs USD	Higher-rate side did better than IFE	Avg gain per 3 months	Worst 3 months
Euro	−1.63 pp	**59%**	+0.24%	−9.0%
Pound	−0.46 pp	**42%**	−0.42%	−9.9%
Krone	−0.19 pp	**62%**	+0.71%	−14.2%
Won	−0.33 pp	**61%**	+0.61%	−14.8%
Yuan	+0.59 pp	**53%**	+0.32%	−6.4%
Yen (for comparison)	−2.26 pp	**63%**	+1.24%	−11.9%
All	−0.71 pp	**57%**	+0.46%	−14.8%



Each dot is one month: the rate gap on the x-axis, the currency's move over the next 3 months on the y-axis.

If the theory held exactly, the higher-rate side would win about half the time. In the data it won 57% of the time and earned +0.46% per 3 months on average, but the worst 3 months lost 14.8%. The yen is the clearest example: its rate was about 2.3 points below the dollar, so the theory says it should rise, yet holding dollars did better 63% of the time.

My takeaway: the theory explains why a high rate does not automatically mean a strong currency. In real data the theory holds on average, but with big swings, so the extra return from a high-rate currency is really a payment for taking that risk.

Sources and limits

Exchange rates: ECB. Interest rates: US Treasury (FRED), ECB euro-area AAA curve, Bank of England, Norges Bank, Bank of Korea, ChinaBond, OECD. Inflation: BLS, Eurostat, ONS, SSB, KOSTAT, NBS. Trade: UN Comtrade, Bank of Korea, Eurostat. Big Mac: The Economist. All workings are in FX_Data.xlsx.

Limits: government rates are not exactly the rates banks use for forwards; KRW and CNY have capital controls, so real forwards can differ; the PPP and Fisher checks use one year of actual data; countries without official data were left out rather than estimated. Not investment advice.