

W U T I S

PPP vs. FX

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Purchasing Power Parity (PPP)

- Comparing different countries' currencies through a "basket of goods" approach
- Two currencies are in equilibrium, when a basket of goods is priced the same in both countries, taking into account the exchange rates



Market exchange rates (FX)

- Reflect so many more influences than the direct price comparisons that are required to make volume comparisons
- Tend to be influenced by factors such as: government interventions, different interest rates, speculation trading and hedging

Theoretical background

Studies evidence that the “Law of one price” holds in the long run

“Law of one price”

- In the absence of friction between global markets, once prices are converted to a common currency, the same good should sell for the same price in different countries
- Achieved by eliminating price differences through arbitrage opportunities between markets

Studies evidence

- Real exchange rates tend toward purchasing power parity in the very long run
- However, the speed of convergence to PPP is extremely slow; deviations damp out at a rate of 15 percent per year





Purchasing power parity puzzle

How is it possible to reconcile the extremely high short-term volatility of real exchange rates with the glacial rate at which deviations from PPP seem to die out?

Theoretical background

From the purchasing power parity puzzle we derive trading strategies

Big Mac PPP

	388 ¥	=	103 ¥
	3.78 €		1 €

Actual FX

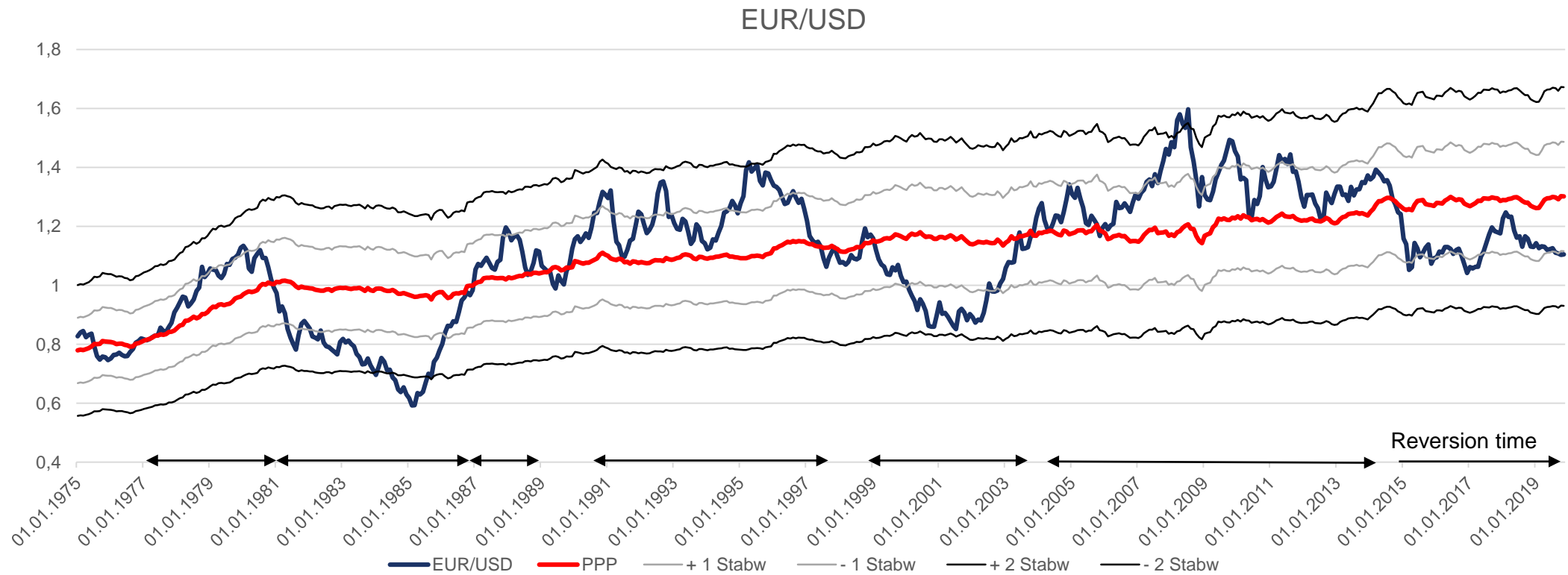
120 ¥
1 €

Big Mac PPP would suggest that the RMB is undervalued

FOREX Trading

- Forex traders use PPP to find potentially overvalued or undervalued currencies
- Investors who hold stocks or bonds of foreign companies may use PPP figures to predict the impact of FX rate fluctuations on a country's economy, and thus the impact on their investment

- Law of one price
- Mean reverting Exchange Rate around PPP



Data from Thomson Reuters

- USD/EURO Timeline till 2000, then German Mark
- USD/FX timeline to get to FX/EUR for every currency you want to plug into the model
- PPI for every country + Eurozone as base country and EUR as base currency
- Comparison between PPI FX and PPI Eurozone → PPP
- Indexing the PPP and shifting the curve up / down to minimize residuals
- Calculating how much the FX currency is over/undervalued in relation to the PPP difference

Criticism

Does the “Law of one price” actually hold?

Free trade problem

- **Tariffs** and other **trade barriers** influence the price in the country
- **VAT** and different **standards** in different countries

Law of one price does not hold

- How to put together **basket of goods** for different cultures
- The prices rely on **non tradable goods** like labour, rent. Which tend to be lower in poorer countries
- **Productivity difference** as developing countries tend to have lower productivity than developed countries

Influence of monetary and fiscal policy

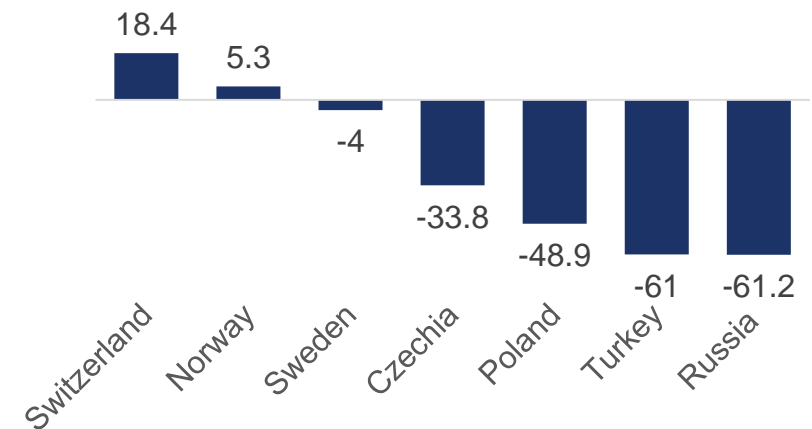
- Exchange rates are highly influence by **monetary shocks**, asset bubbles and **financial markets**
- Fiscal and monetary policy could have a long lasting effect

Other problems

- Simply **supply and demand** for the currency
- Economic stability, **political situation** and level of debt
- **Short time deviation** are high and volatile but mainly unpredictable
- **Capital movements** not covered

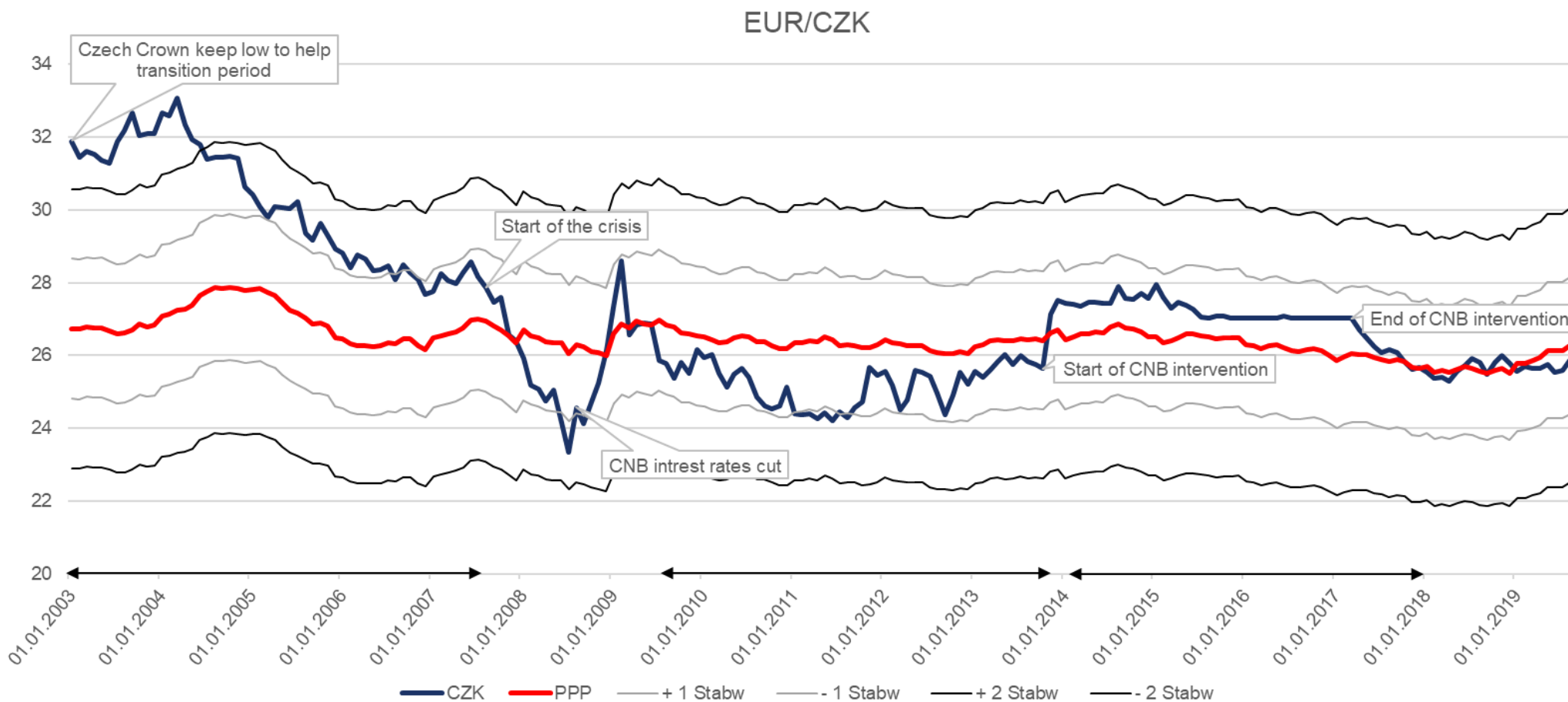
	France	Germany	Difference
Egg	3,65 €	1,94 €	▲ 47%
Rice	1,88 €	3,08 €	▼ -64%
Potato	1,79 €	0,89 €	▲ 50%
Tomato	3,39 €	1,89 €	▲ 44%
Flour	1,90 €	1,16 €	▲ 39%
Banana	1,83 €	0,95 €	▲ 48%
Apple	2,96 €	1,90 €	▲ 36%
Sugar	2,00 €	0,95 €	▲ 53%

Big Mac Index (%USD)



Criticism

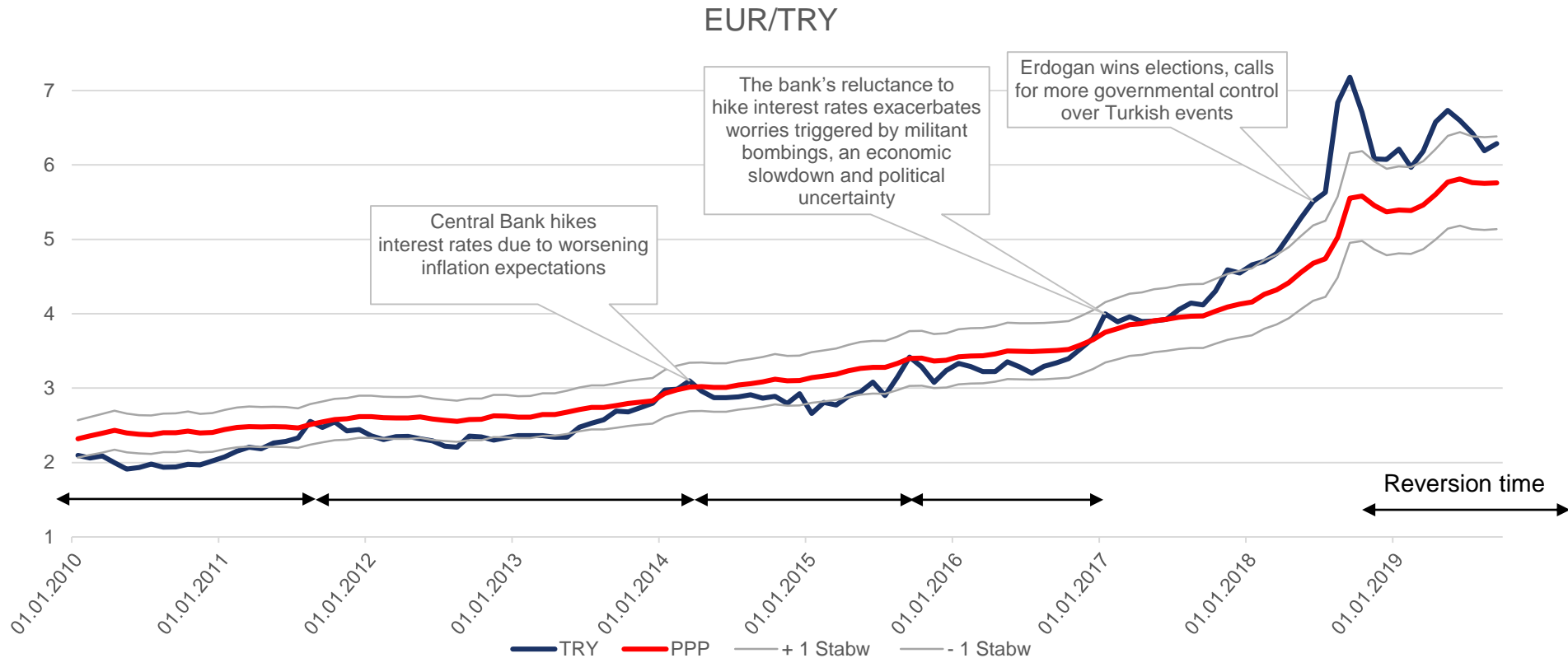
Development of Czech crown



Empirical findings & interesting facts

Taking a closer look at one of the best performers → ≈10% annual returns

- Shorter than average mean reverting cycles
- High inflation rates, high interest rates, low political stability



Empirical findings & interesting facts

Looking for trends: Inflation rate based decision making

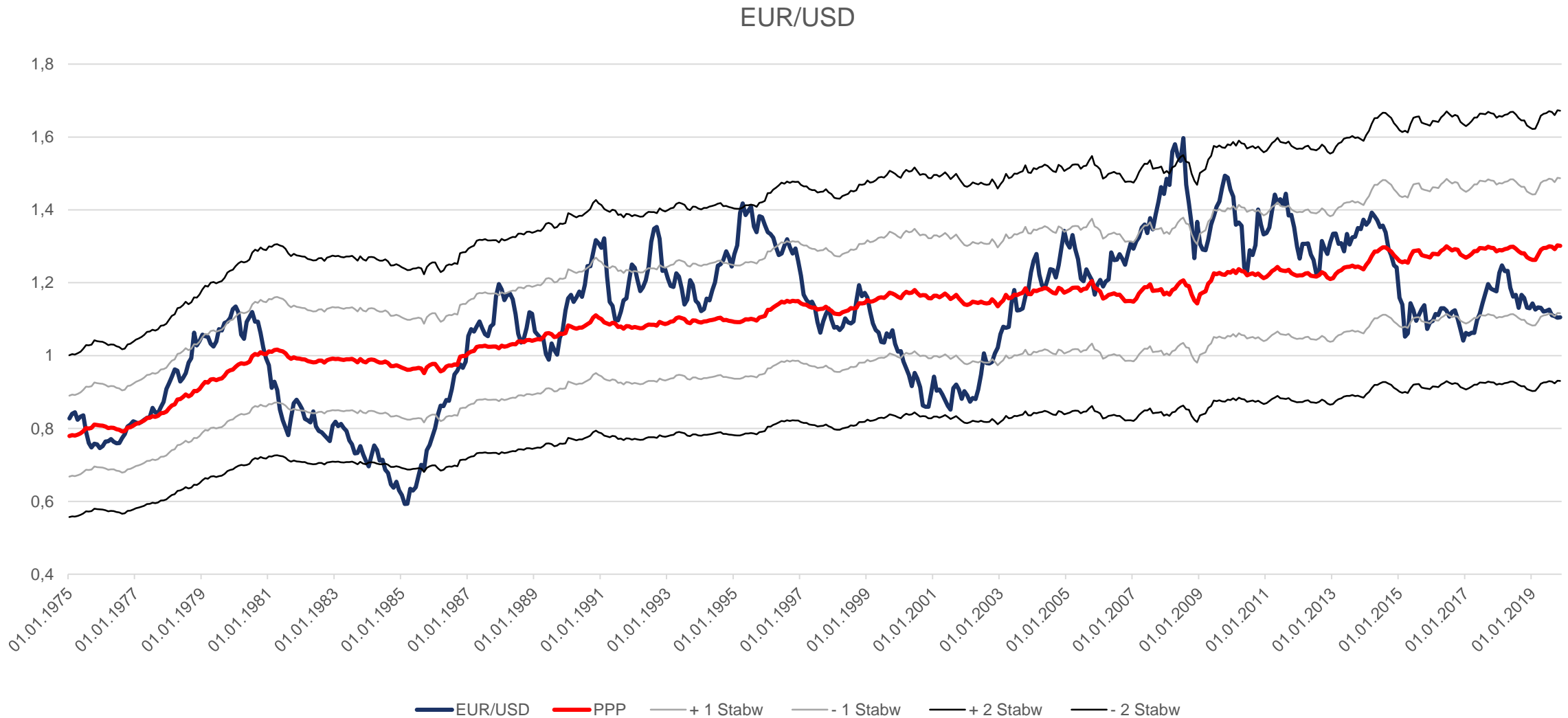
- Sample of 23 currency pairs
- 10 year time period
- Dependent variable – trading strategy returns
- Independent variables – 2009 inflation rate, 2009 interest rate, 2009 political stability index

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- 33% of changes in trading strategy returns can be explained by independent variables
 - Strong correlation of returns only with inflation rate

Inflation rate (%)	Average returns (%)	Sharpe ratio
> 9	7,34	0,57
> 6	4,26	0,38
> 3	3,36	0,36
> 0	2,74	0,30

Trading strategies (1/3)

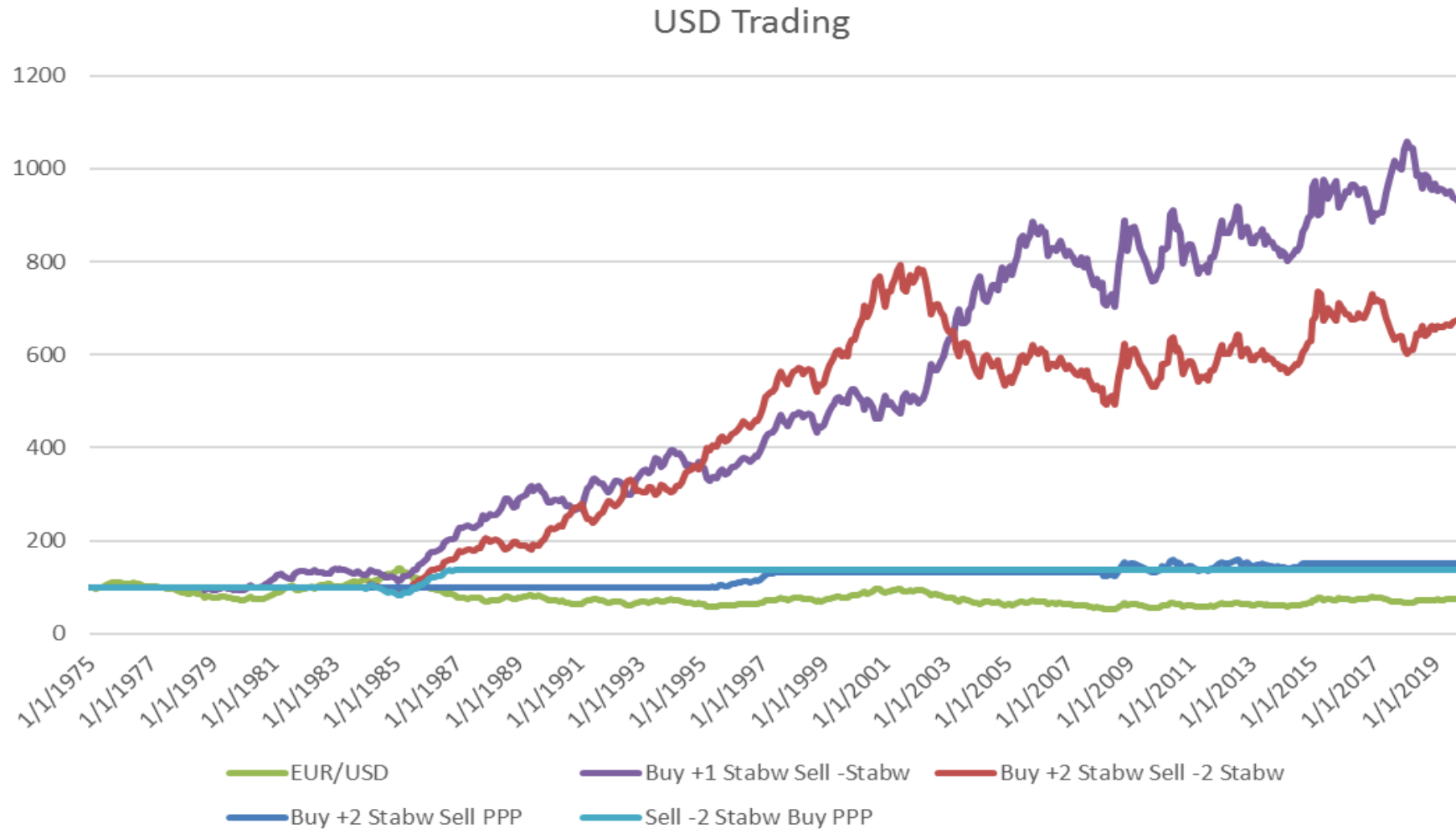
Hedging strategy according to 1 and 2 standard deviations



Past performance is no indication for future returns

Trading strategies (2/3)

Best performing strategy turns out to be buy/sell at +/-1 sd



Trading strategies (3/3)

For most of the 23 currencies, the strategies outperformed the currency itself

Currency	Fremdwahrung Long		Buy +1 Stabw Sell -1 Stabw		Buy +2 Stabw Sell - 2 Stabw		Buy +2 Stabw Sell PPP		Sell -2 Stabw Buy PPP	
	Stabw.	Return	Stabw.	Return	Stabw.	Return	Stabw.	Return	Stabw.	Return
USD	2.70%	-25.13%	2.66%	832.10%	2.49%	573.59%	1.27%	50.59%	0.84%	38.17%
BRL	5.46%	207.92%	5.26%	113.04%	4.83%	141.14%	2.76%	50.47%	0.00%	0.00%
CLP	3.20%	-4.83%	3.22%	38.69%	3.21%	-14.44%	1.27%	Ertrag	0.00%	0.00%
COP	3.59%	-21.87%	3.66%	32.27%	3.64%	-32.62%	1.51%	2.01%	0.00%	0.00%
CZK	1.52%	24.54%	1.54%	52.99%	1.54%	46.83%	0.63%	28.12%	0.00%	0.00%
HUF	2.10%	-21.55%	2.19%	135.27%	1.83%	71.25%	0.41%	0.51%	0.78%	14.00%
IDR	2.83%	-27.42%	2.85%	4.80%	2.83%	-24.89%	1.86%	1.14%	0.00%	0.00%
ILS	2.28%	48.88%	2.29%	46.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
KRW	2.82%	5.97%	2.81%	51.16%	2.48%	13.74%	1.25%	4.32%	0.00%	0.00%
MEX	3.38%	-14.15%	3.41%	34.73%	2.93%	48.14%	1.42%	4.67%	1.13%	20.35%
MYR	2.56%	-22.01%	2.59%	93.98%	2.32%	11.73%	1.34%	17.63%	0.00%	0.00%
PEN	2.59%	9.71%	2.59%	94.32%	2.61%	3.11%	0.67%	7.59%	0.00%	0.00%
PHP	2.83%	-18.40%	2.87%	102.85%	0.76%	5.35%	0.76%	5.35%	0.00%	0.00%
PLN	2.39%	-3.70%	2.46%	178.79%	2.47%	241.42%	1.20%	11.66%	1.09%	36.05%
RON	1.49%	-20.55%	1.62%	34.02%	1.62%	38.09%	0.91%	4.13%	0.96%	30.19%
RUB	3.88%	-62.14%	4.14%	-66.20%	4.14%	-66.20%	1.27%	-12.22%	0.00%	0.00%
THB	2.58%	50.66%	2.60%	46.94%	2.60%	57.88%	1.67%	24.52%	0.00%	0.00%
TRY	3.87%	-71.58%	4.20%	333.29%	2.19%	-19.88%	2.19%	-19.88%	0.00%	0.00%
NOK	1.86%	-15.58%	1.87%	150.54%	1.88%	27.05%	1.15%	48.68%	0.00%	0.00%
JPY	3.28%	4.82%	3.26%	31.27%	2.82%	96.54%	1.12%	37.23%	1.28%	24.61%
SEK	1.80%	-13.63%	1.82%	58.78%	1.65%	61.28%	0.81%	4.46%	0.73%	27.15%
CHF	1.71%	51.89%	1.41%	25.63%	1.40%	28.03%	0.73%	25.41%	0.92%	-12.70%
CAD	1.80%	35.55%	1.77%	101.64%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Conclusion

Past performance is no indication for future returns

- It can be stated that indeed the model shows mean reversion around the PPP for currencies
→ the average mean in this model was roughly 25 months
- This also shows that the Law of one price can be drawn from this studies, however, other factors influence the exchange rate as well
- These other factors may be the reason why the mean reversion takes so long / the exchange rate is not exactly matching with the PPP

