

Lesson XI: Overview

1. FX market efficiency
2. The art of foreign exchange rate forecasting



FX market efficiency



Terminology I



K markets are said to be *efficient* whenever their *prices* ***fully reflect*** all the ***available information***



- What is “**available information**”?
- What does “**fully reflect**” mean?

Terminology II

What is “available information”?

“Efficiency” can take on different meanings,
depending on what is included in the (broad)
concept of “available information””



- **Weak-form efficiency**: the information set only includes historical prices/returns on a given asset
- **Semi strong-form efficiency**: the available information includes all publicly known data
- **Strong-form efficiency**: prices are formed based both on public and private (insider) information

Terminology III

What does “fully reflect mean”?

This term basically implies that market efficiency is an equilibrium situation, such that prices completely incorporate all the available information.



Major implication I

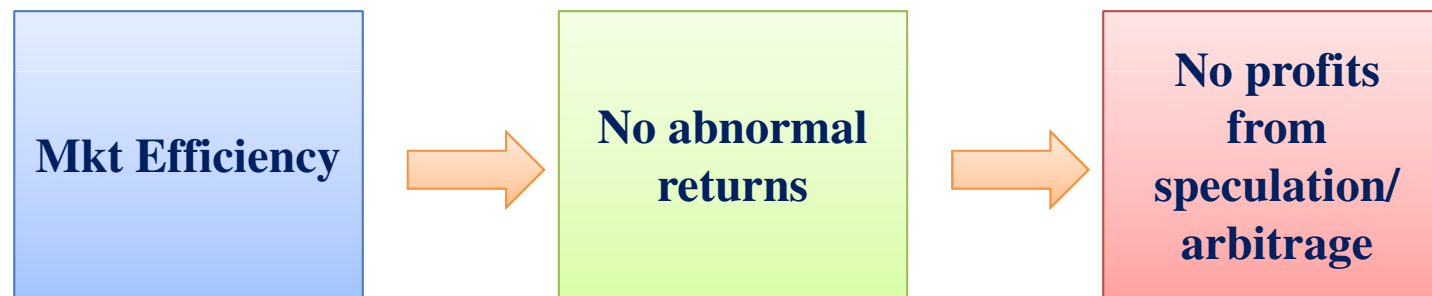


If markets are truly *efficient*, then no **abnormal returns** can be earned based on the knowledge of some available information



Abnormal return = Actual return - Return
that would be **expected** if market prices reflected all the available information

Major implication II



How to test for mkt efficiency? I

**Mkt Efficiency =
Equilibrium condition...**



**...such that prices reflect all the available
information...**



...and Abnormal returns =0

How to test for mkt efficiency? II

In more mathematical terms...

Market Equilibrium Prices = f (Available Information Set)

and

Established Market Prices = f (Equilibrium Expected Values)



Practically, however, it is very difficult to carry out a statistical test, based on system of hp above (e.g. how to be sure we are using the right equilibrium model? How to test whether prices “conform” to their equilibrium expected values?)

How to test for mkt efficiency? III

Most empirical studies deal with market efficiency by testing the availability of abnormal risk-adjusted profit opportunities.

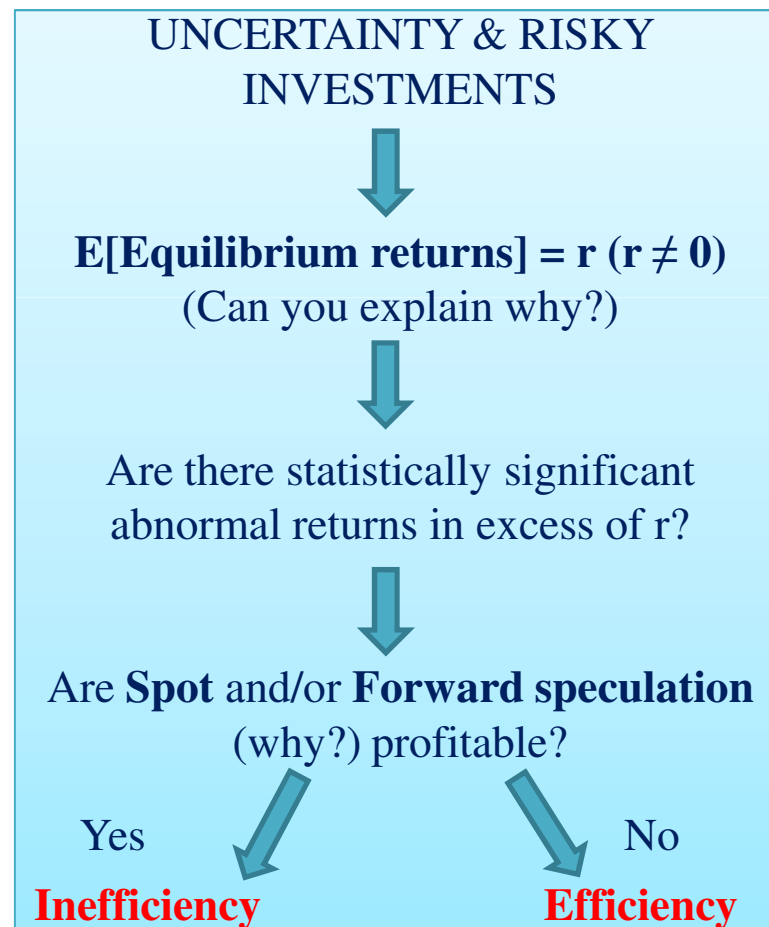
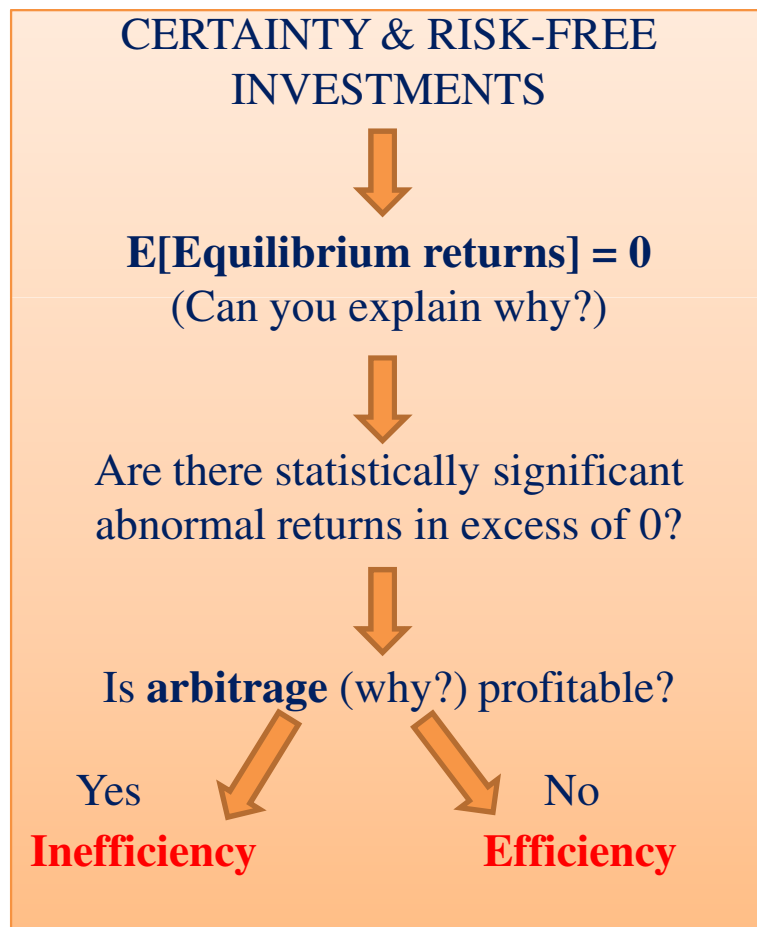


Existence of Statistically Significant
Abnormal Returns = Market Inefficiency



How to test for mkt efficiency? IV

The existence of statistically significant **risk-adjusted abnormal returns** is tested in a **twofold environment**.



Certainty and Rf Investments

Mkt efficiency in the case of certainty and risk-free investments is mainly tested based on covered interest arbitrage



Most of the deviations from parity seem to be due to transaction costs, political risk, taxes...



Profit opportunities are more **apparent** than real



Markets are very likely to be efficient

Uncertainty and Risky Investments

Mkt efficiency in the case of uncertainty and risky investments is tested both for **spot and fwd speculation**



Even after adjusting for transaction costs, speculation seems to result in **significant profits**



Markets are very likely to be inefficient

Spot speculation

Tests for mkt efficiency try to compute the profitability of various **technical trading strategies**



Technical analysis: trading approach that tries to forecast an economic variable based on the **pattern of its past values** → technical analysis assumes a certain level of **persistence** (i.e. $\rho(\Delta \text{Var}_t; \Delta \text{Var}_{t+1}) > 0$) in exchange rate movements

Watch out



Efficient mkts **do not** preclude the existence of price patterns!



Efficient mkts simply **do not** allow to exploit any knowledge of such patterns to earn abnormal profits



- **Filter rule**: once you have defined the filter size “f”, the trading strategy works as follows:

Buy Signal

$$S(t) > (1+f) \cdot S(\text{Min})$$

with $S(\text{Min})$ = most recent trough price

Sell Signal

$$S(t) < (1-f) \cdot S(\text{Max})$$

with $S(\text{Max})$ = most recent peak price

- **MA rule**: the rule is based on the definition of a short term and of a long term MA, so that:

Buy Signal

$$MA(S, t) > MA(L, t)$$

with $MA(S,t)$ = short term MA at time t and
 $MA(L,t)$ = long term MA at time t

Sell Signal

$$MA(S, t) < MA(L, t)$$

Filter and MA Rules I



Source: Bloomberg, 18th January, 2013

Filter and MA Rules II



Source: Bloomberg, 25th January, 2013

Why should technical trading strategies be profitable?

- **Exchange rates** may **not** be **random** → they could follow non-linear behaviours
- **Central Bank interventions** can create **predictable patterns** in FX rates, that would otherwise be efficient;
- Trading **profits** may be **Non-Normally distributed**, so that the duration of profitable positions exceeds the duration of non-profitable positions;

Mixed Evidence

The empirical evidence on technical analysis's profitability is much more **controversial** than it seems...



Some studies tend to support the claim that technical trading rules are profitable...



However...

Schulmeister (2005) examined the profitability of several technical trading strategies over 3 decades (from 1973 to 1999 and out-of-sample from 2000 to 2004)...

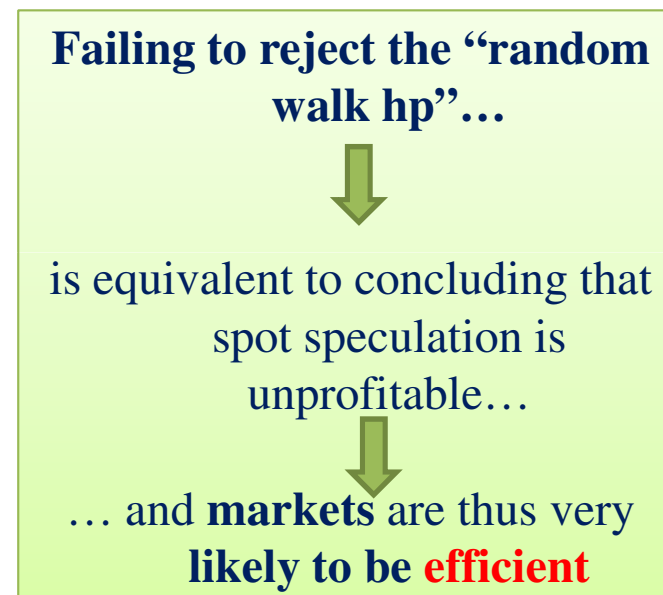


Watch out

- For each strategy, the **number of profitable trades** is **lower** than the number of **unprofitable** trades;
- **Avg daily return** (profitable positions) < **Avg daily loss** (unprofitable positions);
- **Profitable positions last 3/5 times more** than **unprofitable** positions → profitability of technical trading rules = f (persistence in FX trends);
- The **profitability** of technical trading strategies has been significantly **lower** since the late '80s

Technical traders vs econometricians

Do FX rates trend or follow a random walk behaviour?



As expected, there are **no** easy conclusions to be drawn!



Forward speculation I

Tests of fwd mkt efficiency focus on the relationship among $F_{t,n}$, $E[S_{t+n}|I]$ and S_{t+n}



Under the general efficiency hp, it must be that:

$$E[S_{t+n}|I] = S_{t+n} \rightarrow \text{Rational Expectations}$$

and

$$F_{t,n} = E[S_{t+n}|I] + \text{RP}_{t,n} \rightarrow \text{Forward Rate Pricing}$$

Risk Premium

Forward speculation II

As already shown, the Forward rate is a **biased** predictor of the future Spot rate, at least in the short run.






If we can outperform the forward contract, the efficiency hypothesis is automatically rejected



To sum up

The **evidence** on mkt efficiency is **mixed** at best:

| Certainty and Risk-free Investments | Uncertainty and Risky Investments |
|--|--|
| <p>The empirical evidence supports efficiency</p>  | <p><u>Spot speculation:</u> The empirical evidence is substantially mixed</p>  <p><u>Forward speculation:</u> The empirical evidence largely supports inefficiency</p>  |

The art of foreign exchange rate forecasting



Mkt Efficiency & FX Forecasting I



Mkt Efficiency & FX Forecasting II

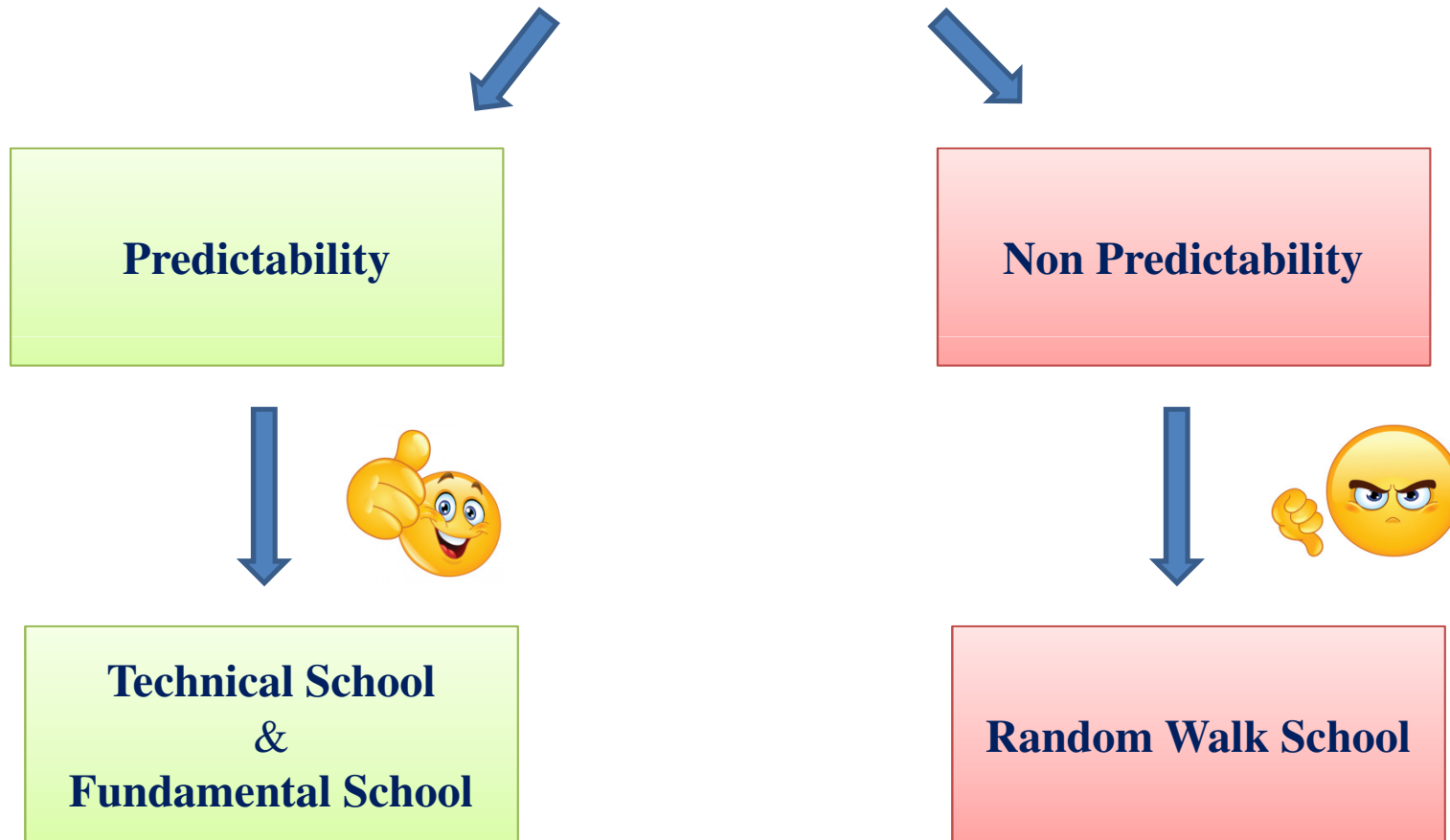
The fact that mkt prices evolve according to predictable patterns does **not** imply mkt inefficiency in and of itself.



Indeed, mkts are said to be inefficient **if** the **knowledge of such patterns leaves some room for profitable trading strategies.**

Are FX rates predictable?

Co-existence of two clashing views



Those in favour...

- **Technical school**: exchange rates do follow predictable patterns in the **short run**
- **Fundamental school**: exchange rates do follow predictable patterns in the **long run**



Why is FX forecasting doable (and possibly profitable)?

- All you have to do is to **get the right direction**: accuracy is not an issue;
- FX mkt movements are likely to be predictable because of **gvt interventions, overshooting...**

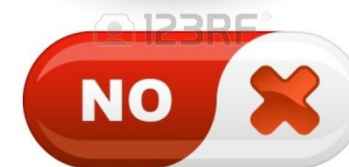
Those all against...I

- **Random walk school**: FX rates cannot be forecast



Why is FX forecasting so difficult?

- **Which model to use?** Which macroeconomic variables to include?
- **Which specification to use?**
- How much **past data**?
- What about **out-of-sample validity**?



Those all against...II

- **“Economists do not yet understand the determinants of short-to-medium run movements in exchange rates. Neither models of exchange rates based on macroeconomic fundamentals nor the forecasts of market participants as embodied in the forward rate or survey data can explain exchange rate movements better than a naïve alternative such as a random walk model”** (R. Meese, 1990)
- **“It is now widely accepted that standard observable macroeconomic variables are not capable of explaining, much less predicting ex ante, the majority of short-term changes in the exchange rate”**
(J. Frankel and K. Froot, 1990)

Watch out



When forecasting exchange rates, you cannot help take into consideration:

- 1. Exchange Rate System:** Pegged, Floating, Hybrid...;
- 2. Forecast Horizon:** ST, MT, LT...;
- 3. Foreign Exchange Unit:** Nominal/Real rates...

Terminology



Pegged Exchange Rate (or Fixed Exchange Rate): rate set by monetary authorities at selected, official levels



Exchange Rate regime

- *Pegged rate regime*: irreversible deviations from the parity value are very likely to be identified → models may help predict the magnitude and the direction of the change in the parity value (timing is a political decision, although mkt speculation –and self-fulfilling prophecies- can speed it up)
- *Floating rate regime*: profitable forecasting depends exclusively on the lack of efficiency

The Argentine Crisis 2000-2002 I

- 1st April 1991= the Peso was officially pegged to the USD @ 1 peso = 1 USD
- **Necessary conditions** for the success of fixed exchange rate regimes:
 1. The **domestic currency** must be **freely convertible** into the anchor currency
 2. The **conversion rate** must be **clearly fixed**
 3. The domestic currency must be **fully backed** with hard currency

The Argentine Crisis 2000-2002 II

- Argentina mainly lacked the 3rd condition: excess of money creation over the backing: **“FIDUCIARY ISSUE”**
- Large fiscal deficits + the continuous strengthening of the USD made the situation even worse
- The stronger the dollar became, the weaker became the Argentine economy → K started to leave massively the country and it gradually became clear that the CB was running short of reserves → the peg was abandoned on 1st January 2002



Forecast Horizon

- **Short term forecasting:** major focus on technical models and on mkt reactions to macroeconomic releases
- **Long term forecasting:** greater reliance on macroeconomic fundamentals
- **Mid term forecasting:** several “special approaches” available → e.g. OTM options



Option pricing and Forecasting I

Consider a target zone with limits \underline{S} and \bar{S}



If the target zone is fully credible, realizations such as $S > \bar{S}$ or $S < \underline{S}$ are **ruled out**.



Calls whose strike price $(K) > \bar{S}$ and put with strike $< \underline{S}$ should be worthless (**OUT of the MONEY**)

Option pricing and Forecasting II

The **more expensive** these options become, the **likelier** becomes the possibility of **extreme occurrences** outside the target zone



FX rate Forecasting: To sum up I

| Short run | Medium run | Long run |
|---|--|---|
| <ul style="list-style-type: none">• Technical Trading Models• FX responses to Macro news | <ul style="list-style-type: none">• Technical Trading Models• OTM options | <ul style="list-style-type: none">• Models based on macro fundamentals• Mean reverting behaviours (real exchange rate) |

FX rate Forecasting: To sum up II

The available empirical findings show that some models have performed well at gauging the direction/magnitude of FX movements over specific time horizons (= the empirical evidence seems to favour FX forecasting).



- **Will these models hold out of sample** (namely outside the period used to fit the models to the data)?
- **There is no available universal model yet → only useful empirical findings**

To put it into practice

- Are mkt efficiency, forecasting and speculation somehow related? Please explain.
- How would you describe “technical” forecasting?
- Concerning exchange rate forecasting, _____ involves the use of historical exchange rate data to estimate future values, while ignoring the economic determinants of exchange rate movements.
 - a. Econometric analysis
 - b. Judgmental analysis
 - c. Technical analysis
 - d. Sunspot analysis

