Lesson XI: Market Efficiency and FX Forecasting

May 11, 2016

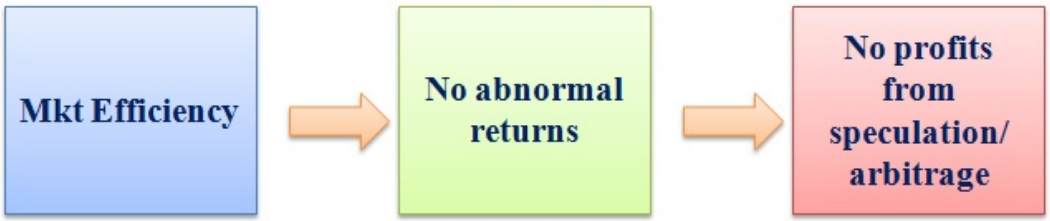
LIUC
Università Cattaneo

Table of Contents

Getting Started

Market efficiency is an **equilibrium condition**, such that prices **reflect all the available information** and **no abnormal returns** can thus be earned based on the knowledge of that information.

In Simpler Terms...



How to Test for Efficiency?

Even though the concept of efficiency is relatively easy to grasp, its practical testable implications are definitely **far from clear-cut**:

- How to model "market equilibrium"?
- How to be sure we are using the right equilibrium model?
- How to model the fact that market prices incorporate all the available information?
- How to test whether prices "conform" to their equilibrium expected values?

The Commonly-Adopted Testing Framework

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

$$\Downarrow$$

Existence of **Statistically Significant Abnormal Returns = Market Inefficiency**

A Deeper Insight into Abnormal Returns

The quantitative definition of **Abnormal Returns** varies depending on whether we are dealing with a **risky/riskless** investment environment. In practice:

CERTAINTY & RISK-FREE INVESTMENTS

E[Equilibrium returns] = 0

Are there statistically significant abnormal returns in excess of 0?
Is **arbitrage** profitable?

- If **Yes** = **Inefficiency**
- If **No**=**Efficiency**

UNCERTAINTY & RISKY INVESTMENTS

E[Equilibrium returns] = r ($r \neq 0$)

Are there statistically significant abnormal returns in excess of r?
Are **Spot/Fwd speculation** profitable?

- If **Yes** = **Inefficiency**
- If **No**=**Efficiency**

Incidentally...

- Would you be able to explain why, under certainty, E[Equilibrium returns]=0?
- Would you be able to explain why we refer to arbitrage and speculation?

Market Efficiency under Certainty

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

$\Downarrow$

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

$\Downarrow$

Profit opportunities are more apparent than real

$\Downarrow$

Markets are very likely to be efficient

Market Efficiency under Uncertainty

Mkt efficiency in the case of uncertainty and risky investments is tested both with respect to spot and fwd speculation

$\Downarrow$

Even after adjusting for transaction costs, speculation seems to result into statistically significant profits

$\Downarrow$

Markets are very likely to be at least in part inefficient

Spot Speculation and Technical Analysis

In order to **assess the profitability of spot speculation** within the scope of efficiency testing, major attention has been paid to technical trading strategies.

$\Downarrow$

Watch out: Efficient mkts do not preclude the existence of price patterns! They simply do not allow to exploit any knowledge of such patterns to earn abnormal profits

Technical Trading Examples: the Filter Rule

Filter Rule: once you have defined the filter size f, the trading strategy works as follows:

- Assuming S(Min)= most recent trough price, **Buy Signal**:

$$S(t) > (1 + f)S(Min)$$

- Assuming S(Max)= most recent peak price, **Sell Signal**:

$$S(t) < (1 - f)S(Max)$$

The Filter Rule in Practice

If you were a **chartist** (i.e. a trader adopting technical analysis principles), would you be able to spot potential trading opportunities based on the chart here below?

Source: Bloomberg, 18th January, 2013

Technical Trading Examples: the MA Rule

MA: the rule is based on the definition of a short term (MA(S,t)) and of a long term MA (MA(L,t)), so that

- **Buy Signal**

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

- **Sell Signal**

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

The MA Rule in Practice

If you were a **chartist** (i.e. a trader adopting technical analysis principles), would you be able to spot potential trading opportunities based on the chart here below?

Source: Bloomberg, 25th January, 2013

Is Technical Trading Profitable? The Empirical Evidence

The **empirical evidence on the profitability of technical trading is largely controversial**: the most recent studies, however, tend to support the claim that profit opportunities are more apparent than real. Schulmeister (2005), for instance, examined the profitability of several technical trading strategies over 3 decades (from 1973 to 1999 and out-of-sample from 2000 to 2004) and found out that:

- 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 to 5 times more than unprofitable positions;
- The profitability of technical trading strategies has been significantly lower for the late 30 years.

To sum up

The empirical evidence for spot speculation tends to rule out the possibility of earning (statistically significant) abnormal returns on a persistent basis, however...

Fwd Speculation and Profitability Assessment

Tests of mkt efficiency based on fwd speculation focus on the relationship among $F_{t,n}$, $E[S_{t+n}|I]$ and S_{t+n}. More precisely, under the general efficiency hp, it must be that:

- **Rational Expectations**

$$E[S_{t+n}|I] = S_{t+n}$$

- **Forward Rate Pricing**

$$F_{t,n} = E[S_{t+n}|I] + RiskPremium_{t,n}$$

In practice, this amounts to saying that, if $F_{t,n}$ is an **unbiased** predictor of S_{t+n}, no statistically significant profits can be realized on the market, thus supporting efficiency.

Is Fwd Speculation Profitable? The Empirical Evidence

Based on the available empirical evidence, the Forward rate is very likely to be a **biased** predictor of the future Spot rate, at least in the short run.

$$\Downarrow$$

Notice, however, that, if we can **outperform the forward contract**, the **efficiency hp is automatically rejected**

A Wrap Up

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

Certainty and Risk-free Investments	**Uncertainty and Risky Investments**
The empirical evidence supports **efficiency** 	*Spot speculation*: The empirical evidence is substantially **mixed**  *Forward speculation*: The empirical evidence largely supports **inefficiency** 

In Search of a New Testing Framework

Such a mixed evidence is likely to depend (at least to some extent) on the adopted testing frameworks; a few weaknesses, in particular, may have biased the final outcomes:

- The first avaialble studies on efficiency are based on low-frequency datasets (daily, weekly...): what if inefficiency were a purely short-term phoenomenon?
- Many researchers have adopted unrealistic equilibrium models (prices following pure random walks, no bid-ask prices, no transaction costs...)
- What about *side information* (market volatility, market abuse and price manipulation techniques at work...)?

Watch out

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

$$\Downarrow$$

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

The Art of FX Forecasting...

FX forecasting can be based on different approaches: the most popular *forecasting schools* rely either on Technical Trading or on Fundamental Analysis.

- **Technical school**: exchange rates do follow predictable patterns in the short run
- **Fundamental school**: exchange rates do follow predictable patterns in the long run that can be forecast based on macroeconomic variables

Notice, however, that independently of the adopted theoretical approach, FX forecasting largely depends of 3 major factors:

- Exchange Rate System (pegged, floating...)
- Forecast Horizon
- Foreign Exchange Unit (nominal or real rates...)

Forecasting based on FX Regime

Pegged rate regime: irreversible deviations from the parity value are **very likely to be identified**

$\Downarrow$

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)

A Practical Example: Argentina

1^{st} April 1991: **the Peso was officially pegged to the USD** (1 peso = 1 USD) **Necessary conditions** for the success of fixed exchange rate regimes:

- The domestic currency must be **freely convertible** into the anchor currency
- The conversion rate must be **clearly fixed**
- The domestic currency must be **fully backed** with hard currency

A Practical Example: Argentina - cont'd

- Argentina mainly lacked the 3^{rd} 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 1^{st} January 2002

Forecasting and the Time Horizon

- **Short Term Forecasting**:major focus on technical models and on mkt reactions to macroeconomic releases
- **Medium Term Forecasting**: *special approaches*, maily based on currency options
- **Long Term Forecasting**: greater reliance on macroeconomic fundamentals

Options and Medium Term Forecasting

Consider a target zone with limits S_{low} and S^{high}: if the target zone is **fully credible**, realizations such as S$> S^{high}$ or S$< S_{low}$ are automatically **ruled out**.

$\Downarrow$

Calls whose strike price $> S^{high}$ and put with strike $< S_{low}$ should be worthless (**OUT of the MONEY**)

$\Downarrow$

What if this is not the case?

Market Efficiency

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?

What is "available information"?

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

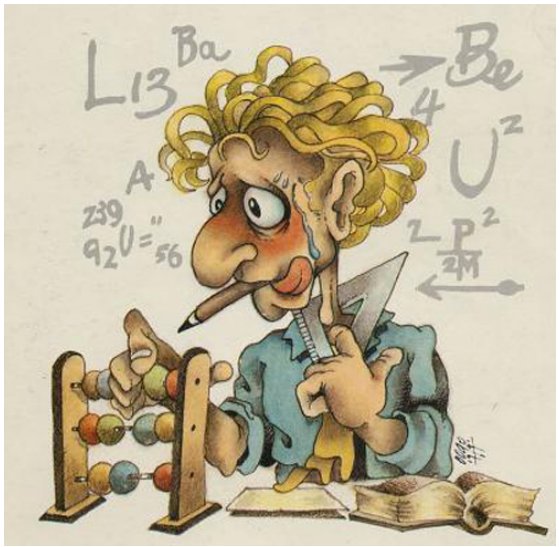
- **Weak efficiency**: the information set only includes historical prices/returns on a given asset
- **Semi-strong efficiency**: the available information includes all publicly known data
- **Strong efficiency**: prices are formed based both on public and private (insider) information

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.

Abnormal Returns

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



Technical Analysis

Trading approach that tries to forecast an economic variable based on the **pattern of its past values**

$\Downarrow$

Technical analysis assumes a certain level of **persistence** in exchange rate movements

Moving Average

Mean of time series data (observations are assumed to be equally spaced in time) from several consecutive periods. Called *moving* because it is continually recomputed as new data becomes available, it progresses by dropping the earliest value and adding the latest value.
Source: The Business Dictionary

To Put It into Practice I

- Are market 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.
  1. Econometric analysis
  2. Judgemental analysis
  3. Technical analysis
  4. Fundamental analysis