

## Handout 2: The Foreign Exchange Market<sup>1</sup>

### 1 Financial Instruments in the FOREX markets

- Forward contracts

Large, non standardized amounts, 1,3,6,12 months

- Futures

Tradeable standardized contracts, smaller amounts, specific maturity dates

Margin requirement

- Swaps

Interest swaps; FX swaps; Currency swaps

- Options

Put; Call

Striking (exercise) price; Option prices (premia)

Out/ in/ at the money

#### 1.1 A comparison of derivatives

Flexibility (obligation vs right)

Default (credit) risk. Riskiness:

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<sup>1</sup> The FOREX is the most active market among financial markets: Spot (rate for current transactions) vs forward (rate agreed upon today for future transactions)

Forwards > swaps > futures

## 1.2 Financial engineering

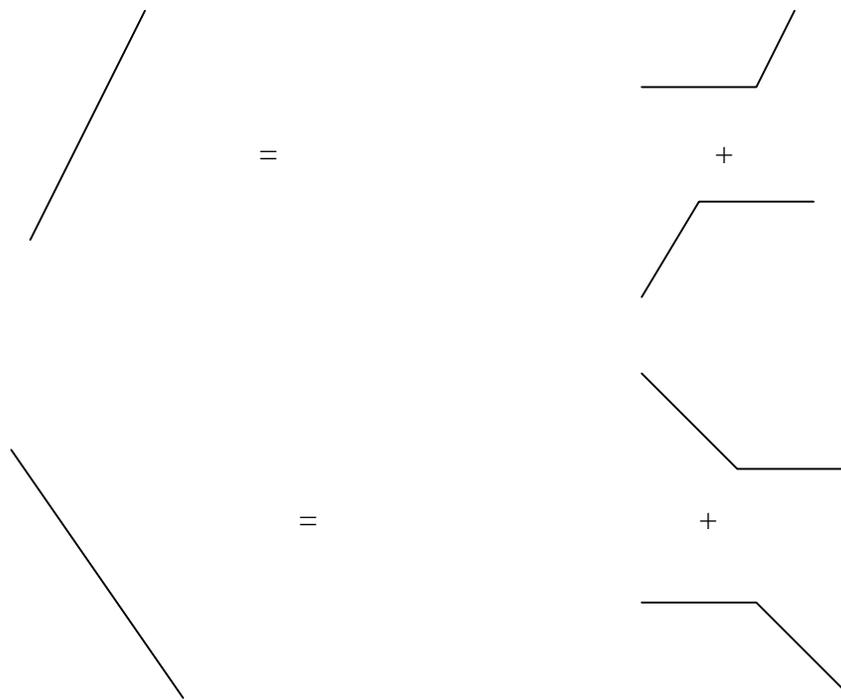
All derivatives can be reduced into some other derivative.

Swaps and futures are simply portfolios of forward contracts!

Options can be replicated by combining forwards (or swaps or futures) and risk free securities

Put-call parity (calls and puts can be combined to become forwards)

### Payoff profiles



Forwards/Futures/Swaps

Options

## 2 On the efficiency of FOREX markets

Covered interest rate parity holds well

$$\text{CIRP: } i(t) - i^*(t) = f(t) - s(t)$$

There is no possibility of making risk free profits

**Tests of market efficiency center on *uncovered* interest rate parity**

**Alternative 1:**

$$er = i^*(t) - i(t) + [s(t+1) - s(t)] = s(t+1) - f(t)$$

Calculate *excess returns* (profits) *-er-* on foreign exchange:

*Predicted* excess returns:

$$per = Es(t+1) - f(t)$$

Regress *per* on currently known variables (such as past *er*)

Are FX profits predictable? If yes, what does this mean for efficiency?

**Alternative 2 (see Froot and Thaler (1990):**

$$s(t+1) - s(t) = a + b[i(t) - i^*(t)] + u(t)$$

or

$$s(t+1) - s(t) = a + b[f(t) - et] + u(t)$$

Test hypothesis:  $a = 0$  ;  $b = 1$

Many estimates of  $b$  exist in the literature. The average value across these studies:

$$b = -0.88 (!)$$

Enjoy –on average- higher interest rates and get capital gains too! Why should one bother to hold currencies like the CHF or the Yen which offer bear such low interest rates?

Answer: *Foolishness, incompetence or risk* (see proceeding section).

### 3 Possible explanations for the failure of the hypothesis

$$i^*(t) - i(t) = s(t) - f(t) = s(t) - E_t s(t+1) + E_t s(t+1) - f(t)$$

Expected depreciation + risk premium

- Existence of a (time-varying) risk premium
- Systematic expectational errors

*An example:*

Risk premium  $f(t) = E_t s(t+1) - c$

Systematic expectational errors  $s(t+1) = E_t s(t+1) + a + u(t+1)$

#### 3.1 Risk premia

People may on average form an accurate expectation of the future exchange rate

They, however, may not use the expected value as the price for future transactions.

They may adjust for risk

Analogy to insurance premia under risk aversion. A risk averse individual will accept

less than the expected value of a gamble.

It is not sufficient to postulate that the existence of excess returns is due to risk aversion and risk premia

One must be able to relate the predictable components of  $e(t+1) - f(t)$  to the economic determinants of risk premia

$e(t+1) - f(t) \leftarrow$  risk aversion, structures of returns (conditional variance, variability of consumption)...

Many different types of models (partial and general equilibrium) have been used to derive the determinants of the risk premium

*Problem: The Fama result*

$$b < \frac{1}{2} \text{ implies } \text{Var}(per) > \text{Var}[E_t s(t+1) - s(t)]$$

No economic model of the risk premium has been able to generate the required variability in predicted excess returns. That is, the determinants of the RP do not vary sufficiently

### 3.2 Systematic expectational errors

- Irrational systematic expectational errors

Expectations are not directly observable

Use survey data in place of expectations. They indicate systematic misses.

Should survey data be taken seriously?

- Rational systematic expectational errors

Learning

Peso problem

- Technical analysis

Have the various trading rules proved profitable?

Review of trading rules (filters, MA...)

The difference between ex ante and ex post profitability

**Overall conclusion:** Judging the efficiency of the FOREX market is a subjective matter