Chapter 4: Marked efficiency - part 1

Exercises

1. In September 1998 the investment banking and securities firm Goldman, Sachs & Company cancelled its plan to go public, i.e. to offer shares to the public. The decision was made after a sharp drop of 25% in the results over the third quarter. Goldman's co-chairman and chief executive Henry M. Paulson Jr. said to the New York Times: "With the volatility we have, the falling valuations (of other investment banks) and uncertainty of earnings going forward, I can't imagine that we would advise a client that this is a good time to go public for a financial service company". What does the EMH say about Goldman's decision to cancel the stock issue because of falling valuations?

2. What does the EMH imply about the Net Present Value (NPV) of the purchase or sale of a security on an efficient market?

3. Suppose that the stock prices of a fertilizer producer move in the same cycles as the fertilizing seasons, high in spring and summer, low in fall and winter. Explain how trading will eliminate the cyclical pattern.

4. It is sometimes argued that markets cannot be efficient because only a small proportion of investors follow the information on a stock and an even smaller proportion actively trade in a stock on a day or in a week. Is this argument correct?

5. Keim and Stambaugh [1] investigate the pattern of stock returns over days of the week, specifically the 'weekend effect'. They use time series of daily returns of the Standard and Poor's Composite stock price index over the period 1953-1982. They report the following mean returns and their t-statistics:

	Monday	Tuesday	Wednesday	Thursday	Friday	All days
mean	-0.154	0.026	0.103	0.036	0.092	0.025
t-statistic	-6.53*	1.30	5.08*	1.99*	5.10*	2.82*

* means significantly $\neq 0$

A statistical test (F-test) on the equality of the means across days of the week rejects equality at all reasonable significance levels.

   (a) Do any of these results of Keim and Stambaugh contradict the Efficient Market Hypothesis (EMH)? If so, explain which results and which form of the EMH they contradict.

Keim and Stambaugh repeat their analyses for all 5-year sub-periods. Their results for the last sub-period (1978-1982) are in the table below. A statistical test (F-test) on the equality of the means across days of the week could not reject equality at a 2.5%

[1] Donald B. Keim and Robert F. Stambaugh, A further investigation of the weekend effect in stock returns, *The Journal of Finance*, vol. 39, no. 3, 1984, pp. 819-835.

significance level.

	Monday	Tuesday	Wednesday	Thursday	Friday	All days
mean	-0.102	0.065	0.130	-0.021	0.096	0.035
t-statistic	-1.43	1.09	2.32*	-0.41	1.79	1.36

* means significantly $\neq 0$

(b) Do any of these results of Keim and Stambaugh contradict the Efficient Market Hypothesis (EMH)? If so, explain which results and which form of the EMH they contradict.

6. You are planning to visit Amsterdam and in preparation for the trip you collect (among other things) some data about the local stock market, viz. the returns of five major stocks and the index. You analyse the data in different ways. First, you plot the percentage daily returns of the stocks and the index against their return on the next day. Figure 1 shows two such plots, one for Air France-KLM (ticker: AF) and one for the AEX index (ticker: AEX). The AEX index consists of the 25 most actively traded securities on the Amsterdam Stock Exchange.

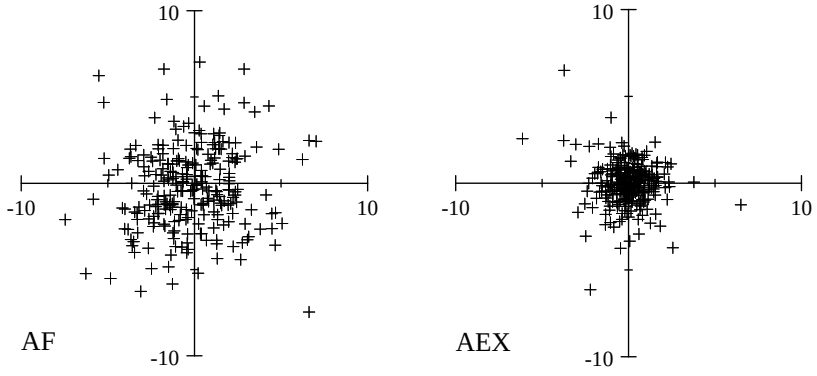

Figure 1: Return day t (x-axis) vs. day t+1 (y-axis)

(a) Do these plots reveal market inefficiency? Explain why.

(b) As an aside, what else do these plots show?

Next, you calculate autocorrelation coefficients for the stocks and the index, i.e. correlation coefficients between the returns today and tomorrow. The results are presented in Table 1.

(c) Does Table 1 reveal market inefficiency? Explain why.

Finally, you run a regression in which, for each stock, the return today is explained by the returns from one to five days back:

$$r_t = \gamma_0 + \gamma_1 r_{t-1} + \gamma_2 r_{t-2} + \gamma_3 r_{t-3} + \gamma_4 r_{t-4} + \gamma_5 r_{t-5} + u_t$$

Table 1: Autocorrelation coefficients

Stock	ticker	$\rho_{r_t,r_{t-1}}$
Air France-KLM	AF	.070
BosKalis-Westminster	BOKA	-.070
Philips	PHIA	-.043
Royal Dutch Shell	RDSA	-.011
Unilever	UNA	-.138*
AEX index (25 stocks)	AEX	-.107

*significantly $\neq$0 (5% level, 2-tailed test)

Table 2 shows the estimated coefficients, γ, of these regressions.

Table 2: Coefficients of time series regression, 5 lags

	γ_0	γ_1	γ_2	γ_3	γ_4	γ_5	
Ticker	constant	r_{t-1}	r_{t-2}	r_{t-3}	r_{t-4}	r_{t-5}	R^2
AF	-0.254	0.073	-0.121	-0.007	-0.083	-0.062	0.029
BOKA	0.291	-0.071	0.037	0.025	-0.126	-0.059	0.025
PHIA	-0.017	-0.032	-0.018	0.079	-0.058	-0.053	0.014
RDSA	-0.008	0.008	0.15*	-0.14*	0.054	0.079	0.046
UNA	0.036	-0.111	0.065	-0.090	0.042	-0.045	0.040
AEX	-0.029	-0.096	0.085	-0.027	0.039	-0.011	0.024

*significantly $\neq$0 (5% level, 2-tailed test)

(d) Does Table 2 reveal market inefficiency? Explain why.

7. Stocks are expected to earn (much) more than the risk free interest rate. This means that stock prices are expected to increase over time which, in turn, means that stock prices will be positively autocorrelated and that they are not a fair game or a martingale as the EMH claims. Is this reasoning correct?