Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG

Exam

Asset Management

Mock Exam

Personal information:

Name: _____   First name: _____

Date of birth:__ __ / __ __ / __ __ __ __   Semester: __ __   Student number:__ __ __ __ __ __ __ __

E- Mail: _____

Instructions (please read carefully):

- During the exam, you are permitted to use (i) a non-programmable calculator and (ii) an English dictionary. Further materials are not allowed.

- The examination document consists of 13 pages (including the front page) and contains 3 sections.

- The examination is scheduled for 60 minutes.

- Questions can be answered either in English or German (stick to one language over the entire exam).

- Answer all questions and show necessary work. Please be brief but precise, explain symbols, and outline your calculations. If necessary assumptions are missing, make reasonable economic assumptions to answer the question.

Declaration:

I hereby declare the veracity of all personal information provided and confirm that I carefully read the given exam instructions.

Date:__ __/__ __ / __ __ __ __   Signature: _____

Completed by the chair:

Question	1	2	3
Points			

Question 1: Mixed questions (25 points)

a)
Explain the difference between the money-weighted rate of return ("geldwertgewichtete Durch-schnittsrendite") and the time-weighted rate of return ("zeitgewichtete Durchschnittsrendite") in a performance measurement context. (5 points)

b)

Suppose you want to test the cross-sectional restriction imposed by the CAPM. State the regression equation and the null hypotheses. Briefly summarize Roll's (1977) critique regarding the validity of such empirical tests. (6 points)

c)

A portfolio manager has the following equity indices in her portfolio:

	Australia	Germany	South Africa	United States
Relative market capitalization	10%	40%	20%	30%
Average annual return	7%	5%	10%	3%

She intends to use the Black-Litterman portfolio optimization approach and has the following views about the expected returns:

- The annual expected return of Australia will be 9.0% (degree of confidence = 90% ($z = 1.64$); confidence interval: [8%, 10%]).

- A value-weighted portfolio of German and South African indices will outperform the US index by 4% (degree of confidence = 95% ($z = 1.96$); confidence interval: [2%, 6%]).

Formalize both views in accordance with the notation of the Black-Litterman portfolio optimization approach (matrix notation). (5 points)

d)

Frazzini and Pedersen (2014) show that average stock returns are related to past beta. Briefly discuss the observed anomaly and devise a simple strategy to exploit it. Discuss <u>two</u> possible explanations why this relationship might be observed. (6 points)

e)

Outline the role of rebalancing for long-term investors and explain how rebalancing serves as a conservative lower bound for „buying low and selling high". (3 points)

Question 2: Strategic and Tactical Asset Allocation (15 points)

a)

Discuss how a higher fraction of stocks (relative to the risk-free asset) might be justified in the long run if returns are predictable. (3 points)

b)

Explain the concept of shortfall risk and the effect of increasing investment horizons on shortfall risk. Can you diversify stock market risk by increasing the investment horizon?

Assume that the expected log-return of an investment is 6% with a volatility of 15%. Calculate the shortfall risk of this investment for an investment horizon of ten years and a threshold return of 2%. (6 points)

Excerpt from the cumulative standard normal distribution table with $\phi(z) = P(Z \le z)$ for $z \ge 0$ and $\phi(-z) = 1 - \phi(z)$ for $z < 0$. <u>For the sake of convenience, you may round the z-value you calculated to two decimal places.</u>

	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
0.1	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5753
0.2	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
0.3	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
0.4	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
0.5	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
0.6	0.7257	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7517	0.7549
0.7	0.7580	0.7611	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
0.8	0.7881	0.7910	0.7939	0.7967	0.7995	0.8023	0.8051	0.8078	0.8106	0.8133
0.9	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389

c)

Explain the concept of relative optimization. Specify the relevant trade-off function and explain each component. Highlight the role of the information ratio (IR). Explain how the IR be approximated using the fundamental law of active management. (6 points)

Section 3: Performance measurement (15 points)

a)

The Fama and French (1993) three-factor model is given as:

$$r_{P,t} - r_{f,t} = \alpha + \beta_M \times [r_{M,t} - r_{f,t}] + \beta_{SMB} \times SMB_t + \beta_{HML} \times HML_t + \varepsilon_t$$

Explain the intuition behind the model. Define all model parameters and discuss the economic meaning of the three risk factors. In addition, explain the extension to the four-factor model by Carhart (1997). (8 Points)
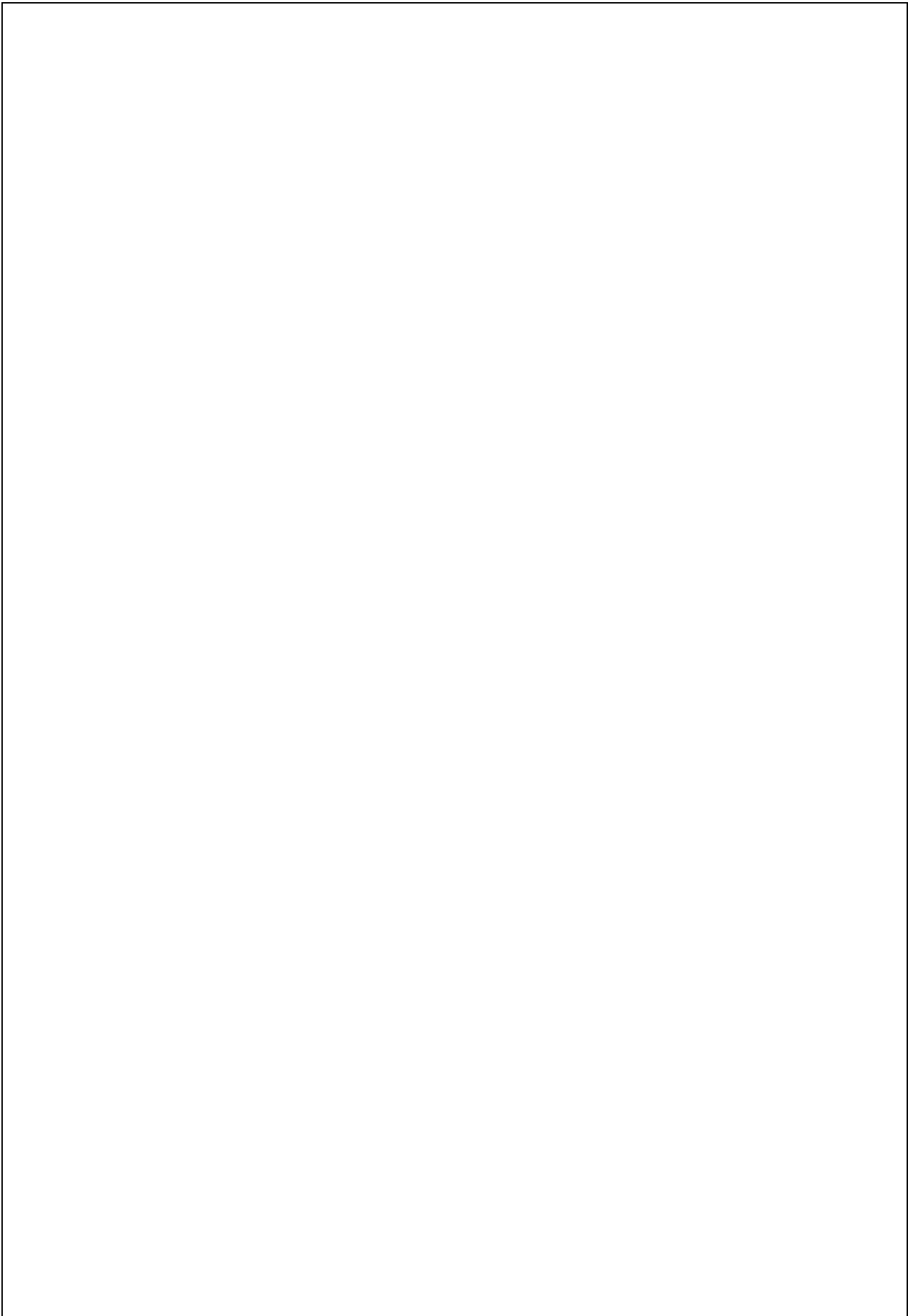
b)

The following graph plots realized excess portfolio returns against excess market returns. Briefly interpret the graph and discuss which problem arises if the portfolio manager is evaluated based on Jensen's alpha. Discuss how the model introduced by Henrikson and Merton (1981) addresses this problem and state its respective regression equation. (6 points)
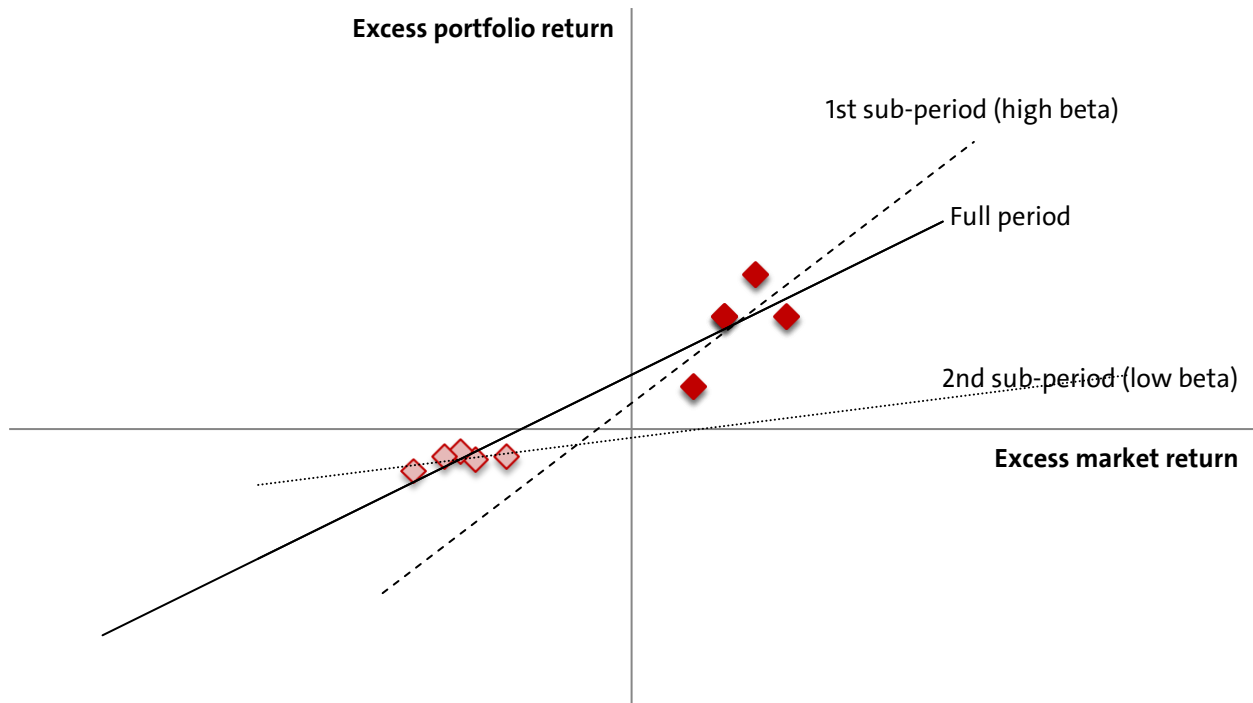
c)

Use the performance attribution model by Brinson, Hood, and Beebower (1986) to decompose the actual return of a mutual fund that has been invested in stocks (75%) and bonds (25%) with realized asset class returns of 10% and 4%, respectively. The index returns of the benchmark portfolio (50% stocks, 50% bonds) have been 11% and 3%, respectively. Calculate and shortly explain the different return components. (6 points)