Final Examination
Finance: Ed LUSK

There are Seven (7) Pages to the exam. Make sure you have seven consecutively numbered pages.

You will have Twenty (20) Minutes to read the examination. You may **NOT** have any writing instrument in your hand during this period. While you are reading, you *may* organize your material. You will have 2 hours (120 minutes) to work the examination. This exam working-time will start after the reading period. I will announce the beginning of the exam.

You may use the lecture script PPoints together with your individual notes and any textbook as reference. You *cannot* share **anything** during the exam. Calculators and any other electronic equipment are only permitted in accordance with the regulations of the Board of Examiners (Prüfungsausschuss). Also, no "Telephone/SMS Jokers" during the examination—i.e. switch off all cell phones.

To receive full credit for an answer that requires computations YOU MUST show your work/calculations—do <u>not</u> extensively label them. To be clear: If you only write down the answer—EVEN IF IT IS CORRECT, you will receive NO CREDIT for that answer.

When there is an explanation called for, there will also be noted the approximate number of words that *should* be necessary to express the idea completely. This is a general GUIDE for you. If you write more, that is OK, but you will be trading valuable time. DO NOT COUNT THE WORDS.

Also, if you want to correct something—you may simply strike it out and continue. DO NOT TAKE VALUABLE TIME TO ERRASE or WHITE-OUT, BLOW-DRY and THEN CAREFULLY RE-WRITE WHAT YOU WANT TO SAY.

If you think something is "tricky", you are probably reading too much into the question. The exam is a straightforward attempt to cover the topics that we discussed during the semester. **We cannot answer ANY questions during the reading period nor during the examination.**

The Final counts 70% of the final grade. The Take-home mid-term counts 30% of the final grade.

Good Luck, and thanks for an interesting semester *Ed* and **Dirk**.

Question 1 [45 Points]

You are an analyst for *Deutsche Bank*, Investment Division—one of their missions is to research traded stocks to identify high growth potential stocks. You are doing a **Pe** analysis [slides 19 to 21, NPV PowerPoint slides] for the SAP AG: {SIC code 7372: *Pre-Packaged Applications Software*} common stock traded on the NYSE. You are doing this analysis at the beginning of 2005 given the 2004 SAP closing information. See **Appendix A** for selected summary information from the *Standard and Poor's Stock Service* and a graph of the recent history of the SAP common stock. Recently, the SAP common stock has been trading in the range of [35,02€ to 45,83€]. The current closing price of SAP is 45,12€. An industry survey of firms in the SIC code 7372 finds that 3% of these firms will not declare a dividend during the next three years—i.e. the analysis horizon; however, SAP has declared a dividend each year since 1999. SAP historically has paid a dividend which is related to the T-Bill composite. This SAP Dividend/T-Bill relationship, as estimated by a linear regression, is included in **Appendix B**. The projected T-Bill composites reported by *The Morgan Stanley IB Service* for the next three years—i.e. the end of 2005, 2006 and 2007 are: 1,25% 1,33% 1,55% respectively. The SAP Net Profit After Taxes in 2004 was: 1.587.338.000€; included therein was a long-term gain (net of taxes) on the sale of operating equipment of 41.150.000€. The number of outstanding shares of SAP common stock on 31.12.2004 was 1.245.118.000. The expected annual return—i.e. **Er**, on SAP traded common stock has historically been 90% of the excess annual return for their ß-peer group. [**See Appendix C**]. Both the Expected Return and the MCR are computed at the index period, t = 31.12.2004 and are assumed to remain constant over the three (3) years during which the **Pe** analysis is to be made. The common stock on the SAP balance sheet as of 31.12.2004 was reported as 5.112.455.000€. SAP financial statements were given an Unqualified Opinion by their auditors: KPMG, International. A dividend of 0,475€ per share was declared for the common stock holders of

record on 23.12.2004. The *Standard and Poor's Futures* analysts have recorded a SAP common target price 50€ for the end of 2005. **See Appendix A.** They project that the price increases for the SAP common stock, which have averaged about 10% per year, will slow down. They estimate that the rate of price increase for 2006—i.e. 1.1.2006 to 31.12.2006— will be one-half of the projected increase from the current price to the Target price. Further, they estimate that the rate of price increase for 2007—i.e. 1.1.2007 to 31.12.2007—will shrink again by 50%. Your analysis is to be conducted over a three-year period. Specifically, you are starting the analysis using 31.12.2004 data for SAP. Your three-year projections will then be from 1.1.2005 to 31.12.2007—i.e.

> 1.1.2005 to 31.12.2005: Year 1 of the projection;
>
> 1.1.2006 to 31.12.2006 Year 2 of the projection and
>
> 1.1.2007 to 31.12.2007 the third year.

Required: Determine Pe given the above information. If you feel it is *NECESSARY* to make assumptions relative to the Pe analysis, then state and defend them briefly—i.e. no more than 25 words per assumption [35 Pts]. How would you use this Pe information? [10 Pts, About 150 words]

Question 2 [25 Points]

Referencing **Appendix D, Part A**, you will find the results of a simulation that was run 100 times by one of your *Deutsche Bank* technical-support colleagues to examine the variability of the **Pe** information that you developed in Question 1.

Required:
2a.) What percentage of these values do you estimate will be larger than the target price for the SAP common stock? [10 Pts]
2b.) Explain this result <u>and</u> how you would use it to *Deutsche Bank's* senior management.
[10 Pts, About 150 words].
2c.) Also, what is the <u>probable</u> reason that there are only 99 values reported for the simulation. [5 Pts, About 25 words]

Question 3 [15 Points]

Further referring to **Appendix D, Part B**, a hurdle analysis is conducted for the above Pe

simulation using the following **IF, Then, Otherwise** conditional:

If (SAP Pe Values > [(45.83) * (1.075)], **Then** "Arb Action",

Otherwise "No Arb Action")

You have selected a Hurdle that you believe will indicate that arbitrage-speculation **Action—**

above noted as Arb Action may be profitably undertaken.

Required: Using information derived from a 90% confidence interval, write a summary of the results of the Hurdle Analysis to be included in your firm's newsletter that will be distributed to members of the AARP—*American Association of Retired Persons*—an organisation for retired individuals over the age of 55 in the USA. [15 Pts, About 150 words]

Question 4 [15 Points]

Assume that you want to compute the option value for the SAP common stock. You are

looking at the option value at 31.12.2005. You assume that the *Standard and Poor's* target

price will be one of the possibilities. At the time of doing the option analysis SAP closed at

45,12€. The down-side possibility for the SAP common is 35,02€. Assume that the risk free

rate is 1,12%. You want to execute a European CALL Option on 31.12.20005 for a strike

price of 45,50€.

Required: Compute the price that you expect to pay for this European CALL option. If you feel that it is *NECESSARY* to make assumptions relative to this computation then state and defend them briefly—i.e. no more than 25 words per assumption). [10 Pts] Also, explain to a technical colleague why this is an equilibrium price. [5 Pts, About 50 words]

This is the end of the examination question set. Following are the four Appendices: A, B, C and D.

SAP AG

Stock Report
November 06, 2004
NYSE Symbol: SAP

Recommendation: **BUY** ★★★★☆

Target Price: **$50.00**

Sector: Information Technology
Sub-Industry: Application Software
Peer Group: Enterprise Applications - Larger

Summary: Based in Germany, SAP is the world's largest provider of enterprise application software.

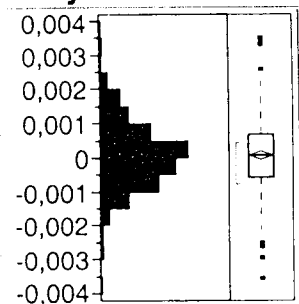---
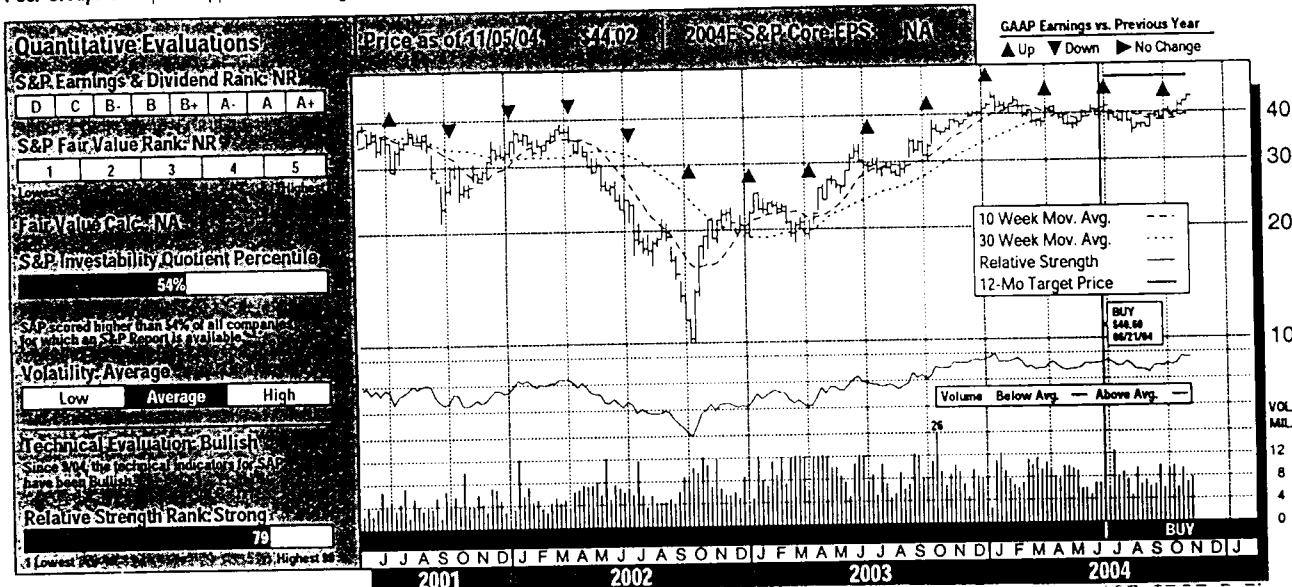
Appendice B

SAP Regression: Dividends given T-Bills

Parameter Estimates

Term	Estimate	Std Error
Intercept	**-0,015426**	**0,015195**
T-Bills	**0,3954895**	**0,01512**

The Fisher's Kappa p-value was 0,5732.

Appendice C

Daily Excess Return for SAPs Beta Peer Group

Moments

Mean	0,0000913
Std Dev	0,0010512
N	252

Appendice D
Part A

Simulation Distribution

Of SAP Pe Values
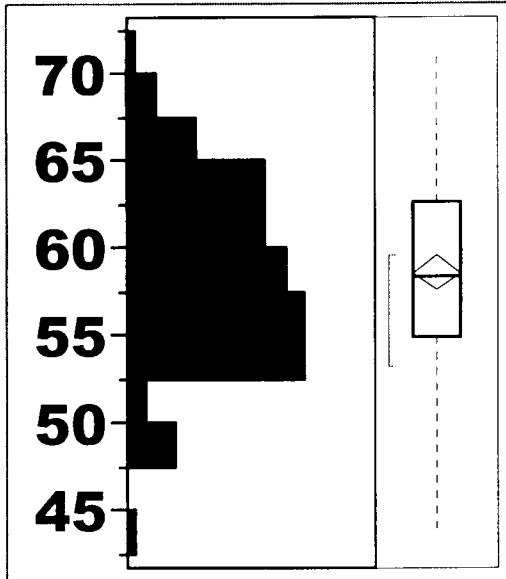
Quantiles

100.0%	maximum	71,094
75.0%	Quartile	62,614
50.0%	Median	54,483
25.0%	Quartile	52,923
0.0%	Minimum	44,085

Moments

Mean	54,614691
Std Dev	5,0456263
N	99

Distributions
Hurdle Cut-off from Question 3
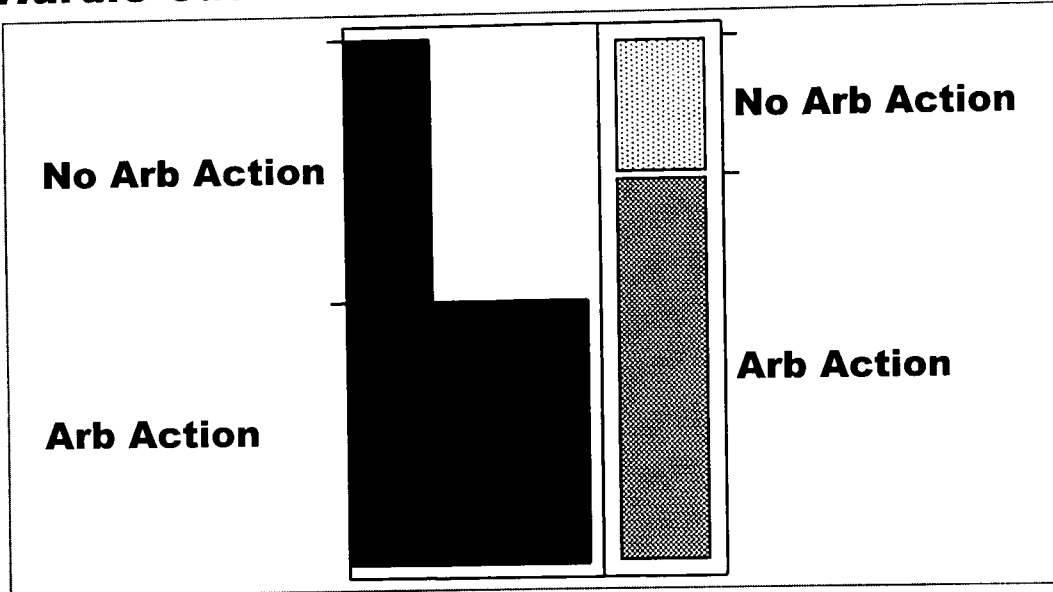
Frequencies

Level	Count	Prob
Arb Action	73	0,73737
No Arb Action	26	0,26263
Total	99	1,00000