

Ejercicios propuestos C. Alexander – Factor models

1. Use weekly data from 3 January 2000 until 27 August 2007 to estimate a single factor model for the Microsoft Corporation (MSFT) stock and the national Western Life Insurance Company (NWL) stock using the S&P 500 index as the risk factor. What do you conclude about the stocks' characteristics? Assuming the stocks' specific returns are uncorrelated, what are the characteristics of a portfolio with 70% of its funds invested in NWL and 30% invested in MSFT? R: Specific risks: 23.17% and 25.74%. Portfolio: 23.97%.
2. A portfolio has 60% invested in American Express (AXP) stock and 40% invested in Cisco Systems (CSCO). Use daily data from 3 January 2000 to 31 March 2006 on the prices of these stocks and on the S&P 100 index (OEX) to estimate the portfolio's characteristics: a) by applying the same method as in the previous exercise, b) regression the constant weighted returns series on the index returns. R: Specific risk of the portfolio is 19.98% under the first method, and 18.19% under the second. Specific risks are not uncorrelated, as it is assumed in method a).
3. Suppose the total volatility of returns on a stock is 25%. A linear model with two risk factors indicates that the stock has betas of 0.8 and 1.2 on the two risk factors. The factors have volatility 15% and 20% respectively, with correlation of -0.5. How much of the stock's volatility can be attributed to the risk factors and how large is the stock's specific risk?
4. Style attribution [see Excel file]. Perform style attribution on the mutual funds: VIT: Vanguard Index Trust 500 index, FAA: Fidelity Advisor Aggressive Fund, FID: Fidelity Main Mutual Fund, using as style factors: a) Russell 1000 value: mid cap, value factor, b) Russell 1000 growth: mid cap, growth factor, c) Russell 2000 value: small cap, value factor, d) Russell 2000 growth: small cap, growth factor. Use the 2003-2004 and the 2005-2006 subsamples, as well as the whole sample.
5. Suppose a portfolio is invested in only three assets with weights -0.25, 0.75 and 0.50. Each asset has a factor model representation with the same two risk factors as in Exercise 3, and the betas with respect to the two factors are: (0.2; 1.2) for asset 1, (0.9; 0.2) for asset 2, and (1.3; 0.7) for asset 3. What is the volatility due to the risk factors (i.e., the systematic risk) for this portfolio?
6. A UK investor holds 2.5 million pounds in UK stocks with a FTSE100 market beta of 1.5, 1 million pounds in US stocks with an S&P500 market beta of 1.2, and 1.5 million pounds in German stocks with a DAX30 market beta of 0.8. The volatilities and correlations of the FTSE100, S&P500 and DAX30 indices, and the USD/GBP and EUR/GBP exchange rates are estimated. Calculate the systematic risk of the portfolio and decompose it into equity and forex and equity-forex components. R:
7. [Case Study II.1] On 20 April 2006 a portfolio is currently holding \$3 million of Nokia stock and \$1 million of Vodafone stock. Using the daily closing prices since 31 December 2000 that are shown in the spreadsheet a) estimate the total risk of the portfolio volatility based on the historical return on the two stocks, b) estimate the systematic risk of the portfolio using a four-factor regression model for each stock (Figure II.1.4): 1) a broad market index: the New York Stock Exchange composite index, 2) an industry factor: the Old Mutual communication fund, 3) a growth style factor, the Riverside growth fund, and 4) a capitalization factor, the AFBA Five Star Large Cup fund.