The effects of firm-specific variables and consensus forecasts data on the pricing of large Swedish firms' stocks.

by

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Abstract

In this essay we model the returns for 14 large Swedish firms' stocks with a conditional multifactor model with time-varying beta terms. The data are monthly and the sample period is June 1992 to August 1997. The beta terms are modelled as linear functions of predetermined firm attributes, which are taken either from published accounting data or from consensus forecast data. The main findings are that the stock exchange is not efficient with respect to the consensus information and the lagged yield spread. We also find that the lagged firm attributes are mainly associated with risk exposures. Using encompassing tests, the models based on consensus forecast data can for six firms unilaterally encompass the models based on accounting data. The reverse result holds for five firms. For most firms, the "best" models are not rejected in out-of-sample forecast tests for the period September 1997 to December 1997.

Keywords: Asset pricing, Consensus forecast, Market efficiency, Predictable stock returns

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1 Introduction

There is an ongoing debate, mainly in the US, concerning the importance of predetermined firm-specific attributes for asset pricing. These attributes are often firm size, price to book ratio, price to earnings ratio, dividend yield, and cash flow to price ratio. One part of the literature claims that the lagged firm attributes can help investors to find under-valued stocks; see for example Lakonishok, Shleifer and Vishny (1994) and La Porta (1996). This view would imply that pricing is not rational and that it is possible to earn abnormal returns. Another opinion is that these measures are proxies for risks that are not captured by the standard onefactor model; see Fama and French (1996). Yet a third belief is that such measures might mostly reflect measurement problems and data mining (or data snooping); see Kothari, Shanken and Sloan (1995) and Campbell, Lo and MacKinlay (1997).

Ferson and Harvey (1998) argue that one can distinguish between mis-pricing and risk exposure only in an explicit model that potentially allows firm attributes to affect both phenomena. This is so they claim, since constructing portfolios based on asset pricing anomalies will make these portfolios or factors appear like risk-proxies, even if mis-pricing is present. On the other hand, if there is mis-pricing, one must first purge the valuation measures from their information about betas. The possibility that lagged firm attributes could act as proxies for betas in a conditional CAPM is shown by Ferson (1995, pp. 182-184).

In this paper we analyse first whether predetermined firm attributes can help to explain individual stock returns employing a modified version of Ferson's and Harvey's model. Thereafter we examine two different kinds of firm attributes containing different information in order to further analyse the return predictability that cannot be explained by risk premia.

Consensus forecast data are compared with accounting data for the firm attributes. Since the forecasts are forward looking while the accounting data are backward looking, the forecasts ought to contain additional information about a firm's value. In terms of information sets, the accounting data is strictly included in the data set that the consensus forecasters use. Hence a linear projection of "true" conditional beta and alpha terms (that is, terms based on the information set that investors use for pricing; see Section 2) onto the information set that contains the consensus data cannot result in a model that has a larger error than the corresponding error from a model that does not include the consensus information. Hence, the use of the forecasts could enable one to get better estimates of risk exposures, since, under the assumptions of the model, the beta terms are coefficients in best linear predictions of returns.[1] The forecasts could also be of use to model a firm's alpha term and hence to test whether the stock market is efficient with respect to the consensus information. This potential for better estimates, and thereby better tests of the issue of whether the lagged firm

[1]We do not use consensus data together with accounting data; if a consensus-based variable does not "improve" upon an accounting-based variable in the sense of more accurately reflecting present risk exposures, then the exclusive use of consensus data does not lead to better models of the beta terms.

attributes are associated with risk exposures or abnormal returns, leads naturally to the question whether the models based on consensus data can encompass the models estimated with accounting data.

The plan of the paper is as follows. First, the theoretical model is outlined and then the data set is described. Then the first model is estimated, using accounting data, and asset pricing tests are performed. Next, the model is estimated with consensus forecast data and several tests, of for instance, return predictability are conducted in order to gauge the usefulness of consensus data for modelling time-varying alpha and beta terms. Then encompassing tests are used to determine which of the two types of models is the better. Thereafter out-of-sample forecast tests are done, and additional encompassing tests are performed with a slightly modified version of the models based on consensus data. Finally, a summary of the results is given.

2 Theoretical Background

Given the aims and the multitude of alternative empirical asset pricing models, one face a difficult choice when selecting an appropriate benchmark model. In many papers and articles simple unconditional or conditional CAPM's are rejected; see for instance Campbell et al. (1997) and references therein. At the same time there seems to be increasing evidence of return predictability. Some of these results may be due to data mining and data snooping biases in these studies: this is a controversial issue (see Campbell et al., Chapter 6). One of the more popular among the recent models is the Fama and French multifactor model with factor-mimicking portfolios derived from factors such as the book-to-market ratio and firm size.

The model used here is based on Ferson and Harvey (1998). The model is briefly described as follows. Assume at first, for simplicity, that there is only one factor in the asset pricing model, and that unexpected excess returns for asset i are given by,

$$r_{i,t+1} - E_t\left(r_{i,t+1}\right) = \beta_{i,t}\left[r_{m,t+1} - E_t\left(r_{m,t+1}\right)\right] + \varepsilon_{i,t+1}. \tag{1}$$

The expected value is taken conditional on an information set that investors use in price setting. The variables $r_{m,t+1}$ and $\varepsilon_{i,t+1}$ are the excess return on the market and a random error term. The equation is interpreted as that the forecast error for the rate of return of asset i is a time-varying linear function of the forecast error for the market portfolio, plus a noise term. The model is further specified by

$$E_t\left(\varepsilon_{i,t+1}\right) = 0, \tag{2}$$

and

$$E_t\left(\varepsilon_{i,t+1} r_{m,t+1}\right) = 0. \tag{3}$$

Together, the equations define $\beta_{i,t}$ as the asset's conditional beta with the market; this is seen by multiplying both sides of equation (1) with the unexpected risk premium on the market and then taking conditional expectations. This gives

$$E_t\left\{\left[r_{i,t+1} - E_t\left(r_{i,t+1}\right)\right]\left[r_{m,t+1} - E_t\left(r_{m,t+1}\right)\right]\right\} = \beta_{i,t} Var_t\left(r_{m,t+1}\right).$$

Furthermore, assume that the conditionally expected risk premium is linear with a potential alpha term:

$$E_t\left(r_{i,t+1}\right) = \alpha_{i,t} + \beta_{i,t} E_t\left(r_{m,t+1}\right), \tag{4}$$

with[2]

$$\alpha_{i,t} = \alpha_{i,0} + \sum_{j=1}^{m} \alpha_{ij} A_{ij,t}, \tag{5}$$

and

$$\beta_{i,t} = \beta_{i,0} + \sum_{j=1}^{m} \beta_{ij} A_{ij,t}. \tag{6}$$

The variables $A_{ij,t}$ are firm-specific or macroeconomic variables that are known at time t. Despite the notation for the alpha and beta terms, there is no presumption that a variable must enter as both an alpha term and a beta term. That is obviously an empirical question. Under a conditional beta pricing model, α_{ij} is zero, and any effect of informational variables will be confined to their instrumental status for betas. Putting the model together gives the following empirical equation:

$$r_{i,t+1} = \alpha_{i,t} + \beta_{i,t} r_{m,t+1} + u_{i,t+1}. \tag{7}$$

The model is invariant to the form of the conditionally expected return on the market. This is shown by means of the following calculations.

$$u_{i,t+1} = r_{i,t+1} - \left\{\alpha_{i,t} + \beta_{i,t}\left(r_{m,t+1} - E_t\left(r_{m,t+1}\right) + E_t\left(r_{m,t+1}\right)\right)\right\} \tag{8}$$

[2]We restrict the information set (the conditioning variables) in the empirical sections. The model is otherwise useless since we cannot observe the true information set. Note that the chosen specification of the alpha and the beta terms is not the linear projection of the true conditional terms onto the chosen information set. The specification is instead directly the linear projections of the returns onto the chosen information set.

which, after substitution from equation (4) becomes, with the obvious notation for the unexpected risk premium on the market:

$$u_{i,t+1} = r_{i,t+1} - E_t\left(r_{i,t+1}\right) - \beta_{i,t}\varepsilon_{m,t+1}. \tag{9}$$

This error term, or unmodelled part of the return, is, under the null hypothesis, the same as the one in equation (1). It is therefore conditionally uncorrelated with the market portfolio, as was assumed in equation (3). This means that, under the asset-pricing hypothesis, the model in equation (7) is well specified irrespective of the functional form for the market risk premium,[3] and can be estimated by means of OLS. Furthermore, as can be shown, the same moment conditions are imposed as if the model is estimated by GMM. This ensures that the beta equation in (6) is constrained to be the conditional beta with respect to the market index.

That the specification is invariant to the model of the expected risk premium on the market is an important property of the model since this specification can be subject to a substantial data mining bias.[4]

We decided to use a three-factor model, complementing the market factor with an exchange rate factor and a yield spread factor.[5] The motives for this choice are mixed, and not strictly derived from a theory.[6] The more risk factors used, the smaller should

[3] It could be mis-specified, however, with respect to the alpha and the beta equations.

[4] See, for instance, Foster, Smith and Whaley (1997).

[5] We define the yield spread as the difference between the yield to maturity on a five-year government bond and a one-month treasury bill rate.

[6] Except for the standard CAPM, there are few empirical works with a rigorous theoretical mo-

be the chance of finding spurious abnormal returns; the included firm-specific or more general instrumental variables could otherwise be correlated with omitted risk factors. It is important to control for foreign exchange rate exposure since the majority of the firms are multinational, with their stocks traded internationally. There are also firms in the sample, which are traditionally thought to be interest rate sensitive, such as, for example, insurance and building companies. We therefore try to control for this potential influence with the yield spread variable. The sample period is only five years and sets an upper limit on the number of factors that can be meaningfully included.

In Section 4 we will estimate the model with accounting-based firm attributes and test if the alpha terms are zero for each firm. We will also test whether lagged exchange rate changes and lagged yield spread changes have any predictive power for the firm's rates of return. Tests of the importance of each factor are also performed. Simple multivariate tests are done with the help of Bonferroni bounds.

In Section 5 we will do similar tests of models estimated with consensus data based firm attributes. We test whether the consensus can predict abnormal returns (alpha terms), and whether the consensus data can be used to predict the three risk exposures that seemed relevant from the accounting data based models.

3 The Data Set

The model in the previous section is very general and it needs to be specified further for use in the empirical work. This is done in the next section where the choice of

tivation; most other models are empirically motivated.

firm attributes is discussed. In this section the construction of the variables and their sources are described.

The monthly consensus forecasts of individual companies' earnings per shares (EPS) and dividends per share (DPS) are taken from Associés en Finances (AEF) booklets.[7] AEF contacts research teams each month and computes summary data such as means, medians and average absolute deviation from mean. The consensus has varied somewhat but now consists of seven large institutions from the Nordic countries and the UK. (See Table 1 for the research teams that are included in the consensus.) This consensus could therefore well represent the Swedish stock market expectations. Each research team includes at least three analysts and each research team's regular list covers at least half of the country's sample. In estimating the earnings per share, next dividend per share, and net asset value per share, each research team adheres to methodological rules that have been defined in common. Each analyst, using the same number of shares on a fully diluted basis, computes all the relevant variables. In addition, continuous contact is maintained between AEF and each participating institution to harmonise the accounting methods and procedures used for these calculations. Consequently, forecasts are generally consistent[8] and forecast differences reflect differences of opinion; they should not reflect differences in accounting methods and procedures used by financial analysts. The summary data

[7] Associés en Finance EPS and DPS forecast data for Sweden have, to the author's knowledge, not been used for modelling purposes before.

[8] They are not necessarily consistent in a statistical sense.

that are analysed here are sold to institutional investors. The data for "this year's" earnings, next dividend per share, and net asset value per share are used. This implies that over the year, the first forecast horizon is twelve months. Thereafter the forecast horizon is reduced each month so that the final forecast horizon in the forecast year is one month. This process is then repeated each year. The sample includes 14 firms during the period June 1992 to August 1997. The firms included in the analysis, with their sector classification and their international listing, appear in Table 2.

The earnings forecasts for each company are matched with stock returns, accounting numbers, exchange rates and interest rates. Care is taken to adjust for stock splits and other changes in the firm capital structure so that all returns, earnings, dividends, net asset values and forecasts of these variables are expressed in per share terms in a consistent manner. The lag between the end of the accounting year and the announcement in annual reports is assumed to be five months. There are therefore, shifts in the accounting data in June each year. This means, for example, that when returns are predicted during January to June 1996, earnings[9] from the accounting year 1994 are used. Further, during the latter part of 1996, from July on, earnings from the accounting year 1995 are used. Dividends and net asset values are used in the same way. "Börsguiden" provides the accounting data. The return data are generated from prices and dividends for the firms' B-shares. B-shares have a lower voting right but are open to foreign investors. The returns for the firms as well as the Swedish stock market index are provided by "EcoWin" and "Affärsvärlden", and the dividends are

[9] The price to earnings ratio is used with the latest lagged price in the numerator.

obtained from "EXTEL". The exchange rate (MERM: a tradeweighted exchange rate for the Swedish krona), the one-month Treasury bill rates and the five-year government bond rates are provided by the Swedish central bank. Descriptive data for the variables are provided in Tables 3, 4 and 5. The rate of return on market index, the percentage change of the MERM, the first difference of the yield spread, and the returns for ten firms do not seem to be normally distributed.[10] The Box-Pierce Q-statistic, which sums the squared autocorrelations, indicates that the MERM, the yield spread, and the returns of five firms have significant autocorrelation.

4 The Effects of Lagged Firm Attributes on Returns

The theoretical discussion in Section 2 has the following implications for empirical work. Given a choice of firm-specific variables and factors, (see below), one can test whether firm attributes enter as alpha terms or beta terms. If any attribute enters as an alpha term in the multivariate test, then the conditional beta pricing model is rejected. Accordingly, the case for non-rational explanations of the effects of lagged firm attributes on returns, is then supported. Tests are also done for whether firm attributes matter for the risk exposures. There are also tests for whether lagged factors have any predictive power for the returns.

In the data set there are four firm-specific variables that can plausibly enter both in the alpha and in the beta equation for each firm which were stated in equations

[10] We use the first difference of the yield spread because we could not reject the presence of a unit root in the level of the variable.

(5) and (6) in Section 2. These variables are firm capitalisation and the following ratios: price to earnings, price to book, and dividend price. Due to the persistent upward trend for many of these variables during the sample period, first differences are used for all firm-specific-variables, and the yield spread, but not for returns. This makes the models based on accounting data close to non-linear autoregressions since A (P_t/E_t) is equal to $(\Delta P_t/P_t)\,.(P_t/E)$, if earnings are constant? This is then close to $r_t \cdot (P_t/E)$.[12] The information content of the variable is composed of a lagged price change, and a term that reflects how the market values the recent earnings figures.

There is a large literature concerning the importance of these lagged firm attributes as measures of risk not captured by the standard CAPM, as a basis for stock selection, or as instruments for earning abnormal returns when pricing is not fully rational; see Ferson and Harvey (1998), and references therein. We have no convincing argument for choosing one variable over any of the others as an especially important indicator of risk or abnormal returns. Different authors have stressed different measures in the "anomaly literature".[13] It is natural to ask what these ratios really capture. By simply examining one ratio, for example the book-to-market (B/M), it is clear that many different factors could be reflected in the ratio. Some factors would support a "behavioural theory" of pricing and others would support a "risk based theory". For example, an overvalued so called "glamour stock" may have a high market value in

[11] As was mentioned in the previous section, the accounting variables are changed only once a year.

"However, such a model is still linear in the parameters.

[13] Some authors stress firm size, others the price to book ratio, and yet others the dividend price ratio.

relation to the book value simply because it has done well in the past and is expected to do so in the future. A low B/M might also describe a company that has high growth opportunities that do not affect the computation of the book value but affect the market price. On the other hand, a high B/M could mean that a stock is "out of favour" with investors, meaning that investors extrapolate recent bad performance into the future. It could, however, also mean that the firm is distressed. The low market value would reflect, in the latter case, a "distress premium". Hopefully, the model that is used here can shed some light on the relevance of these alternative explanations.

The choice of a model is based on a trade-off between several restrictions. The sample is small (61 observations for each firm) and we want to use three factors in order to minimise the occurrence of spurious abnormal returns. There are also the inferential dangers of data mining when one searches for a "true model" or a best fitting model and then estimates the parameters with the same data set. At the same time, for this analysis, there is no particular interest in specific parameters; it is enough if the variables together capture risk, abnormal returns, or possibly both.[14] It was therefore decided to use a very general model, allowing all four variables to enter both in the alpha equation and in the beta equation. The lagged exchange

[14] We have only found one reference to a theoretical motivation for the inclusion of firm-specific variables. Berk (1995) shows that capitalisation will predict returns in a given cross-section if the market portfolio is imperfectly measured or if there are omitted risk factors. These omitted factors will be included in today's price and thereby predict tomorrow's return.

rate factor and the lagged change in the yield spread was also used to see if these variables have any predictive power for the firms' rates of return. This is interesting given that previous studies like Jorion (1990 and 1991), Bartov and Bodnar (1994) have had difficulties finding a significant contemporaneous exposure;[15] Bartov and Bodnar even find a stronger link to lagged exchange rates, suggesting the presence of mis-pricing. The following specification is used:

$$r_{i,t+1} = \alpha_{i,t} + \beta^1_{i,t} r_{m,t+1} + \beta^2_{i,t} \left(\frac{\Delta merm}{merm} \right)_{t+1} + \beta^3_{i,t} \Delta Y s_{t+1} + u_{i,t+1} \qquad (10)$$

where the three factors are defined in the data section, and the alpha and the beta terms are linear in the four firm-specific variables.

With the inclusion of an overall constant in the regressions, there are 22 parameters to estimate for each firm, with the alpha equation containing 7 parameters. Then Wald tests are done with finite sample F-test approximations for exclusion of the alpha parameters, the time-varying part of the beta equation, and the three risk factors (one at a time).

To get a multivariate test, Bonferroni tests were calculated in the following way. Let F_i be the event that a null hypothesis i is rejected at a given significance level. Denote the probability of this event by $P(F_i)$. Then the probability of rejecting at least once in n number of possibly dependent tests is $P\left(\bigcup_{i=1}^{n} F_i\right) \leq \sum_{i=1}^{n} P(F_i)$, by elementary probability theory. One can then say that the probability of reaching a certain pvalue p or lower in any of n tests is bounded from above by np. This

[15]This ought to exist in a CAPM world, given that an unexpected exchange rate change influences the net present value of firms.

upper bound will be used as a probability value for the joint test across firms that, for example, the lagged exchange rate risk factor has no predictive ability for returns. The test is known to have low power to reject a false null hypothesis and is biased towards acceptance, and this is enhanced by multicollinearity. This means here that any rejection will be stronger than otherwise, while the downside is that non-rejections might not say that much. The results from the tests are shown in Table 6.

The fit of the regressions is unimpressive. One must remember, however, that individual firms'stocks are used here and not portfolios. Forming portfolios obviously serve to average out the idiosyncratic terms, leaving the systematic and predictable component. There is also some slight evidence of mis-specification in the form of non-normal residuals for the firm Electrolux[16]. Other diagnostics show no serious problems.[17] When only one parameter is tested a comparison is made with t-tests computed with heteroskedasticity-consistent standard errors but the inference is not affected. Although the Bonferroni test is weak, one can reject all the null hypotheses at low significance levels, except for the ones corresponding to mis-pricing with respect to the exchange rate, and the firm-specific alpha terms.

The importance of the market factor stands out as in most studies, while the yield spread factor seems to matter significantly for 4-5 firms. The exchange rate factor matters significantly (at 5%) for three companies. The low probability values for the

[16]See Table 2 for a list of the included firms.

[17]Since later reductions got rid of these possible mis-specifications we do not think that they seriously affect the inferences.

Bonferroni tests are strong evidence of the importance of each factor.[18] This also applies to the alpha terms and there is strong evidence of abnormal returns. The firm-specific variables also have a significant impact in the beta equations for several firms, and for them all, according to the multivariate test. The firm-specific terms in the alpha equation are significant at the 5%-level for three firms but the probability value for the Bonferroni statistic is only 9.5%. Overall, these variables are more important as means for determining risk exposures than as indicators of abnormal returns.

5 The Effects of Consensus Forecasts in the Asset Pricing Model

As was mentioned in the Introduction, the use of concensus forecast data should give rise to better, more precise, models than the corresponding models with accounting data. In short, these forecasts should be more relevant for a firm's value than historical accounting data. In this section, the same model as in the previous section is estimated, but consensus forecasts of this year's earnings, instead of the latest accounting data for earnings, are used. Forecasts of next dividend per share are used instead of latest dividends, and forecasted net asset value is substituted for the accounting value. A measure of firm uncertainty is also included: a degree of consensus measure. This is defined as the average absolute deviation, within the consensus, from the average expected earnings for the present year. The firm capitalisation and

[18] Except possibly for the exchange rate factor for which the firm Electrolux dominates the Bonferroni test.

lagged exchange rate and yield spread are the same as in the previous section. All variables are used in first differences due to non-stationarity in levels. The results of various tests are shown in Table 7. For most firms, the fit is worse than for the previous model. There is a problem with non-normality in one of the regressions and there are some indications of instability for a few firms.

The tests are slightly different now,[19] since the question is whether the forecaster's revisions can be used to model betas and/or alpha. For instance, the tests in column 1 can be seen as tests of whether the revisions can predict abnormal returns when one control for their information about betas. Such predictability is found for only one firm, SSAB, but the prob-value is low enough to give a significant Bonferroni statistic. For two firms, Astra and SSAB, we find that the revisions are useful for modelling the risk exposures. Again, the prob-values are sufficiently low to render the multivariate statistic significant at the five per cent level in two of the tests for significant parameters in the beta equations. Multicollinearity and over-parameterisation probably plague the results, but the usefulness of the forecasts in this context must be questioned. In the next two sections, it is further investigated whether the models with forecasted variables in the regressors are better, in a sense defined below, than the models with accounting data based variables.

[19] The multivariate test of all alpha terms being zero is also rejected here at a low level.

6 Reduction of the Initial Models

In this section, we reduce the initial general unrestricted models from the two **previous** sections to models that are more parsimonious. This modelling strategy was chosen for the following reasons. First, in order to get "clean" tests in the previous sections, a specification was selected and then not tampered with. This makes conventional statistic inference possible, without having to worry about discounting for pretesting, searching for anomalies, etc. However, this also lead to over-parameterisation, which is evident from the many insignificant F-tests in the previous sections. Second, we want to compare consensus data based models with accounting data based models. This is not possible with such large models as we used earlier.

The reduction is done for each specification by successively deleting parameters and trying to minimise the Schwartz criterion (SC).[20] An effort is made to reduce as much as possible to safeguard against finding spurious relationships due to over-parameterisation. This means that the reductions are continued as long as the SC increases, even if it means that the specification tests reject below the O.l%-level. The reduction search is moderated with n&-specification tests to avoid self-contradictions. Tests are done for residual autocorrelation, heteroskedasticity, and non-linearity. Additionally, the residuals are required to be normally distributed, to make better inferences despite the small sample. Furthermore, it is required that the parameters be

[20] This is given by SC = $\ln \hat{\sigma}^2 + \frac{K \ln T}{T}$, where K is the number of parameters. This statistic, when minimised, selects the "correct" model with probability one as the sample size goes to infinity, and it penalises large models more than other standard criteria.

stable. The tests of this latter property are performed with recursive Chow-tests of various forms.[21] Tests at the five per cent level are used for the tests of autocorrelation and non-normality. Otherwise, in an attempt to control the overall significance level without sacrificing too much test power, the one per cent level is used. The best models are displayed in Tables 8 and 9. First, in Table 8, one sees that for most firms, the final model is much reduced in relation to the initial general unrestricted model. Exceptions to this property are the firms Atlas Copco, Electrolux, Skandia and Skanska. For these firms, one can do more reductions without creating obvious mis-specifications. However, these reductions increase the SC and/or are rejected at very low significance levels in the F-tests. As was mentioned previously, the split sample Chow tests do not reject, for any firm, that these chosen final specifications are stable. With no obvious mis-specification at hand, one can go on and discuss the estimated parameters.

In Table 8 one sees that it was justified to use all the accounting measures in the initial general unrestricted model; it was impossible to get completely rid of any of these variables. For eight firms the firm-specific attributes are included in our best models. These attributes matter for the alpha term for four firms. However, two of these t-values are below 2.5.

The most striking result is the predictive power of the lagged change in the yield

[21] See the manual for PC-GIVE, which we use for all estimates. In addition to the pre-programmed Chow-tests, we also tested all specifications for structural breaks in the middle of the sample period. These tests are never significant at the five per cent level.

spread. The t-values for this parameter are in the interval 3.3 to 3.9. Moreover, for several other firms, the second best models also contain this variable. It was checked that this effect was not due to the predictive power of the short interest rate since there is some evidence that short-term interest rates can predict returns for portfolios.[22]

In Table 9 the best models from consensus data are shown.[23] These models are in general more parsimonious than the corresponding accounting data based specifications. This suggests that the consensus data has less explanatory power than the accounting data. The F-tests in the previous section hinted at this. In addition, changes in both the price earnings ratio, and the degree of consensus measure, stand out as the most important variables among the consensus variables, One can see that the predictive power of lagged changes in the yield spread also holds when consensus data is used. This effect is significant for six firms. The degree of consensus variable, ΔSpr_t, is significant for five firms.[24] However, given the reduction search, only one t-value can be considered large (above 3.5). The predictive power of these two lagged variables are often significant, and while this rejects mean-variance efficiency,

[22] See, for example, Campbell et al. (1997, Chapter 7).

[23] We do not show the results for the firms that were identical to the estimates based on accounting data.

[24] This variable is also important for the firms SKF and SCA, but leads to instability according to the Chow tests. For SKF one can actually replace the market index with this variable, and the specifications will mutually encompass each other. However, the explanatory power of the regression with ΔSpr_t included instead of the market index is much reduced. For SCA the degree of consensus measure actually has some significant predictive power for the market index.

the effect on the excess rates of return is seldom above one per cent, which is small compared with the effect of the contemporaneous market index.

In both data sets, the change in the yield spread is a significant predictor of returns. In a recent article,[25] an empirical study was conducted to analyse the predictive power of the yield spread in several European countries and the US. This variable (in level) contains information about future inflation, growth of GDP, and recessions. This predictability seems to be highest for a 1-2 years horizon for real variables, and for up to a five year horizon for inflation. There is a positive relation between the yield spread, growth of GDP, and inflation. There is also a negative relation with the probability of a recession one year ahead.[26] They show that the yield spread is influenced by monetary policy, but that it also contains independent information about the above mentioned variables. Consequently, the common factor explanation that both future real activity and the yield spread are determined by current monetary policy can not be the whole truth. It is hazardous to generalise their results to Sweden, but it is plausible that they have found a general pattern for all the European countries.[27] It is then possible, when markets are not fully efficient, that the yield spread can have an independent[28] effect especially on stocks that are cyclical and interest rate sensitive.

[25] Estrella and Mishkin (1997).

[26] Ibid pp. 13841397.

[27] We are not aware of any comparable study using Swedish data.

[28] That is, having an effect after controlling with the market index, the exchange rate, and the contemporaneous yield spread.

The predictive effects of the yield spread and the degree of consensus variable in the sample stands out for cyclical shares from the sectors: capital goods, construction, steel and paper/packaging. The degree of consensus variable is a proxy for the standard deviation of the consensus forecast and thus captures information about changes in forecaster's uncertainty about this year's earnings. As such, the variable is likely to pick up firm-specific information not captured by simply taking the mean of the consensus forecasts. This degree of consensus variable, together with the mean of the earnings, probably mirrors the importance of this year's earnings for the stock prices. The parameter for the degree of consensus variable is, in general, significant for the same companies as those that are predictable with the yield spread. However, the sign vary among the companies. That this sign is not uniformly positive makes it difficult to view this parameter as reflecting some kind of ARCH in mean effect.[29] If it were such an effect, it would indicate an own-variance factor, reflecting residual risk.[30] Instead it seems plausible, when markets are not fully efficient, to view this variable as a complement to the yield spread, both variables simply contain unused information that lead to predictive power for abnormal returns.

[29] In a recent article, Bomberger (1996) shows that, regarding consensus forecast data for inflation in the US, there is a stable and significant relationship between disagreement within the consensus and uncertainty. He measure uncertainty with ARCH-models.

[30] It could, of course, also be a sign of mis-specification.

7 A Comparison of the Models: Do the Models Based on Forecasting Data Encompass the Models Based on Accounting Data?

In this section, a comparison is made, for each firm, between models from the two data sets. This is done with encompassing and out-of-sample forecast tests. The outline of the section is as follows. First the encompassing principles are briefly discussed, followed by the empirical tests. Then out-of-sample forecast tests are conducted for each firm, using the reduced specifications. Finally, a slightly different model is estimated with consensus data, and additional encompassing tests are done.

Encompassing[31] deals with the question of whether one model can explain the results from another model. There are different levels of encompassing, though here only specification encompassing is used. Assume that one has a true data generating process (DGP), M_0, and two alternative specifications M_1 and M_2. The corresponding density functions are:

$$\begin{aligned} M_0 &: D_y(y \mid \theta),\ \theta \in \Theta \subseteq R^p \\ M_1 &: D_1(y \mid \lambda),\ \lambda \in \Lambda \subseteq R^k \\ M_2 &: D_2(y \mid \delta),\ \delta \in \mathrm{A} \subseteq R^n \end{aligned} \tag{11}$$

Here y represents a sample while the Greek letters symbolises, respectively, parameters and parameter spaces (the capital letters). R^n stands for n-dimensional Euclidean spaces, and so on. The population encompassing difference between M_2 and the

[31] We follow Hendry's book here, see Hendry (1995, pp. 506-512). Note that encompassing tests are also an evaluation of a model with information that was not used in the estimation itself.

prediction of M_2 based on M_1 is:

$$\varphi_\delta(\theta_p) = \delta(\theta_p) - \phi_{21}(\lambda(\theta_p)). \tag{12}$$

Now, model M_1 is said to encompass model M_2, with respect to δ if $\varphi_\delta = 0$. The meaning of this is that model M_2 can explain the results of M_1. This need not hold for all population parameters and, despite the dependence on population parameters, the concept is not limited to the situation in which one of the models is true. The next important concept is the minimal nesting model M_m which is defined as the smallest model that nests both M_1 and M_2. The interpretation of this is that both these models can be derived, with reductions, from this minimal nesting model. This model M_m arises naturally in a general-to-specific modelling strategy. In a simple-to-general strategy, M_m is an ambiguous concept, since models can be expanded in a multitude of ways. Still following Hendry, model M_1 is said to parsimoniously encompass M_2 if it is nested within M_2 and if it encompasses it, i.e. can predict it's results. Hendry then goes on to show that M_1 parsimoniously encompasses M_2 if and only if it encompasses M_m. Several encompassing tests can be derived from the encompassing difference and the covariance matrices of the estimated models. Hendry also shows that, for linear regressions, variance encompassing is a necessary condition for specification encompassing. However, it is not sufficient since a best-fitting model might not have stable parameters, it might be over-fitted, or it may fail in some other dimension.

The tests are reported in Table 10. First, for four firms the best models are identical so for these firms none of the specifications encompass the others. There are five cases where the models from accounting data unilaterally encompass the other models. For four firms, the consensus-based models unilaterally encompass their rivals. Finally, for one firm, Astra, both models fail to encompass each other, indicating that each specification contains information that the other model does not include. The weak result for the consensus data based models is hard to swallow since the analysts have access to all historical data; in fact, that is the basis for their forecasts. One can observe that, in general, the accounting data based models are larger. Despite the thorough tests for mis-specification as well as for stability, the Schwartz criterion as the basis for selection of models might lead to over-fitting. One can do a limited check of this matter by testing whether the specifications fit out of sample. The models which are estimated with the sample from June 1992 to August 1997 are used, and then one-step-ahead predictions are made for the four observations from the period September to December 1997. Of course, such forecasts are not truly out of sample since there is a conditioning on contemporaneous risk premia. Although there are few observations to predict, the test is not completely without power, since the "crisis" caused by the Asian turmoil is included. The results from this exercise are presented in Table 11. The specifications, on both data sets, perform badly for four firms: Aga, Electrolux, SKF and Stora. For two of the firms, Aga and Electrolux, the χ^2-statistic[32] rejects at the 5%-level (or lower). For the other two firms, the

[32] This statistic is worse than the corresponding Chow-statistic; it does not take into account that the parameters in the conditional mean are estimated. The prob-values for these Chow-tests are,

t(3) test statistic of unbiased forecasts is rejected at below the 1%-level. Finally, for Atlas Copco the χ^2-statistic rejects on accounting data, but not on consensus data. There does not seem to be any serious over-fitting in the previous estimates, since the largest models are not rejected, and the forecasts are reasonably good. The consensus data based models give only slightly better predictions so this can not be used to discriminate between the specifications. This is explained by the dominating influence of the market index, which is included in both classes of specifications.

Summarising the results of this section so far, in only four out of fourteen firms, does a model based on consensus forecasts data unilaterally encompass the other specification from accounting data. How can one explain this weak result for the models from consensus data? One possible explanation, which is relevant for both the alpha and the beta terms, is that our specification blurs the informational distinction between revisions of forecasts and price changes so that, with prices included in both types of specifications, one cannot separate the effects.[33] This would constitute a small sample problem. Under the assumption that the consensus indeed has exclusive information that is not reflected in the lagged price changes, that is the stock market is not fully efficient, it would still be difficult for us to discover this information in the form of significant alpha terms. Another explanation is that most of the useful information, including the consensus information, is already included in the lagged stock prices and the lagged accounting data. Adding predicted earnings would not

however, similar to the χ^2-tests, see Table 11.

[33] The **ratios are differenced and the resulting terms enter multiplicatively.**

matter. This latter explanation implies that the stock market is efficient with respect to the consensus information.

The forecasts are public about a week before the last trading date each month, and then a limited number of agents have direct access to them since they are not free of charge. Granting the possibility of an incorporation of the consensus information into the stock prices through trading, the meaningful issue is whether the consensus has information that is not fully exploited in the market.

One can analyse this blurring of price and forecast changes, and the question of efficiency with respect to the consensus information, by modelling the returns without including the lagged stock prices, and then check whether these specifications can unilaterally encompass their rival models from accounting data (with prices included). If these consensus-based models can indeed encompass their rivals one can say that the consensus has additional information that is not incorporated into the prices. The results from this encompassing exercise are shown in Table 12.

The best consensus data based models are chosen, using the same criteria as earlier.[34] The comparison with the accounting data based models is now slightly more favourable for the consensus models. Compared with Table 10, two additional cases of encompassing can be recorded. For Astra the consensus based model encompasses the accounting data based model but not vice versa. Previously, the balance was slightly in favour of the consensus based model, and when prices are deleted, this tendency is

[34]The reduced models are shown in Table 13. When the best models are identical for both data sets, the estimates are shown in Table 8.

strengthened. Stora is an additional case; previously the same best model was gotten from both data sets.

Comparing tables 10 and 12, there is no reversal of the ranking of the models for each firm. Except for the firm Astra, the cases where the consensus data based models unilaterally encompass the accounting data based models are all dominated by the degree of consensus variable, which is an alpha term. This means that, given our three-factor model for returns, the stock market is not fully efficient with respect to the consensus information. However, this inefficiency seems to be mostly related to a variable that is a by-product of the consensus, a variable that is related to higher moments of the expected earnings distributions.

8 Conclusions

Several factors are needed to model returns, and the risk exposures are time varying. This time variation can be modelled with accounting based valuation variables. The firm-specific alpha terms are not significant so the lagged firm attributes are here mostly associated with risk. The evidence for mis-pricing with respect to the exchange rate is weak, and the multivariate test of no influence from the lagged exchange rate rejects only at a higher than ten per cent level. There is, however, a significant contemporaneous exchange rate exposure. There is also a significant return predictability from lagged changes in the yield spread. Accordingly, the asset pricing model is rejected since the alpha equations contain parameters that are significant at low levels.

The consensus forecasts that were used in the general unrestricted model have some predictive power for abnormal returns, which was not the case for the models based on accounting data. This predictability suggests that the market is not efficient with respect to the consensus information. There is also some explanatory power for the exchange rate exposure. The forecasts are of little use in specifications of exposures to market risk or interest rate risk. When modelling the market beta, there are significant (at 5%) effects for only three firms. There is clear evidence of return predictability for only one firm, but it should be noted that these unrestricted regressions are overly parameterised, and the tests suffer from low power, as later reductions show.

The reduced models with accounting data based firm attributes reinforce the test results from the initial unrestricted models; lagged firm attributes are mainly associated with risk exposures. The corresponding results for the models with attributes from consensus data are not so clear cut. That lagged firm attributes are associated with abnormal returns comes mainly from the degree of consensus variable, which is not a proper firm attribute that researchers normally use. Many risk exposure parameters have high absolute t-values in Table 9 so even with this data set the lagged firm attributes are mainly associated with risk exposures.

The striking results from the reduced models are the predictive power of the lagged changes in the yield spread and the degree of consensus variable. The effect of the degree of consensus information is small but statistically significant below 5% for five firms. In addition, for several companies, the change in the expected earnings variable, either in itself or as a price earnings ratio, can be used in specifications of risk exposures.[35]

Using encompassing tests for the reduced models, the two classes of models are equally good for three firms. For five firms the accounting data based specifications encompass the consensus forecasts data based models, without themselves being encompassed. In six cases (from the most favourable comparison for the consensus-based models without prices) do the forecast-based models unilaterally encompass the other models.

Finally, the out-of-sample forecasts shows no signs of over-fitting. In fact, the four firms for which the forecasts reject stability are among the smallest models. For these firms, the consensus variables are of little or no use in modelling.

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[35] Three of these t-values in Table 9 are above four in absolute value.

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Table 1: Research teams included in the consensus

Research Team	Country
Aros Securities, Carnegie	Sweden
Bg Bank, Danske Bors, Jyske Bank	Denmark
Kleinwort-Benson	UK
UBS	Switzerland

Table 2: Sector classification and international listing of firms

Firm	Economic sector[1]	New York	London	Other
AGA	Energy		x	x
Astra	Consumer nondurables	x	x	
Atlas Copco	Capital goods		x	x
Electrolux	Consumer durables	x	x	x
Ericsson	Capital goods	x	x	x
Modo	Paper/packaging			
Sandvik	Capital goods			
SCA	Paper/packaging	x	x	
Skandia	Insurance		x	x
Skanska	Construction			
SKF	Capital goods	x	x	
SSAB	Metal/steel			
Stora	Paper/packaging		x	x
Volvo	Consumer durables	x	x	x

Note: [1]As classified by Associés en Finance.

Table 3: Descriptive data for the monthly return on the market index, the percentage change of the MERM, and the first difference of the yield spread

Statistic	Market index	Merm	Yield spread
Mean	1.488	0.403	0.004
Std. dev.	6.267	2.806	0.174
Skewness	0.700	2.285	1.940
Exc. kurtosis	2.690	9.880	25.371
Normality	14.393	30.605	174.690
Q(1)			
Q(3)	0.098 5.700	4.610 5.119	8.450 8.780
Q(12)	17.400	19.460	16.510

Comments: The market index and the yield spread are expressed in percentages per month. Critical values at the 5%-level are for the Normality-test $\chi^2(2)=5.99$, $Q(1)=3.84$, $Q(3)=7.84$, and $Q(12)=21.03$.

Table 4: Descriptive data for firms' rates of return

Statistic	Aga	Astra	Atlas copco	Electro-lux	Erics-son	Modo	Sandvik
Mean	0.912	1.520	2.241	1.560	4.137	2.132	1.881
Std. dev.	6.780	7.403	7.773	9.861	12.141	13.106	8.009
Skewness	0.146	0.665	0.496	0.669	1.086	1.259	0.155
Exc. kurtosis	1.365	2.726	0.215	0.546	4.386	4.450	-0.231
Normality	8.386	15.090	2.782	5.269	19.610	16.970	0.301
Q(1)	1.413	0.093	0.465	0.478	1.000	0.014	2.868
Q(3)	2.508	4.852	0.792	8.886	6.114	0.918	12.380
Q(12)	16.180	12.740	15.200	18.930	16.720	19.790	28.150

	SCA	Skandia	Skanska	SKF	SSAB	Stora	Volvo
Mean	1.109	2.470	2.450	1.202	2.773	1.522	1.853
Std. dev.	9.108	14.131	14.559	9.544	10.703	11.661	10.913
Skewness	1.952	1.277	1.815	0.023	0.711	1.878	1.358
Exc. kurtosis	7.952	5.835	8.331	0.199	2.560	8.397	3.847
Normality	24.120	24.840	25.340	1.138	13.200	24.770	14.990
Q(1)	0.188	0.454	0.058	1.265	4.100	2.468	0.222
Q(3)	3.743	8.088	9.023	4.272	1.643	7.934	1.361
Q(12)	14.030	32.990	18.100	16.880	16.570	26.410	7.991

Comments: See the previous table.

Table 5: Q-statistics for the first differences of the following ratios: price/earnings, price/book, and dividend/price

Firms		Q(1)		Q(3)		Q(12)	
		Accounting	Consensus	Accounting	Consensus.	Accounting	Consensus
Aga	P/E	0.633	2.142	1.227	3.675	19.140	20.370
	P/B	0.142	0.120	1.338	0.511	8.108	7.446
	D/P	0.739	0.899	1.277	4.138	13.360	17.020
Astra	P/E	0.121	0.215	3.942	3.501	5.361	13.360
	P/B	0.739	0.048	3.939	2.468	10.750	9.604
	D/P	0.456	1.993	0.838	2.362	6.234	10.880
Atlas	P/E	0.782	0.011	2.584	0.444	24.960	14.240
Copco	P/B	1.462	1.112	1.890	1.294	13.280	15.490
	D/P	0.173	1.281	2.442	1.597	15.440	11.170
Electro-	P/E	0.000	0.023	6.672	14.810	19.820	26.100
lux	P/B	1.085	0.486	11.720	11.170	26.070	21.740
	D/P	0.156	0.272	0.834	0.388	12.990	9.261
Ericsson	P/E	0.503	3.189	1.820	6.118	15.990	33.420
	P/B	5.439	2.339	6.121	6.083	17.930	13.560
	D/P	0.004	1.108	4.673	2.941	12.670	16.550
Modo	P/E	0.192	0.994	0.680	7.628	30.280	36.190
	P/B	0.543	2.494	1.623	3.187	21.580	14.650
	D/P	0.082	0.382	1.014	2.255	13.060	7.882
Sandvik	P/E	0.077	1.973	9.398	13.370	24.010	39.500
	P/B	2.869	2.415	14.000	2.802	27.320	13.220
	D/P	0.030	0.559	2.786	1.083	12.950	6.507
SCA	P/E	0.005	1.816	0.078	1.862	12.660	17.720
	P/B	0.533	0.242	0.889	1.425	5.202	10.820
	D/P	0.279	0.056	3.165	0.169	14.550	13.820
Skandia	P/E	0.136	5.563	0.201	6.559	3.126	10.550
	P/B	3.113	1.002	5.216	2.142	16.070	11.540
	D/P	0.274	11.980	1.768	11.980	40.970	13.360
Skanska	P/E	0.029	17.930	0.135	18.630	41.950	34.460
	P/B	0.332	1.002	3.508	2.142	16.770	11.540
	D/P	0.619	11.980	7.661	11.980	36.380	13.360

Table 5: Continued

Firms		Q(1)		Q(3)		Q(12)	
		Accounting	Consensus	Accounting	Consensus	Accounting	Consensus
SKF	P/E	0.029	17.330	1.080	18.240	17.440	20.440
	P/B	2.957	0.020	5.065	0.165	26.390	5.483
	D/P	0.005	2.075	0.209	14.970	8.043	33.770
SSAB	P/E	0.212	0.142	0.294	1.686	23.570	62.200
	P/B	0.192	0.616	1.993	9.485	17.000	18.850
	D/P	1.322	0.015	2.770	1.966	7.359	8.141
Stora	P/E	0.094	14.110	0.288	16.810	32.240	39.660
	P/B	1.514	2.042	4.286	6.772	15.870	14.130
	D/P	0.002	0.400	3.353	3.826	16.420	11.370
Volvo	P/E	0.068	4.151	0.066	5.395	2.758	63.200
	P/B	0.041	0.881	0.676	2.260	9.608	5.235
	D/P	0.145	0.352	5.408	4.799	30.170	9.605

Comments: Critical values for the Q-statistic at the 5%-level are: Q(1)=3.84, Q(3)=7.84), Q(12)=21.03.

Table 6: Tests based on specification (10), accounting data

Firm	Alpha F(7,39)	Alpha F(4,39)	$Merm_t$ F(1,39)	Ys_t F(1,39)	Tv beta F(12,39)	Market F(5,39)	Ys F(5,39)	Merm F(5,39)	$\overline{R}^2$
Aga	0.625	0.352	0.375	0.336	0.582	0.010	0.678	0.886	0.59
Astra	0.006	0.007	0.144	0.062	0.005	0.000	0.029	0.008	0.73
Atlas	0.231	0.455	0.044	0.094	0.028	0.000	0.100	0.544	0.74
Electrolux	0.008	0.015	0.014	0.596	0.000	0.000	0.052	0.001	0.85
Ericsson	0.152	0.121	0.974	0.766	0.420	0.000	0.475	0.140	0.70
Modo	0.075	0.677	0.236	0.012	0.262	0.000	0.185	0.454	0.80
Sandvik	0.616	0.770	0.183	0.417	0.603	0.000	0.834	0.762	0.75
SCA	0.610	0.609	0.393	0.436	0.862	0.001	0.476	0.721	0.77
Skandia	0.716	0.544	0.895	0.579	0.221	0.002	0.000	0.199	0.74
skanska	0.015	0.007	0.007	0.012	0.001	0.000	0.106	0.031	0.91
SKF	0.069	0.063	0.738	0.005	0.175	0.000	0.038	0.108	0.76
SSAB	0.001	0.010	0.170	0.000	0.072	0.000	0.044	0.144	0.80
Stora	0.656	0.476	0.258	0.711	0.970	0.000	0.859	0.903	0.82
Volvo	0.857	0.881	0.350	0.548	0.501	0.000	0.582	0.381	0.75
Bonferroni	0.017	0.095	0.101	0.001	0.003	0.000	0.004	0.014	

Comments: Alpha F(7,39) is a test of the hypothesis that all alpha terms are zero. The seven alpha terms are a constant, lagged exchange rate, lagged yield spread, price/earnings, price/book, dividend/price and capitalisation. Except for the constant, all these variables are in first differences. Alpha F(4,39) is a test of the null that the firm-specific alpha terms are zero. $Merm_t$ F(1,39) is a test of the hypothesis that the lagged exchange rate can predict returns, while Ys_t F(1,39) is the corresponding test for the lagged change of the yield spread. Tv beta F(12,39) is a test that all varying beta coefficients are zero. The remaining test statistics refers to the significance of each of the factors. Bonferroni is the multivariate test that was previously discussed. Prob-values are given in the cells.

Table 7: Tests based on specification (10), consensus forecast data

Firm	Alpha $F(4,38)$	All betas $F(9,38)$	Market beta $F(3,38)$	Merm beta $F(3,38)$	Ys beta $F(3,38)$	$\overline{R}^2$
Aga	0.130	0.737	0.261	0.952	0.939	0.59
Astra	0.158	0.012	0.010	0.302	0.046	0.75
Atlas	0.160	0.527	0.318	0.727	0.324	0.65
Electrolux	0.950	0.910	0.647	0.813	0.867	0.73
Ericsson	0.064	0.908	0.431	0.817	0.838	0.70
Modo	0.132	0.618	0.718	0.814	0.693	0.81
Sandvik	0.329	0.793	0.713	0.916	0.590	0.78
SCA	0.324	0.296	0.145	0.280	0.091	0.79
Skandia	0.280	0.366	0.407	0.273	0.334	0.76
Skanska	0.389	0.189	0.273	0.161	0.975	0.89
SKF	0.354	0.388	0.514	0.502	0.236	0.75
SSAB	0.002	0.000	0.012	0.000	0.027	0.86
Stora	0.141	0.226	0.047	0.123	0.689	0.86
Volvo	0.834	0.971	0.890	0.743	0.939	0.74
Bonferroni	0.024	0.001	0.143	0.006	0.307	

Comments: Alpha $F(4,38)$ is a test of the hypothesis that all alpha terms that are based on forecasts are zero. These alpha terms are the price/earnings, dividend/price, price/book ratios and the degree of consensus measure. All betas $F(9,38)$ is a test of the null that the firm-specific beta terms that are based on forecasts are zero. The next three columns contain the corresponding tests for each factor in turn. Bonferroni is a multivariate test. Prob-values are given in the cells.

Table 8: Reduced models from the specification (10), accounting data

Firms	Constant			$\Delta(Cap)_t$				$\Delta(\frac{P}{E})_t$				$\Delta(\frac{P}{B})_t$			$\Delta(\frac{D}{P})_t$				ΔYs_t	$(\frac{\Delta merm}{merm})_t$
	β_M	β_{merm}	β_{Y_t}	α	β_M	β_{merm}	β_{Y_t}	α	β_M	β_{merm}	β_{Y_t}	β_M	β_{merm}	β_{Y_t}	α	β_M	β_{merm}	β_{Y_t}	α	α
AGA	0.71																			
	(0.10)																			
Astra	0.86												0.62							
	(0.10)												(0.22)							
Atlas Copco	0.92									1.10		-5.00	-7.99			-3.85				0.58
	(0.12)									(0.33)		(1.58)	(3.94)			(1.57)				(0.23)
Electrolux	1.28			31.49				1.19		1.39	-53.2		-19.63	1,245.7						
	(0.11)			(12.61)				(0.36)		(0.35)	(15.6)		(7.56)	(366.7)						
Ericsson	1.27	1.19																		
	(0.18)	(0.40)																		
Modo	1.39																		20.56	
	(0.17)																		(6.13)	
Sandvik	1.22		-12.16																-17.21	
	(0.11)		(3.93)																(4.39)	

Table 8: Continual

Firms	Constant			Δ(Cap)$_t$				Δ(P/E)$_t$				Δ(P/B)$_t$			Δ(D/P)$_t$				ΔYs_t	$\left(\frac{\Delta merm}{merm}\right)_t$
	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	α	α
SCA	0.93																		15.32	
	(0.12)																		(4.31)	
Skandia	1.23					-16.37				-0.20	10.42		10.06		4.36	-0.74				
	(0.20)					(2.76)				(0.04)	(1.51)		(4.60)		2.11)	(0.20)				
Skanska	1.55	0.86	-46.8				341.5	1.21	-0.23				-10.58					106.9	29.09	-0.98
	(0.13)	(0.38)	(13.2)				(137.7)	(0.27)	(0.04)				(2.99)					(27.6	(7.50	(0.29)
SKF	1.12			15.60		8.95													20.46	
	(0.14)			(7.87)		(2.71)													(5.41)	
SSAB	1.31		-14.97																	
	(0.14)		(5.23)																	
Stora	1.31				-4.37															
	(0.14)				(1.49)															
Volvo	1.36																1.16			
	(0.13)																(0.46)			

Comments: Standard errors are given in parentheses. For notation, α is a constant, β_M is the market beta, β_{merm} is the exchange rate beta, β_{Ys} is the yield-spread beta.

Table 9: Reduced models from the specification (10), consensus forecast data

Firms	Constant			$\Delta(Cap)_t$				$\Delta\left(\frac{P}{E}\right)_t$				$\Delta\left(\frac{P}{B}\right)_t$			$\Delta\left(\frac{D}{P}\right)_t$				ΔYs_t	ΔSpr_t
	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	α	α
Astra	0.77 (0.10)									0.50 (0.17)										
Atlas Copco	0.92 (0.12)																-3.23 (1.66)			
Electrolux	1.32 (0.12)								-0.06 (0.03)											
Ericsson	1.34 (0.17)	0.90 (0.39)																		-1.06 (0.40)
Modo	1.32 (0.17)																		23.85 (6.22;	-0.19 (0.09)
Sandvik	1.21 (0.1 I)		-11.20 (3.83)																-16.13 (4.23)	0.18 (0.07)
Skandia	1.23 (0.20)										-0.88 (0.11'		-6.07 (2.47)							

Table 9: Continued

Firms	Constant			$\Delta(Cap)_t$				$\Delta(\frac{P}{E})_t$				$\Delta(\frac{P}{B})_t$			$\Delta(\frac{D}{P})_t$				ΔYs_t	ΔSpr_t
	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	β_M	β_{merm}	β_{Ys}	α	β_M	β_{merm}	β_{Ys}	α	α
Skanska	1.60								0.08							1.27			-0.74	0.20
	(0.13)								(0.02)							(0.38)			(0.29)	(0.09)
SSAB	1.10		27.G					-0.45	-0.07	0.17								-44.39	37.13	-0.42
	(0.13)		(11.1)					(0.22)	(0.03)	(0.04)								(12.86)	(9.04)	(0.10)
Volvo	i.37																			
	(0.13)																			

Comments: Standard errors are given in parentheses. For notation, α is a constant, β_M is the market beta, β_{merm} is the exchange rate beta, β_{Ys} is the yield-spread beta.

Table 10: Encompassing and nested tests, I

Firm	M_1 vs M_2	M_2 vs M_1	Nested
Astra			
Cox N(0,1)	-1.79 (0.07)	-0.98 (0.33)	
Ericson N(0,1)	1.69 (0.10)	0.94 (0.35)	
Sargan χ^2	1.90 (0.17)	0.70 (0.40)	
Joint model F	1.93 (0.17)	0.69 (0.41)	
Atlas			
Cox N(0,1)	0.37 (0.72)	-13.63 (0.00)	
Ericson N(0,1)	-0.35 (0.72)	11.12 (0.00)	
Sargan χ^2	0.14 (0.71)	18.32 (0.00)	
Joint model F	0.13 (0.72)	4.86 (0.00)	
Electrolux			
Cox N(0,1)	-1.50 (0.13)	-12.86(0)	
Ericson N(0,1)	1.38 (0.17)	10.65 (0.00)	
Sargan χ^2	1.06 (0.30)	16.55 (0.00)	
Joint model F	1.06 (0.31)	3.44 (0.01)	
Ericsson'			F(1,58)=6.97 (0.01)
Modo[1]			F(1,58)=4.27 (0.04)
Sandvik[1]			F(1,57)=6.29 (0.02)
Skandia			
Cox N(0,1)	0.26 (0.78)	-3.12 (0.00)	
Ericson N(0,1)	-0.25 (0.80)	2.79 (0.01)	
Sargan χ^2	4.15 (0.13)	10.47 (0.11)	
Joint model F	2.17 (0.12)	1.91 (0.10)	
Skanska			
Cox N(0,1)	-1.67 (0.10)	-8.68 (0.00)	
Ericson N(0,1)	1.45 (0.15)	6.15 (0.00)	
Sargan χ^2	4.73 (0.19)	24.79 (0.00)	
Joint model F	1.63 (0.19)	4.76 (0.00)	
SSAB[1]			F(6,53)=8.21 (0.00)
Volvo2			F(1,59)=6.34 (0.02)

Comments: M_1 is the model from accounting data while M_2 is the model based on forecasting data. The tests are, in order of appearance, a Cox test of variance encompassing, an Ericsson instrumental variables test of variance encompassing, a Sargan test for the restricted reduced form parsimoniously encompasses the unrestricted reduced form which is implicitly defined by projecting the dependent variable on all of the unmodelled variables, and finally, the F-test is a test for each model parsimoniously encompassing their union. The fourth column contains nested F-tests where [1] means that the model from accounting data is the null while [2] means that the model from forecasting data is the null hypothesis. Prob-values are given in parentheses.

Table 11: Out-of-sample forecast tests

Firm	Model	$\chi^2(4)^{1)}$	Chow F(4,T-k)[2)]	t(3)[3)]
Aga	M_1	10.64 (0.03)	2.57 (0.05)	-0.21 (0.83)
Astra	M_1	4.32 (0.36)	1.04 (0.40)	1.36 (0.17)
	M_2	5.25 (0.26)	1.26 (0.30)	1.04 (0.30)
Atlas Copco	M_1	13.75 (0.01)	1.83 (0.14)	-0.76 (0.45)
	M_2	0.82 (0.94)	0.19 (0.94)	0.40 (0.69)
Electrolux	M_1	19.00 (0.00)	4.32 (0.00)	-0.12 (0.90)
	M_2	18.08 (0.00)	3.94 (0.01)	0.26 (0.80)
Ericsson	M_1	3.30 (0.51)	0.81 (0.81)	-0.43 (0.67)
	M_2	5.37 (0.25)	1.29 (0.28)	-0.32 (0.75)
Modo	M_1	3.02 (0.55)	0.72 (0.58)	-1.46 (0.14)
	M_2	3.50 (0.48)	0.83 (0.51)	-1.50 (0.14)
Sandvik	M_1	0.96 (0.92)	0.24 (0.91)	-0.74 (0.46)
	M_2	1.15 (0.89)	0.29 (0.89)	-0.84 (0.40)
SCA	M_1	2.43 (0.66)	0.61 (0.66)	0.43 (0.67)
Skandia	M_1	6.48 (0.17)	1.57 (0.20)	0.97 (0.33)
	M_2	6.46 (0.17)	1.59 (0.19)	1.48 (0.14)
Skanska	M_1	1.71 (0.79)	0.38 (0.82)	0.51 (0.61)
	M_2	1.31 (0.86)	0.31 (0.87)	0.95 (0.34)
SKF	M_1	2.82 (0.59)	0.69 (0.60)	-6.66 (0.00)
SSAB	M_1	4.18 (0.38)	1.04 (0.39)	-1.61 (0.11)
	M_2	8.13 (0.09)	1.96 (0.11)	-1.51 (0.13)
Stora	M_1	7.09 (0.13)	1.54(0.20)	-4.22(0.00)
Volvo	M_1	1.35 (0.85)	0.32(0.86)	0.99(0.32)
	M_2	1.25 (0.87)	0.30(0.88)	0.96(0.34)

Comments: M_1 refers to the model estimated with accounting data while M_2 refers to the model estimated with consensus forecast data. Prob-values are given in parentheses.

Notes: [1)] A test of parameter constancy: $\sum_{t=T+1}^{T+H} \frac{e_t^2}{\hat{\sigma}_u^2}$, where the numerator is a squared residual from the forecast period, and the denominator is the estimated variance. [2)] Test of parameter constancy: $\left[\left(RSS_{T+H} - RSS_T\right)/H\right]/\hat{\sigma}_u^2$. The numerator contains the difference in residual sum of squares between-out-of-sample and in-sample. [3)] Test of bissedness: The mean of out of sample residuals divided by estimated standard deviation.

Table 12: Encompassing and nested tests, II

Firm	Test	M_1 vs M_2	M_2 vs M_1	Nested
Astra	Cox N(0,1)	-2.96 (0.00)	-1.81 (0.07)	
	Ericson N(0,1)	2.74 (0.01)	1.70 (0.09)	
	Sargan χ^2	3.78 (0.15)	1.68 (0.19)	
	Joint model F	1.95 (0.15)	1.70 (0.20)	
Atlas	Cox N(0,1)	-0.55 (0.58)	-15.02 (0.00)	
	Ericson N(0,1)	0.51 (0.61)	12.43 (0.00)	
	Sargan χ^2	0.24 (0.89)	13.85 (0.01)	
	Joint model F	0.12 (0.89)	4.25 (0.01)	
Electrolux	Cox N(0,1)	-3.01 (0.00)	-20.12 (0.00)	
	Ericson N(0,1)	2.80 (0.01)	16.31 (0.00)	
	Sargan χ^2	2.00 (0.57)	18.13 (0.00)	
	Joint model F	0.65 (0.58)	3.96 (0.00)	
Ericsson'				F(1,58)=6.97 (0.01)
Modo[1]				F(1,58)=4.27 (0.04)
Sandvik[1]				F(1,57)=6.29 (0.02)
Skandia	Cox N(0,1)	1.21 (0.22)	-5.40 (0.00)	
	Ericson N(0,1)	-1.20 (0.22)	4.33 (0.00)	
	Sargan χ^2	1.84 (0.61)	15.42 (0.02)	
	Joint model F	0.60 (0.62)	3.15 (0.01)	
Skanska	Cox N(0,1)	-0.82 (0.41)	-12.47 (0.00)	
	Ericson N(0,1)	0.73 (0.46)	8.64 (0.00)	
	Sargan χ^2	1.01 (0.60)	27.42 (0.00)	
	Joint model F	0.49 (0.61)	5.68 (0.00)	
SSAB	Cox N(0,1)	-7.23 (0.00)	-1.96 (0.05)	
	Ericson N(0,1)	6.27 (0.00)	1.83 (0.07)	
	Sargan χ^2	10.10 (0.01)	1.89 (0.17)	
	Joint model F	5.88 (0.01)	1.93 (0.17)	
Stora	Cox N(0,1)	-8.69 (0.00)	-1.28 (0.20)	
	Ericson N(0,1)	7.14 (0.00)	1.20 (0.23)	
	Sargan χ^2	14.09 (0.00)	1.06 (0.30)	
	Joint model F	5.88 (0.00)	1.06 (0.31)	
Volvo[2]				F(1,59)=6.34 (0.02)

Comments: See Table 10 for explanations.