Risk Factors in the Returns for Banks in the European Union

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Abstract

The thesis applies and extends the Fama French 3-factor model on public banks in the European Union by using data from 2007 to 2013. Market excess return has similar significance as it does in Fama and French (1993), while SMB and HML perform less well than expected, particularly for smaller banks, suggesting that additional factors might be needed to fully explain the returns, particularly for the smaller banks. The three-factor model is extended by adding two factors formed on book leverage and net interest margin, where the later is special for the banking sector. The statistical tests indicate that both of these factors might be potentially useful risk factors in explaining stock returns as well.

Keywords: Risk factors, Stock returns, Fama French 3-factor model

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1 Introduction

The banking sector has an immense impact on financial markets and a great influence in an economy as a whole. As a consequence the performance of the banking sector influences people's lives, countries, regions, even the economic stability of the whole world. Explaining and predicting stock returns is a classic area of interest for research.

1.1 The Aim of the Study

In this study we aim to answer the following questions:

- How well do the factors from the Fama-French three-factor model explain stock returns of public banks in the European Union?
- What additional factors may help explaining more of the returns?

To answer these question the Fama-French three-factor model as well as its factors are tested on stock returns for banks in the European Union. Additional factors, which also can work as proxy for different risks, are first tested individually. Later some are used to extend the three-factor model. The additional factors studied are factors based on leverage, earnings-price ratio, net interest margin and net charge-offs, as well as factors based on the slope of term structure for risk free rates as well as change of risk free rates.

Nine portfolios are formed based on the intersections of 3*3 sorts on size and value. To test the consistency of the results the quintile portfolios based on leverage, earnings-price ratios, size, value, net interest margin and net charge-offs are also used.

Due to limitations concerning availability of data the study is limited to the period from 2007 to 2013.

1.2 Comparison to Previous Work

While the Fama-French 3-Factor model is widely spread, the focus of the model has in general not been at financial firms. Schuermann and Stiroh (2006) is one of those focusing on this sector, but their extension of the model focuses on factors not directly related to the banks, such as change in interest rates and commercial paper spreads. The study of Viale et al. (2009) is similar to Schuermann and Stiroh (2006), and it includes momentum as an additional factor but does not look into additional factors based on any other financial measures.

This study on the other hand attempts an extension of the Fama-French 3-Factor model using factors based on the return premiums related to different financial measures, while also including factors used by Schuermann and Stiroh (2006). Various papers examining risk factors in the financial sector, such as Angbazo (1997), are also checked, and the risk factors found are incorporated into the Fama-French set-up.

1.3 The Results

The results show that market excess return has as much explanatory power as in the study by Fama and French (1993) with an average R^2 of 0.72 for the nine portfolios formed by size and value. When using the quintile-based portfolios based on the financial ratios and measures the mean R^2 is up to 0.82 with far less variance among the portfolios.

The explanatory power of SMB and HML alone varies tremendously from portfolios to portfolio, a result also very consistent both in magnitude of variance among the portfolios and absolute levels with Fama and French (1993). Combined with market excess return the explanatory power of the model increases, but it only reaches the levels in the results of Fama and French for the larger size portfolios. The traditional three-factor model has far less explanatory power for the smaller-size portfolios, supporting the results by

Schuermann and Stiroh (2006). Testing the first set of results using the other set of portfolios these original results still holds, even though the difference in average R^2 is less extreme compared to Fama and French.

The factor based on book leverage has a coefficient that is highly significant even when paired with the traditional three factors, but only for some portfolios and the same applies to the factor based on net interest margin. This is on the other hand the case for both SMB and HML as well. Using the quintile portfolios, at a 10% significance level all four, HML, SMB and the factors based on book leverage and net interest margin, are significant for approximately the same number of portfolios, while at the 1% level HML and the factor based on net interest margin are the winners.

The changes in risk free rate as well as the slope of term structure have very low explanatory power. When they are paired with market excess return they are not significant at all at a 1% level either.

None of the models pass the GRS F-test of testing the hypothesis that all intercepts are zero, which is the case in Fama and French (1993) as well. While some of the portfolios show clear signs of heteroscedasticity adjusting for these does only produce minor changes.

1.4 Implications

While the market excess return performs well as expected, the Fama-French 3-Factor model only performs as expected for some of the portfolios. This could be due to the narrow and turbulent time period or the small sample size but it might also suggest that there are other factors reflecting risks that might be important for banks when explaining and predicting stock returns. If so, the choice of factors based on size and value might need to be complemented with other factors. Both a factor based on book leverage and a factor based on net interest margin could be suitable candidates.

2 Previous Literature

Fama and French have been doing studies to explore factors that can explain stock returns for decades. In their study of cross-section of expected stock returns (Fama and French, 1992) they study effects of market beta, size measured as market capitalization, earnings-price ratio, leverage and book-to-market equity in the cross-section of average stock returns. The study uses NYSE, AME and NASDAQ stocks during the time period 1963-1990 to test their hypotheses. Financial firms are excluded due to certain values of these measures would have different meanings to financial firms compared to non-financial firms.

Market beta has little impact both when it is used alone or in combination with other variables. Size, earnings-price ratio, leverage and book-to-market equity have explanatory power when they are used alone, but in combination only size, and book-to-market equity have explanatory power on stock returns. The explanation given is that size and book-to-market equity seem to absorb the apparent roles of earnings-price ratio and leverage when they are used in combination.

2.1 The Fama-French 3-Factor Model

Based on their results in 1992, Fama and French (1993) study common risk factors in the returns on both stocks and bonds. Monthly returns on stocks and bonds are regressed on the returns to a market portfolio of stocks and mimicking portfolios for size, book-to-market equity(BE/ME), and term structure risk factors in returns(a term premium and a default premium). In order to generate the size premium factor SMB and the value premium factor HML the samples are assigned to one of six portfolios depending on size (small or big stocks) and value (value, neutral or growth stocks). SMB is the difference of the average return of small firms and big firms. HML is the difference of the average return of value stocks and growth stocks. Fama and French found that the common variation in stock returns is largely captured by the market, size and value factors while the commonn variation in bond returns is largely explained by two bond factors, term premium and default premium. The study by Fama and French (1993) created the popular three-factor model for asset pricing.

Both the study from 1992 and the one from 1993 use data of non-financial firms in the US market. Financial firms are excluded due to because the financial firms have a quite different structure from common stock firms (non financial firms).

Fama and French (2012) extends their study to international scope by dividing the world into four regions according to the markets' integration. Europe is one of the regions. Using the same 4-factor model, different regions do not have same results, but the main factors (market, size, value and momentum) have explanatory power, even though not in same level for all regions.

2.2 Application for Financial Firms

Even though the Fama and French model came to existence by analyzing non financial firms and Fama and French have not claimed the model can be used directly on financial firms, the model might still be useful for financial sector. Schuermann and Stiroh (2006) extends the three-factor model to financial area with the purpose of finding visible and hidden risk factors for banks. Besides the market excess return, SMB and HML, six other factors are used: market volatility, the slope of term structure, change in yield, two types of commercial credit spreads and liquidity.

According to Schuermann and Stiroh (2006) market excess return is the most important factor for banks, followed by the other two Fama-French factors, which is consistent with what Fama and French (1993) finds. Schuermann and Stiroh (2006) also claims that the market volatility and liquidity are relevant for all firms, but the change of the yield, the change in the slope of the term structure and credit spreads are only relevant for banks.

Differences between small and large banks are also noticed by Schuermann and Stiroh (2006). Large banks do not require special risk factors, which can be seen in the general significance of the standard Fama-French factors, and the general insignificance of the other interest rate related factors thought to be relevant for banks. The returns of small banks on the other hand appear to be partially driven by bank-specific risk factors, particularly the yield curve and credit spreads. This divergence is reasonable if these institutions lack the scale or expertise to successfully leverage modern risk management tools like interest and credit derivatives according to Schuermann and Stiroh (2006).

Viale et al. (2009) compare three different models for explaining excess stock returns in the banking sector and found no evidence of that firm specific factors, like the SMB and HML, are priced in stock returns. Instead the best performing model in the study was a version of the CAPM-model that includes the shocks to the slope of the yield curve.

2.3 Other Risk Factors For Banks

Angbazo (1997) examines default risk and interest rate risk for commercial banks and claimed that the net interest margins of commercial banks reflect both default and interest rate risk premiums. The ratio of net charge-offs to average loans is studied due to the assumption that NCO/AL is related with default risk. From study of Angbazo we know that net interest margin and NCO/AL are important variables to reflect bank risks so these two variables are included in our study as risk factors as well.

3 Data

The main source of data for this study is the database Orbis (Dijk, 2014), from which bank specific information is extracted. Additionally official Euribor rates are used as risk free rates. The data set is limited to firms classified by Orbis as banks within the current 28 member states in the European Union. Fama and French (2012) shows that market integration is an important factor for the success of the Fama-French model, and that local models result in a better fit than global models for Europe. By limiting the data set to the European Union a level of market integration and similar regulation is a reasonable assumption.

3.1 Time Period

While key numbers for banks are available from 2005 to 2013, monthly stock returns are only available from 2007, which limits the range of data for this study to the period from 2007 to 2013. The formation of portfolios follows the method used by Fama and French (1992, 1993, 2012), where firm data from year t is used to form portfolios by June year $t+1$. This is to ensure the firm information has reached the market and that the market has had time to respond to the information. The time it takes for the market to absorb the yearly accounting data counting from the end of December is of course not identical for each bank, especially since the accounting year might not end in December for every bank, which means that an additional uncertainty is introduced into the data.

3.2 Global Factors

3.2.1 Risk Free Rate

Euribor is an abbreviation for Euro Interbank Offered Rate. The Euribor rates are based on the average interest rates at which a large panel of European banks borrow funds from one another. There are different maturities, ranging from one week to one year. In this study Euribor has been used as a proxy of risk free rate. While US Treasury bill rate is commonly used as a proxy for risk free rate for studies on the US market, such data would introduce the variations within the US market as a factor. By using Euribor rates such an introduction is avoided.

3.2.2 YIELD and TERM

The change of the yield and the change of the slope of the term structure are related with interest rate risk (Schuermann and Stiroh, 2006). In our study these two variables are also included. Two factors YIELD and TERM are created accordingly. YIELD here is defined as one period change of yield, and is calculated by subtracting 1 month risk free rate of previous month from 1 month risk free rate of current month. TERM is the monthly change of the difference between 12 month risk free rate and 1 month risk free rate. Here Euribor rates with 1 month and 12 months maturity are used as corresponding risk free rates to calculate the change of yield and term Structure.

3.3 Firm Specific Data

3.3.1 Firm Return

Returns for each firm here refer to stock returns. The stock returns are calculated using monthly closing prices, so the return for month t refers to the return from the end of month t-1 to the end of month t. Monthly excess return is calculated by subtracting the corresponding risk free monthly rate of the same time period from the stock return.

3.3.2 Size and Value

Size is measured by market equity, ME, also called market capitalization. BE/ME, the ratio of book equity to market equity, is a measure of value. Both size and value follow the standard definition used in the Fama-French model.

Barber and Lyon (1997) found that size is related to profitability, even when controlling for other factors such as book-to-market ratio. Small firms tend to have higher returns than larger firms, an effect that seems to be exaggerated and prolonged during recessions. They argue that this suggests that size is a proxy for a risk factor that explains the negative relation between size and average return.

Fama and French (1992) gives two alternative explanations to why higher value firms tend to have higher stock returns compared to lower value firms. The risk captured by the ratio could be a relative distress factor, which then makes a high BE/ME ratio work as a signal to the market that the firm has poor prospects, and firms that the market deem to have poor prospects have higher expected stock returns as they are penalized by higher costs of capital. Their alternative explanation is that BE/ME just captures the irrational market expectations of the future of the firm, which would essentially suggest a reversed causality. While the reason behind the connection might not be the clearest, both the results from 1992 and 1993 from Fama and French clearly supports the positive correlation between value and returns.

Barber and Lyon (1997) argues that there is no reason to expect that size or value has a different meaning for financial institutions compared to non-financial firms. The results of their study supports this argument and they are unable to reject the hypothesis that size and value premium differs between the different markets. This suggests that the results by Fama and French in their cross sectional approach should still hold for financial firms. Based on the results from Barber and Lyon (1997) size and value are used in our study as well.

Brown et al. (2008) demonstrate that stocks with negative book equity are disproportionately represented in extreme growth–value sectors while these stocks are small in number, and therefore they can have an impact on applications where value is defined in terms of book equity. According to Brown et al. both practitioners and academics typically omit such stocks in their analysis. Due to the same reason, firms with negative book equity have been excluded from the data in our study.

3.3.3 Leverage

Fama and French (1992) study the effects of leverage on excess stock returns, arguing that a high leverage level would be associated with financial distress. The ratio of book assets to market equity, A/ME, is interpreted as a measure of market leverage and the ratio of book assets to book equity, A/BE, as a measure of book leverage. Using the logarithm of the measures Fama and French found that market leverage is positively correlated with excess stock returns, consistent with Bhandari (1988) while book leverage has a negative correlation, both significant. Fama and French do however exclude financial firms due to higher leverage being normal for these firms. While an overall higher leverage level might not make it useful to compare financial firms with non-financial firms in this aspect, it does not mean that leverage for financial firms necessarily has a different behaviour, relative to their own normal level of leverage.

3.3.4 Earnings-Price Ratio

The earnings-price ratio, E/P, is the earnings per share divided by the share price. Ball (1978) suggests that the ratio might be proxy for a wide range of risks. The results of Ball however imply that it is the difference between announced and expected E/P rather than the announced E/P itself that is of importance.

Fama and French (1992) however argue that if the current earnings-price ratios proxy for expected future earnings, high risk stocks with high expected returns will have low expected price relative to their earnings, which would mean that the earnings-price ratio would be positively correlated with excess return, something their study also confirms. This is however limited to firms with a positive E/P ratio, which is explained by the dependence on positive earnings for the ratio to function as a proxy for expected returns. In our data set there is however no observations with negative earnings-price ratio so there is no need to separate firms based on negative or positive earnings.

3.3.5 Net Charge-Offs

Net charge-offs, NCO, are the difference between loans actually written off and recoveries on loans previously classified as noncollectable, a measure for the amount of bad loans a bank has. Normalized by the average loans for each bank it is the fraction of loans deemed to be noncollectable, which is used by Angbazo (1997) as a measure of credit risk. A larger risk exposure would suggest a higher stock return, and NCO/AL would then be positively correlated with stock returns. However Angbazo (1997) notices a relationship between NCO/AL and size of the banks, where the larger banks tend to have higher NCO/AL rates. This would suggest that the impact of NCO/AL on stock returns might already be incorporated by including size as a factor in the model.

3.3.6 Net Interest Margin

Net interest margin, NIM, is the difference between interest income and interest expense divided by interest earning assets. The results of Angbazo (1997) suggest that net interest margin is positively correlated with a number of different financial risk factors and that a higher overall risk level also tends to be connected with a higher net interest margin. This would imply that banks with higher net interest margins would exhibit higher stock returns.

3.4 Portfolio Creation

Following the procedure of Fama and French (1992, 1993, 2012), portfolios are formed based on firm-specific data. As there is a delay between the publication of the yearly financial data and the fiscal year ending a delay in the markets reaction to the financial reports is expected. To make sure the market has had a chance to respond to the information, Fama and French form portfolios by June year t, using the financial data from year $t-1$, and the same method is used here. This does however exclude size, for which the data from June is used.

The stocks will remain in their assigned portfolios for one year, at which point the stocks will be assigned to another set of portfolios. The portfolios in each set are numbered from 1 to N, N being the number of portfolios in the set, where 1 consists of the firms with the lowest values of the variable used to form the portfolios and N consists of the firms with the highest values.

Nine size-value portfolios are formed by first assigning stocks to both a size and a value portfolio, using the breakpoints of 30th and 70th percentile for each measure. The intersection of the sorts on size and value create nine portfolios where each portfolio has a specific size and value profile. These portfolios are created to both mimic the different factors used to explain the returns but also to create well-diversified but also different portfolios.

The choice of nine as opposed to the twenty-five portfolios used by Fama and French (1992, 1993) is due to the smaller data set. If using the larger number of portfolios some portfolios during some months would only contain one stock due to using the intersections to form the size-value portfolios, even though the total number of firms in all portfolios would still remain around one hundred.

Quintile portfolios are also created based on size, value, leverage, monthly return, NCO/AL, NIM and earnings-price ratio. The cut-offs here between the portfolios are the 20th, 40th, 60th and 80th percentiles. The sets of quintile portfolios serve as a mean to investigate the relationship between the explanatory variables and the returns of the portfolios as well as a mean to test whether the results for the nine size-value portfolios are sensitive to the number of portfolios.

3.5 Firm-Based Factors

3.5.1 Market Excess Return

The monthly market return is calculated as the average monthly stock return of all the firms within our sample for each month, weighted by the size of the firms measured with the market capitalization of that month. The monthly market excess returns is calculated by subtracting the monthly risk free rate from the monthly market return.

As the market excess return here is the market excess return for the banking industry in a specific geographic market it is reasonable to expect it to reflect behaviour of the portfolio returns better than using a general market return which includes other sectors as well.

3.5.2 SMB and HML

The factors SMB and HML from Fama and French (1993) are factors capturing the premiums due to size and value. They are calculated using stock returns, market capitalization and book-to-market ratio. SMB is an abbreviation for "Small Minus Big", referring to size, and HML for "High Minus Low" referring to value.

By June each year each stock is assigned to one size portfolio, small or big, based on the market capitalization that month, and to one value portfolio based the book-to-market ratio calculated using the market capitalization from December the year before and the book equity from the last fiscal year. The highest 30% are called value stocks and the lowest 30% book-to-market banks are called growth stocks, and those between value and growth stocks are called neutral stocks. The intersections of the two size portfolios and the three value portfolios form six portfolios, for which average returns weighted by market capitalization is calculated.

The factor SMB is the average return of the small portfolios minus the average return of the big portfolios. The factor HML is the average return of the high value portfolios minus the average return of the low value portfolios.

3.5.3 Additional Factors

In addition to the Fama-French factors new factors based on book leverage, market leverage, earnings-price ratio, net interest margin and net charge-offs over average loans are generated.

These factors are constructed in a similar way as HML. Using the financial data from year t-1 each stock is assigned to one of three portfolio for each measure, by June year t for the following 12 months. This is done using the 30th and 70th percentiles as breakpoints between the three portfolios. The factor for variable X for each month is then the weighted return of the portfolio containing the 30th percentile and down minus the weighted return of the portfolios containing the 70th percentile and up. This would let the factor based on variable X to represent the return premium due to having a small value of variable X.

4 Methodology

4.1 Choice of Methods

While a cross-sectional approach to the explanation of stock returns could have been an obvious choice, Black et al. (1972) shows that this approach can be misleading as a test of significance due to the structure of the process. Instead they present a time-series approach to test significance, which is also used to test the validity of the CAPM-theorem. Here, under the assumption of normal distribution, if the model holds the intercept should be zero

$$R_{jt} = a_j + B_j RM_t + \epsilon_{jt}$$

The test is however still inefficient as it just makes use of one data set, while there are stock data available for many firms. To solve this aggregation problem the tests are run on grouped data, by forming portfolios and regress the portfolio returns on the market returns. The portfolios should be grouped to allow for maximum dispersion among the coefficients in the regressions. An issue does however arise if the coefficients are not stationary through time for each firm, Black et al. (1972) solves this by reforming the portfolios yearly.

Fama and French (1993) extends the model by adding additionally explanatory factors other than market excess return, using excess return due to size, SMB, and excess return due to value profile, HML. By using factors rather than the raw average size and value of each portfolio the properties allowing a test of the model by testing the intercept's significance still holds. It also avoids making the assumption that the effect on the portfolio excess return by value and size is stationary. As size and value are the firm-related measures of main interest portfolios based on these factors are constructed.

This study will continue on using the same method as Fama and French use in their 1993 paper, but in a slightly adapted version due to the introduction of other factors. The main tests will be conducted using the same value-size portfolio assignment as per Fama and French (1993) but our selection of additional distributions of portfolios to be used in the final tests will be based on the factors introduced. Due to the changes in financial regulations and the financially turbulent time period the data set covers it is hard to argue stationarity concerning the firms properties and exposure. This makes the approach by Black et al. (1972) and Fama and French (1993) far more suitable than the cross-sectional approach used by Fama and French 1992.

4.1.1 Intercepts

The intercepts of all models are also analyzed in order to compare the effectiveness of different models. Both mean absolute value (MAV) of the intercepts and GRS F-tests (Gibbons et al., 1989) are used for this purpose. MAV is simpler, and it suggests that the model which produce the lowest MAV is the best model to explain variation in the dependent variable (Billou, 2004).

GRS F-tests test the null hypothesis that all intercepts of a model equal to zero. The GRS F-statistic follows a F-distribution with A and C-A-B degrees of freedom, A being the number of regressions, B the number of explanatory variables in the regression and C the number of observations, under the assumption that the returns and the explanatory variables are normally distributed and that the true intercepts are zero.

A higher F-statistic means that the hypothesis that all intercepts are zero can be rejected on a higher confidence level, which would then signify less probability that the intercepts are truly zero based on the observations and then naturally a less well-fitting model.

4.1.2 January effect

Keim (1985) among others shows that stock returns tend to be higher during January. While this is especially true for smaller sized stocks, even when controlling for size this January effect remained. Fama and French (1993) argues that looking for this January effect is now standard when testing asset pricing models, arguing that even if the January effect is only partially due to a sampling error there might be a bias towards rejection for the model.

4.2 The Process

The investigation has three main steps. First off the data set is analyzed. Portfolios based on size, value, leverage, net charge-offs, net interest margin, earnings-price ratio and return are created. The properties of these portfolios are used as an informal test to give a clue of what relationships are to be expected. Factors are formed and analyzed independently, while a test of correlations between them is also performed.

Secondly the nine portfolios based on size and value are used to run regressions using different sets of explanatory factors to explain the value weighted excess stock returns. Both significance of coefficients for the different factors, explained variance by the model and the test of the intercepts being equal to zero are used to judge the performance of the models.

Finally the models are tested. By applying it to portfolios formed on other variables than size and value the greatest variation between the portfolios on these variables is achieved. Tests of the intercepts for both sets of portfolios using both the MAV test and the GSR F-test are then done. Finally a test for the January effect is also performed, together with test of heteroscedasticity and least-absolute-deviation regressions.

5 Results

5.1 Properties of the Portfolios

5.1.1 Returns of the Quintile Portfolios

Table 1 on page 23 shows the means and the variances of the weighted monthly returns on portfolios formed on leverage, value, earnings price ratio, size, net charge-offs and net interest margin respectively.

The portfolios based on net charge-offs show a clear positive correlation, the higher the ratio of net charge-offs to average loans, NCO/AL, the higher the stock returns. If ignoring the first quintile a decreasing trend is visible for net interest margin. Ignoring the first two quintiles we see a increasing trend for the portfolios based on both book and market leverage ratios. No trend can be seen for the portfolios based on book-to-market ratio and size. The returns of portfolios formed on E/P have the u-shape documented by Fama and French (1992). The standard deviations of the returns on the portfolios are high, suggesting that none of these factors alone is enough to explain the differences in returns between the portfolios.

Using portfolios formed on stock returns June each year, summary of average key figures per portfolio is presented in Table 2 on page 24. There is a potential trend for stocks with lower returns to have higher average assets to equity ratios. The stocks with lower returns also on average tend to have higher value, larger size and higher E/P ratio. The trends for net interest margin and net charge-offs seen in table 2 are no longer clear.

5.1.2 Properties of the Size-Value Portfolios

Summary statistics of the properties of the stocks in the nine size-value portfolios are presented in table 3.

We can see that the numbers of banks in the nine portfolios formed on different size and value are far more evenly distributed between the portfolios

Table 1: Returns for Portfolios Based on Various Properties

	Q1	Q2	Q3	Q4	Q5
			Mean		
A/BE	-0.30	0.12	-0.44	-0.06	0.29
A/ME	0.07	-0.23	-0.06	-0.05	0.43
BE/ME	-0.05	-0.24	0.48	-0.43	0.70
E/P	0.51	-0.03	-0.19	-0.20	1.23
ME	0.60	0.02	0.33	-0.16	0.07
NCO/AL	-0.44	-0.09	0.25	0.62	0.96
NIM	0.22	0.30	-0.05	-0.09	-0.18
			Median		
A/BE	0.55	0.38	-0.02	-0.17	0.47
A/ME	1.22	-0.52	0.11	-0.28	0.58
BE/ME	-0.31	-0.56	1.21	0.03	-0.76
E/P	1.12	0.06	-0.26	0.52	1.19
ME	0.26	-0.20	-1.00	0.36	0.52
NCO/AL	0.99	-1.86	0.62	0.51	0.83
NIM	0.89	0.01	-0.20	0.48	0.08
			Standard Deviation		
A/BE	5.96	6.67	9.51	9.56	10.87
A/ME	6.51	9.04	8.31	10.41	12.14
BE/ME	8.28	8.36	9.79	10.83	11.84
E/P	9.65	9.08	9.61	9.52	13.54
ME	4.54	6.39	7.97	9.16	10.03
NCO/AL	10.79	13.56	11.29	11.01	10.99
NIM	9.92	11.86	9.57	8.22	9.88

At June each year stocks are assigned to portfolios for the following 12 months based on the their A/BE. The return, weighted by market capitalization, is calculated for each portfolio for each month. Here the mean, median and the standard deviation for the return on each portfolio by month is presented. For each portfolio there is observations for 78 months. Q1 refers to the quintile with the stocks with the lowest value of the measure, Q5 to the highest.For each portfolio there is one observation per month for 78 months.

Table 2: Properties for Portfolios Based on Return

	R1	R2	R3	R4	R5
	Mean				
A/BE	14.97	13.74	11.74	10.52	12.42
A/ME	35.80	24.52	18.61	20.82	17.55
BE/ME	1.84	1.39	1.28	1.30	1.16
E/P	0.20	0.20	0.21	0.17	0.12
Firms	48.41	51.52	46.66	45.49	44.77
ME	8.86	12.81	11.41	8.95	8.44
NCO/AL	0.60	0.32	0.54	0.30	0.51
NIM	2.51	2.27	3.02	3.95	2.88
	Median				
A/BE	15.75	14.24	11.21	10.29	11.02
A/ME	30.46	22.03	19.11	20.36	17.36
BE/ME	1.75	1.34	1.31	1.27	1.27
E/P	0.19	0.18	0.19	0.17	0.12
Firms	48.00	51.00	49.00	46.00	47.00
ME	7.15	9.65	11.01	10.75	7.70
NCO/AL	0.45	0.13	0.39	0.35	0.50
NIM	2.25	2.31	1.93	2.52	2.63
	Std				
A/BE	3.95	1.76	2.73	0.89	3.57
A/ME	20.88	8.12	5.46	6.99	8.62
BE/ME	0.86	0.51	0.38	0.32	0.50
E/P	0.07	0.06	0.09	0.07	0.02
Firms	2.85	3.56	5.69	3.71	4.14
ME	4.50	5.46	6.11	3.96	3.82
NCO/AL	0.45	0.36	0.45	0.29	0.33
NIM	0.87	0.94	2.75	3.66	1.81

At June each year stocks are assigned to a portfolio for the following 12 months based on the stock returns for the last month, with one quintile in each portfolio. R1 refers to the portfolio with the lowest stock returns and R5 to the highest. Then the average A/BE, A/ME, BE/ME, E/P, ME, NCO/AL and NIM are calculated for each portfolio for each period. The number of firms in each portfolio each month is also calculated. This table shows the mean, median and standard deviation for each portfolio for these monthly measures. For each portfolio there is one observation per month for 78 months.

Table 3: Properties of the 9 Size-Value Portfolios

	BE/ME								
ME	1	2	3	1	2	3	1	2	3
	A/BE			A/ME			BE/ME		
1	11.95	11.78	18.57	6.42	12.19	44.60	0.60	1.09	2.45
2	16.79	14.26	13.91	9.59	17.93	36.69	0.59	1.28	2.53
3	14.32	20.02	23.85	9.78	21.94	51.13	0.66	1.19	2.14
	E/P			ME			Fraction of Total ME		
1	0.08	0.13	0.16	1.46	1.41	1.59	1.26	1.58	1.02
2	0.09	0.11	0.1	3.88	3.56	3.75	4.86	5.01	4.02
3	0.10	0.11	0.11	27.52	32.15	24.22	16.79	36.21	24.29
	NCO/AL			NIM			Firms		
1	0.78	-0.02	0.10	9.06	2.46	1.27	8.86	10.71	6.86
2	0.68	0.33	-0.11	0.47	2.06	1.36	13.29	14.43	10.86
3	0.58	0.47	0.36	2.49	1.76	1.30	6.14	12.29	10.43

By June each year stocks are assigned to a size (ME) portfolio based on the ME of the stock at the this time and a value (BE/ME) portfolio based on the BE from the year before and the ME at the end of the same year. The three ME and BE/ME portfolios use 30% and 70% breakpoints. The intersections of these size portfolios form 9 portfolios. The yearly average of the mean value of book leverage (A/BE), market leverage (A/ME), value (BE/ME), earnings-price ratio (E/P), size (ME), fraction of total market, net charge-offs over average loans (NCO/AL), net interest margin (NIM) among the firms in each portfolio are presented in this table.

than in the study of Fama and French (1993), in which they found that the portfolios in the smallest size quintile have the most stocks. This might be due to the construction of the breakpoints for the portfolios, here the full sample is used while Fama and French chose to use NYSE breakpoints to achieve a more even distribution of total value between the portfolios. With our far smaller sample, such a distribution would have left some of the portfolios close to empty. The fewer the number of stocks in each portfolio, the heavier the impact of each stock will be on the portfolios performance.

Despite the more even distribution of the number of firms the average annual percent of market value in each portfolio is actually more evenly spread between the portfolios here. This is most likely due to the range of firm size within the sample here being far smaller. The portfolios with the largest average firm size have a size 20 times the ones of the smallest, while for Fama and French (1993) the largest portfolio is 239 times the smallest.

For each set of same size portfolios, the banks with higher book-to-market ratio tend to have higher market leverage, suggesting a correlation that would mean that differences in returns due to market leverage could well be covered by using the book-to-market factor, HML. Book leverage does not show the same clear tendency, and neither does net interest margin or net charge-offs over average loans.

5.2 The Variables in the Regressions

5.2.1 The Factors

Table 4: Descriptive and Auto-Correlation for Factors Used In Regressions

	Mean	St. Dev.	t(Mean)	Lag 1	Lag 2	Lag 12
A/BE	-0.04	6.38	-0.06	0.15	-0.15	0.00
A/ME	-0.24	7.08	-0.30	0.29	-0.18	0.01
E/P	0.11	7.06	0.14	-0.02	-0.13	0.02
HML	0.41	5.07	0.71	0.07	-0.21	-0.07
LTRF	2.11	1.55	11.94	0.99	0.97	0.49
NCO/AL	-1.14	7.24	-1.39	-0.34	-0.14	-0.22
NIM	0.32	5.27	0.54	-0.01	-0.14	-0.03
RF	1.47	1.63	7.91	0.99	0.97	0.53
RM	-0.72	8.91	-0.71	0.26	-0.11	0.15
RM-RF	-2.11	9.65	-1.92	0.36	0.04	0.15
SMB	0.01	5.16	0.02	0.20	-0.23	0.05
TERM	0.00	0.14	-0.03	-0.33	0.24	0.19
YIELD	-0.05	0.25	-1.79	0.39	0.30	-0.07

The table shows the mean, standard deviation and the t-statistic for the factors used in the regressions later on in the paper. It also shows the auto correlation with the value of the factor one month(Lag1), two months(Lag2) and twelve months back(Lag12). A/BE, A/ME, E/P, NCO/AL and NIM refer to the factors that are based on these variables. HML and SMB refers to the same factors in the Fama-French thre-Factor model. LTRF refers to the long term risk free rate, here 12-month Euribor rate. RF refers to the 1 month risk-free Euribor rate. $TERM_t = (LTRF_t - RF_t) - (LTRF_{t-1} - RF_{t-1})$ and $YIELD_t = RF_t - RF_{t-1}$. RM is the value-weighted market return for the sample used in this study. RM-RF is the market excess return.

Table 4 on page 26, presents summary statistics for the different factors generated. The mean values of the explanatory variables are the average risk premiums due to the variable the factor is constructed on (Fama and French, 1993).

The means for both book and market leverage are negative, suggesting that on average firms with higher A/BE or A/ME ratio have higher returns than the stocks with lower leverage ratios, the opposite to the expected mean for book leverage. At the same time the standard deviations are high for both factors based on leverages and neither is significantly different from zero.

The mean for the factor based on E/P is negative, which indicates that firms with higher earning price ratios on average have lower excess stock returns, the opposite of what would be expected, but the high standard deviation means nothing can be said for certain. The factor based on net charge-offs is on average negative, as expected. The means for HML and SMB are both positive, which also is expected, though the mean for SMB is very close to zero. The average of the SMB factor is 0.01%, which means the average premium for the size related factor in returns is 0.01% per month (t=0.02). The mean of HML factor is 0.41% (t=0.71) meaning that the average premium for the value related factor is 0.41% per month. The mean of HML is quite big, but its t-statistics is still small.

The mean for the factor based on net interest margin is positive, suggesting that on average a firm with low net interest margin has a higher excess return, but once again the standard deviation is very large. The average value of RM-RF is -2.1134% per month. This average market premium is big and negative, but its t-statistics is -1.92 which means average monthly market premium is marginally significant (different from 0).

The average premium for the change of Yield is -0.05%(t=-1.79) which is very small and marginally different from 0. The average premium for the change of term structure is even smaller (-0.0005%, t=-0.03) and is not different from zero. Both YIELD and TERM's volatility are much smaller than that of RM-RF, SMB and HML, that's why RM-RF, SMB and HML work very well in explaining common variations in stock returns (shown in later tests), while the change of yield and term structure can not capture much variation in stock returns.

5.2.2 Autocorrelations

As for autocorrelation, the only really high autocorrelation found is between the risk free rate and the long term risk free rate with one and two lag, with a quite high correlation a year back as well. The factor based on NCO/AL has a negative autocorrelation with one lag of -0.34, YIELD has an autocorrelation to the last month of 0.39 and market excess return's autocorrelation to the previous month is 0.36.

5.2.3 Correlations

There are a few very high correlations between the explanatory variables that pop up when examining the correlations between them, see Table 5 on page 29. The market and book leverage factors are highly correlated (0.82), which suggest that using one of them might be sufficient. Almost the same level of correlation (0.83) can be found between SMB and the factor based on book leverage, suggesting that the use of SMB as a factor might capture the effect of book leverage as well. Between HML and the market leverage factor there is a similar, but negative, correlation (-0.75), which could mean that the effect of both types of leverage might already be captured by the Fama-French factors.

The long term risk free rate and the short term risk free rate are highly correlated (0.99) , which is expected. Both YIELD and TERM are essentially uncorrelated with anything but themselves, where a negative correlation of -0.48 was found.

Market return and market excess return are also highly positively correlated (0.99). Market excess return also has a strong negative correlation with the factors based on market leverage (-0.74) and book leverage (-0.70) as well

Table 5: Correlations For Factors in Regressions

	A/BE	A/ME	E/P	HML	LTRF	NCO /AL	NIM	RF	RM	RM -RF	SMB	TERM	YIELD
A/BE	1.00	0.82	0.46	-0.51	0.17	0.02	-0.58	0.18	-0.77	-0.74	0.83	0.01	-0.12
A/ME	0.82	1.00	0.41	-0.75	0.18	-0.28	-0.69	0.18	-0.72	-0.70	0.68	0.01	-0.06
E/P	0.46	0.41	1.00	-0.27	0.14	0.32	-0.19	0.13	-0.37	-0.37	0.47	-0.06	0.01
HML	-0.51	-0.75	-0.27	1.00	-0.03	0.40	0.55	-0.02	0.50	0.46	-0.32	0.05	-0.03
LTRF	0.17	0.18	0.14	-0.03	1.00	-0.02	-0.12	0.99	-0.35	-0.49	0.12	0.04	-0.02
NCO /AL	0.02	-0.28	0.32	0.40	-0.02	1.00	0.28	-0.01	0.01	0.01	0.10	-0.19	0.15
NIM	-0.58	-0.69	-0.19	0.55	-0.12	0.28	1.00	-0.12	0.46	0.44	-0.44	-0.05	0.07
RF	0.18	0.18	0.13	-0.02	0.99	-0.01	-0.12	1.00	-0.36	-0.50	0.14	0.00	-0.01
RM	-0.77	-0.72	-0.37	0.50	-0.35	0.01	0.46	-0.36	1.00	0.99	-0.74	0.16	0.13
RM-RF	-0.74	-0.70	-0.37	0.46	-0.49	0.01	0.44	-0.50	0.99	1.00	-0.71	0.15	0.12
SMB	0.83	0.68	0.47	-0.32	0.12	0.10	-0.44	0.14	-0.74	-0.71	1.00	-0.05	-0.16
TERM	0.01	0.01	-0.06	0.05	0.04	-0.19	-0.05	0.00	0.16	0.15	-0.05	1.00	-0.48
YIELD	-0.12	-0.06	0.01	-0.03	-0.02	0.15	0.07	-0.01	0.13	0.12	-0.16	-0.48	1.00

The table shows the correlation between the different factors used in the regressions later on. A/BE, A/ME, E/P, NCO/AL and NIM refers to the factors based on these variables. HML and SML refers to the factors in the Fama-French 3-Factor model. LTRF refers to the long term risk free rate, here 12-month Euribor rate. RF refers to the 1 month risk-free Euribor rate. $TERM_t = (LTRF_t - RF_t) - (LTRF_{t-1} - RF_{t-1}$ and $YIELD_t = RF(t-1) - RF(t)$. RM is the value-weighted market return for the sample used in this study. RM-RF is the market excess return.

as SMB (-0.71). The factor based on net interest margin has a correlation of -0.69 with the factor based on market leverage.

5.2.4 The Returns to Be Explained

Table 6: Excess Weighted Returns of the 9 Size-Value Portfolios

	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
	Mean			Median		
ME1	-0.26	-1.09	-3.48	-0.87	-1.09	-1.14
ME2	-1.62	-2.13	-0.66	-1.74	-1.74	-0.68
ME3	-1.70	-1.44	-1.77	-1.65	-1.40	-0.98
	Standard Deviation			t(Mean)		
ME1	6.56	5.58	9.61	-1.16	-1.71	-1.04
ME2	8.62	9.14	10.41	-1.77	-1.68	-0.57
ME3	9.28	10.51	12.41	-1.56	-1.17	-0.69

By June each year stocks are assigned to a ME portfolio and a BE/ME portfolio based on the ME of the stock at the same time and the BE from the year before and the ME at the end of the same year. The three ME and BE/ME portfolios use 30% and 70% cutoff-points for the stocks. The intersections of these portfolios form 9 portfolios. For each of these portfolios and each month the value-weighted return, weighted by market capitalization, is calculated. The monthly excess return per portfolio is calculated by subtracting the risk free rate from the monthly return. This table presents descriptive statistics for the monthly excess returns for the size-value portfolios.

Table 6 on page 30 shows the means, standard deviations and t-statistics for the average excess returns of the 9 portfolios formed on size and value. The mean excess returns are negative for all portfolios.The standard deviations are consistently high and the t-statistics show that only three portfolios have excess returns significantly different from zero.

It is also noticeable that the mean excess returns not at all follow the nice clean pattern as Fama and French (1993)'s portfolios, where most portfolios follow the trend of higher return the higher the value and the smaller the size. This would suggest that the factors HML and SMB might not have as good explanatory power for this segment as they do in the study of Fama and French.

5.3 Regressions With Size-Value Portfolios

This section presents the results of the regressions for the nine size-value portfolios. First each of the individual factors is tested alone, to see their individual explanatory power. After that they are grouped together step by step to test potential models for explaining the portfolio returns.

5.3.1 Regressions with One Explanatory Variable

Table 7 on page 31 presents the results of the regressions with only one explanatory variable.

Table 7: Regressions of Excess Returns on One Variable for Size-Value Portfolios

	$R_t - RF_t = a + bX_t + e_t$						
	Mean	Std	p<0.10	p<0.05	p<0.01	Mn(R^2)	Sd(R^2)
A/BE	-0.85	0.42	100%	100%	89%	0.34	0.20
A/ME	-0.75	0.36	100%	100%	100%	0.32	0.18
E/P	-0.39	0.22	78%	67%	56%	0.09	0.20
HML	0.76	0.45	89%	89%	67%	0.18	0.14
NCO/AL	0.05	0.16	11%	0%	0%	0.01	0.01
NIM	0.57	0.33	100%	67%	56%	0.11	0.08
RM-RF	0.81	0.26	100%	100%	100%	0.72	0.19
SMB	-0.97	0.55	100%	100%	67%	0.31	0.22
TERM	11.36	3.71	22%	11%	0%	0.03	0.19
YIELD	2.02	2.44	0%	0%	0%	0.01	0.00

The table presents a summary of the results of regressing excess return on the following factors: the A/BE factor, the A/ME factor, the E/P factor, HML, the NCO/AL factor, the NIM factor, RM-R, SMB, TERM or YIELD one at a time separately for each of the nine size-value portfolios. b corresponds to the coefficient for the explanatory variable, X. The mean is the mean of the coefficient b among the portfolios, std refers to the standard deviation of the same mean among the same portfolios. p<q is the fraction of the portfolios displaying a p-value for the coefficient b less than q. Mn($R2$) is the mean of the R^2 value for the portfolios and Sd($R2$) refers to the standard deviation of the same.

Market excess return is significant at 1% for all portfolios and can explain on average more than twice the amount of variation of A/BE which has the second highest average R^2, but market excess return used alone has less power than it does in Fama-French's tests 1993.

SMB is significant at 1% for 67% of the portfolios, and at 5% for all portfolios. HML is significant at 1% for 67% of the portfolios, at 5% for 89% of the portfolios. HML's significance is less than SMB's at the less strict limits, and SMB's average R^2 (0.31) is almost dobule of HML's (0.18), which means that SMB has more power explaining common variation in stock returns.

The two leverage factors perform better than SMB and HML, and each of them can manage to explain 32% to 34% of the variance on average. While the factor based on book leverage is significant for 89% of the portfolios at the 1% level, and for all at the 5% level, while the market leverage factor is significant for all the portfolios already at the 1% level.

The factors based on E/P and NIM have similar significance. They are significant at 1% for 56% of the portfolios, and at 5% for 67% of the portfolios. Their R^2 are also in a similar level (0.09 to 0.11).

The bottom performers are YIELD, TERM and the factor based on NCO/AL. These factors do on average explain 1-3% of the variation, and the coefficient of TERM is significant for 11% of the portfolios(1 out of 9) at the 5% level, but the coefficients for the other two are not significant for any portfolios at that level.

NCO/AL is only significant at 10% for 11% of the portfolios, and TERM is significant for 22% at that level. The factors based on TERM and YIELD is not very useful in explaining common variation in stock returns either, but TERM is slightly better than YIELD.

Even though market excess return can alone capture much more variation in stock returns compared with other explanatory variables, its average R^2 is only 72% which means that much variation in stock returns is not explained by using one of the factors alone.

Table 8: Regressions of Excess Returns on HML and SMB for Value-Size Portfolios

$R_t - RF_t = a + bHML_t + cSMB_t + e_t$						
	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
		b			c	
ME1	0.12	0.30**	1.13***	-0.29*	-0.16	-0.10
ME2	0.11	0.44**	0.97***	-0.95***	-0.92***	-0.79***
ME3	0.03	0.38**	1.00***	-1.24***	-1.44***	-1.52***
		R^2			s(e)	
ME1	0.07	0.12	0.37	6.40	5.30	7.73
ME2	0.35	0.41	0.49	7.02	7.13	7.53
ME3	0.48	0.62	0.72	6.75	6.60	6.61

The table presents the results of regressing excess return on HML and SMB for each of the nine size-value portfolios separately. b and c corresponds to the coefficients for HML and SMB. The intercepts are presented in table 14 for 42. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

5.3.2 HML and SMB Paired

Table 8 on page 33 shows the results of regressions on SMB and HML. SMB is significant in 6 out of 9 portfolios at significance level of 1%, and HML is significant in 3 out of 9 portfolios at the same level, while HML at the same time is significant for 6 out of 9 portfolios on the 5% level. It might be worth noticing that the value factor HML is not significant for the portfolios with the lowest BE/ME and the size factor SMB is the least significant for the portfolios with the smallest size.

SMB and HML together explain less variation in stock returns than market excess return does alone. The highest R^2 here is 72%, which is the same as the average R^2 when using market excess return alone. The portfolios based on the smallest size and lowest value have the lowest R^2 values, with the portfolio of the smallest size and lowest BE/ME having a R^2 of 7%.

SMB is negatively correlated with stock returns for all portfolios and HML is positively correlated with stock returns, the opposite of what Fama and French (1993) found, but the magnitudes of the coefficients show the same trend.

Both the distribution and the mean of the R^2 values are very similar here compared to Fama and French (1993).

5.3.3 Adding Market Excess Return to One Explanatory Variable Regressions

Table 9: Regressions of Excess Returns on RM-RF and One More Variable for Size-Value Portfolios

$R_t - RF_t = a + b(RM_t - RF_t) + cX_t + e_t$							
	Mean	Std	p<0.10	p<0.05	p<0.01	Mn(R^2)	Sd(R^2)
RM-RF	0.88	0.14	100%	100%	100%	0.76	0.17
A/BE	0.14	0.30	56%	56%	44%		
RM-RF	0.85	0.20	100%	100%	100%	0.75	0.19
A/ME	0.07	0.30	67%	67%	56%		
RM-RF	0.82	0.23	100%	100%	100%	0.73	0.19
E/P	0.02	0.11	44%	33%	11%		
RM-RF	0.80	0.26	100%	100%	100%	0.76	0.18
HML	0.05	0.44	78%	67%	56%		
RM-RF	0.81	0.26	100%	100%	100%	0.74	0.19
NCO/AL	0.04	0.16	67%	56%	33%		
RM-RF	0.83	0.24	100%	100%	100%	0.74	0.25
NIM	-0.09	0.24	67%	44%	33%		
RM-RF	0.89	0.13	100%	100%	100%	0.77	0.20
SMB	0.20	0.44	56%	56%	56%		
RM-RF	0.80	0.26	100%	100%	100%	0.73	0.25
TERM	2.75	3.69	11%	11%	0%		
RM-RF	0.82	0.26	100%	100%	100%	0.73	0.24
YIELD	-1.79	1.53	0%	0%	0%		

The table presents a summary of the results of regressing excess returns on market excess return together with one of the following factors: the A/BE factor, the A/ME factor, the E/P factor, HML, the NCO/AL factor, the NIM factor, SMB, TERM or YIELD, once for each of the nine size-value portfolios. The mean is the mean of the coefficient for the variable among the portfolios, std refers to the standard deviation of the same mean among the same portfolios. p<q is the fraction of the portfolios displaying a p-value for the coefficient b less than q. Mn($R2$) is the mean of the R^2 value for the portfolios and Sd($R2$) refers to the standard deviation of the same. The full results of the regression can be seen in table 25 on page 64

By adding market excess return, the best performing variable so far, to the regressions with only one explanatory variable in table 7, we can see how much additional explanatory power each variable offer after market excess return and in turn examine if they lose significance and explanatory power when each of them works together with market excess return.

From table 7 we know that market excess return alone explain in average 72% variation in stock returns. Table 9 on page 34 shows that each of the additional explanatory factors adds only on average one to five percent units to the R^2. The significance of the market excess return is not affected by any of the additional variables.

SMB, HML, the market leverage and book leverage factors show the best results, even though the numbers of portfolios with significant coefficients have dropped substantially for all of them.

The NCO/AL factor is the only one whose coefficient now is significant in more portfolios. The mean and standard deviation of the factor's coefficients have not changed much though. While we cannot provide a clear explanation of why this is happening, we suspect it could be due to the market excess return capturing a large portion of the variance in the excess return, a portion which the NCO/AL factor cannot explain. The correlation of these two factors are very low (0.01) which means that they have very little overlap in the variations they explain.

As the market excess returns explain such a large portion of variation it might well be that the fit of the NCO/AL factor improves massively as the portion of variation the model attempts to explain with NCO/AL might now correlate better with the factor.

The clearly lower significance and less additional explanatory power for the majority of the variables now compared to when market excess return was not included suggest that they capture partially the same underlying variation as the market excess return. While the mean of the coefficient for market excess return has not changed much, the means of the coefficients of the factor based on A/BE, A/ME, E/P and SMB have changed sign from negative to positive, suggesting that the results for these variables in 7 are biased downwards.

As the market excess returns during this time period have on average been negative, forcing the other factors to alone capture as much as possible of the impact of the negative market excess return might force the coefficients more to the negative side.

All of the portfolios' coefficients for the factor based on NIM have changed from positive to negative. The effects on the coefficients of YIELD and TERM when including market excess return are very small, which is expected due to the small correlation between them and market excess return seen earlier.

5.3.4 Market Excess Return, HML and SMB

Table 10: Regressions of Excess Returns on RM-RF, HML and SMB for Size-Value Portfolios

$R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + \epsilon_t$						
	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
		b			c	
ME1	0.83***	0.64***	0.77***	-0.31***	-0.03	0.73***
ME2	0.96***	0.94***	0.87***	-0.39***	-0.05	0.51***
ME3	0.98***	0.96***	0.93***	-0.48***	-0.11*	0.51***
		d				
ME1	0.67***	0.59***	0.79***			
ME2	0.16	0.17	0.22			
ME3	-0.09	-0.33***	-0.44***			
		R^2			$s(\epsilon)$	
ME1	0.71	0.66	0.63	3.62	3.34	6.00
ME2	0.85	0.83	0.77	3.42	3.81	5.06
ME3	0.93	0.95	0.95	2.42	2.46	2.84

The table presents the results of regressing excess return on HML and SMB for each of the nine size-value portfolios separately. b and c corresponds to the coefficients for HML and SMB. The intercepts are presented in table 14 for 42. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 10 presents the results of the regressions where market excess return, HML and SMB are used as explanatory variables in the nine size-value portfolios. Market excess return is not noticeably affected by the inclusion of the other two variables. SMB is significant in 5 out of 9 portfolios at the 1% level and HML is significant in 6 out 9 portfolios at the same level. The factor based on size, SMB, has the strongest significance for the smallest and the biggest size portfolios, while the factor based on value, HML, has the strongest significance for the highest and lowest value portfolios.

While the R^2 values for the portfolios containing the big stocks (0.93 and 0.95) are at the same level as the results from Fama and French (1992), the smallest stocks show R^2 values far lower, at 0.63 to 0.71. This is consistent with Schuermann and Stiroh (2006), where specific risk factors are needed for the smaller banks but not the larger ones.

5.3.5 Market excess return, HML and SMB and One More

Table 11 presents the results of the regressions where the factors based on market leverage, earnings-price ratio, net-charge offs and net-interest margin have been added one variable at a time to the regression in table 10.

Using the three Fama-French factors alone an average R^2 of 0.81 is achieved. Neither the addition of the factor based on earnings-price ratio nor the factor based on net charge-offs manages to add even one percentage point to the average R^2, and neither of them has a single coefficient significant at the 1% level, suggesting that the majority of the effect of these factors have been absorbed by the classical three factors.

The market leverage factor, the book leverage factor and the NIM factor all manage to add one percentage point to the average R^2. The two leverage factors perform fairly similarly, though the factor based on book leverage has a coefficient significant for three out of nine portfolios at the 10% level, while the one based on market leverage only has two.

The significance for the coefficients of the NIM factor is strong in more cases than for the leverage factors. At the 10% level it is actually comparable

Table 11: Regressions of Excess Returns on RM-RF, HML, SMB and One Variable for Size-Value Portfolios

$$R_t - RF_t = a + b(RM_t - RF_T) + cHML_t + dSMB_t + eX_t + \epsilon_t$$

	Mean	Std	p<0.10	p<0.05	p<0.01	Mn(R^2)	Sd(R^2)
M-RF	0.89	0.11	100%	100%	100%	0.82	0.12
HML	0.06	0.43	67%	67%	67%		
SMB	0.13	0.44	56%	56%	33%		
A/BE	0.08	0.23	33%	22%	11%		
RM-RF	0.89	0.11	100%	100%	100%	0.82	0.12
HML	0.12	0.47	67%	67%	44%		
SMB	0.14	0.40	67%	56%	44%		
A/ME	0.10	0.23	22%	22%	11%		
RM-RF	0.87	0.11	100%	100%	100%	0.81	0.13
HML	0.04	0.44	33%	33%	22%		
SMB	0.20	0.42	78%	67%	56%		
E/P	-0.02	0.08	22%	0%	0%		
RM-RF	0.88	0.11	100%	100%	100%	0.81	0.12
HML	0.03	0.42	67%	67%	67%		
SMB	0.19	0.43	56%	56%	56%		
NCO/AL	0.02	0.07	22%	22%	0%		
RM-RF	0.88	0.11	100%	100%	100%	0.82	0.13
HML	0.09	0.44	67%	67%	67%		
SMB	0.17	0.44	56%	56%	56%		
NIM	0.82	0.13	56%	44%	22%		

The table presents a summary of the results of regressing excess return on market excess return, HML and SMB together with one of the following factors: the A/BE factor, the A/ME factor, the E/P factor, the NCO/AL factor and the NIM factor, for each of the nine size-value portfolios separately. The full results can be seen in table 11 on page 38. The mean is the mean of the coefficient for the variable among the portfolios, std refers to the standard deviation of the same mean among the same portfolios. p<q is the fraction of the portfolios displaying a p-value for the coefficient b less than q. Mn($R2$) is the mean of the R^2 value for the portfolios and Sd($R2$) refers to the standard deviation of the same.

to the coefficients of SMB and not far from HML, though it drops some at the 5% and 1% level. The coefficients which are significantly different from zero for the NIM factor can all be found in the medium size portfolios, and those with less strong significance in the small size portfolios, which in all regressions still show the smallest R^2 values.

5.3.6 Adding the A/BE and NIM Factors

Table 12: Regressions of Excess Returns on RM-RF, HML, SMB, A/BE and NIM Factors for Size-Value Portfolios

$$R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t + e\Pi(NIM)_t + fSMB_t + \epsilon_t$$

	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
		b			c	
ME1	0.81***	0.70***	0.75***	-0.13	0.42***	-0.13
ME2	0.99***	0.97***	0.90***	0.21	0.15	0.13
ME3	0.98***	0.96***	0.91***	-0.05	0.01	-0.15
		d			e	
ME1	-0.35***	0.07	0.68***	0.02	0.02	0.02
ME2	-0.22**	0.09	0.74***	-0.24**	-0.23**	-0.41***
ME3	-0.49***	-0.04	0.42***	-0.01	-0.16**	0.12
		f			R^2	
ME1	0.78***	0.28**	0.90***	0.71	0.71	0.63
ME2	-0.06	0.00	0.01	0.87	0.85	0.80
ME3	-0.06	-0.37***	-0.29**	0.93	0.95	0.95

The table presents the results of regressing excess return on market excess return, the A/BE factor, HML, the NIM factor and SMB once for each of the nine size-value portfolios. $\Pi(X)$ refers to the factor based on X, as opposed to X itself. b, c, d, e and f correspond to the coefficients in the regression above. The intercepts are presented in table 14 for 42. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The results of adding our two best-performing new factors, the book leverage factor and the NIM factor to 3-factor regressions, are presented in table 12.

There is hardly any change for coefficients' significance of the original factors, and while the mean R^2 for the portfolios have only increased by 0.01. For the four portfolios with a change in R^2, the three medium size portfolios have an increase in their R^2 of 0.02 to 0.03 and the R^2 of the small size medium value portfolio has an increase of 0.05. These increases also correspond to the highly significant coefficients of the newly added variables.

While the book leverage factor is only significant for one portfolio, it is highly significant for that portfolio and adds a fair bit of explanatory power. The coefficient for the factor based on net interest margin is significant in four portfolios at the 5% level, including all the medium size portfolios.

5.3.7 HML, SMB and the A/BE and NIM Factors

Table 13: Regressions of Excess Returns on HML, SMB, A/BE and NIM Factors for Size-Value Portfolios

$$R_t - RF_t = a + b\Pi(\frac{A}{BE}) + cHML_t + d\Pi(NIM)_t + eHML_t + \epsilon_t$$

	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
		b			c	
ME1	-0.58**	0.03	-0.55*	-0.06	0.33**	0.96***
ME2	-0.34	-0.38	-0.37	0.14	0.45**	1.07***
ME3	-0.59**	-0.53**	-0.65***	-0.13	0.32*	0.75***
		d			e	
ME1	-0.03	-0.02	-0.03	0.23	-0.19	0.40
ME2	-0.30	-0.29	-0.46**	-0.73**	-0.65**	-0.59*
ME3	-0.07	-0.22	0.07	-0.72***	-1.02***	-0.90***
		R^2			$s(\epsilon)$	
ME1	0.15	0.12	0.40	6.22	5.37	7.64
ME2	0.38	0.43	0.53	6.97	7.07	7.37
ME3	0.52	0.64	0.75	6.58	6.47	6.32

The table presents the results of regressing excess return on the A/BE factor, HML, the NIM factor and SMB once for each of the nine size-value portfolios. $\Pi(X)$ refers to the factor based on X, as opposed to X itself. b, c, d, and e correspond to the coefficients in the regression above. The intercepts are presented in table 14 for 42. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

When removing the market excess return from the model in table 12 we get the results visible in table 13. The R^2 has decreased fairly dramatically, and the pattern for significance for HML and SMB is back to it's original formation, with strong significance for all but the low value and the small size portfolios, respectively. The book leverage factor shows strong significance in far more portfolios, and the coefficients are now significantly different from zero in four out of nine portfolios at the 5% level, which suggests that the market excess return might absorb at least some of the effect from book leverage premium.

5.4 Intercepts of the Regressions for the Size-Value Portfolios

The intercepts for the regressions using the following factors as explanatory variables: market excess return; HML and SMB; market excess return, SMB and HML; market excess return, SMB, HML, the book leverage factor and the net-interest margin factor, as well as the last one with market excess return excluded are presented in table 14.

It is clearly visible here that for each of these models there are at least some portfolios that have intercepts significantly different from zero. A good model should result in the intercepts being equal to zero, something we cannot see here.

When RM-RF is used alone as explanatory variable in the time-series regressions, the intercepts in table 14 show that the bigger size portfolios have larger intercepts. The intercepts show also a relation with BE/ME. Bigger intercepts can be seen for the portfolios with higher BE/ME except in lowest ME portfolios.

Fama and French (1993) find that the intercepts for the smallest-size portfolios are greater than those for the biggest portfolios, and the intercepts increase with BE/ME for every size. Both their results and the results of our study show that, used alone, market excess return leaves the cross-sectional variation in average stock returns that is related to size and book-to-market equity unexplained. The difference is the intercepts for portfolios for large banks are higher than those for small banks, and this is opposite to what

Table 14: Intercepts from the Excess Stock Returns Regressions for Size-Value Portfolios

	a			t(a)		
	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
(i) $R_t - RF_t = a + b(RM_t - RF_t) + e_t$						
ME1	0.18	-0.22	0.22	0.34	-0.48	0.25
ME2	-0.04	0.08	1.25*	-0.10	0.17	1.93
ME3	0.25	0.83**	1.60***	0.66	2.56	3.48
(ii) $R_t - RF_t = a + bHML_t + cSMB_t + \epsilon_t$						
ME1	-0.94	-1.24**	-1.70**	-1.28	-2.05	-1.92
ME2	-1.82**	-1.99**	-1.18	-2.26	-2.44	-1.37
ME3	-1.71**	-1.63**	-1.53**	-2.21	-2.16	-2.02
(iii) $R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + \epsilon_t$						
ME1	1.05**	0.31	0.15	2.37	0.75	0.20
ME2	0.49	0.27	0.92	1.16	0.59	1.48
ME3	0.66**	0.67**	0.72**	2.22	2.22	2.06
(iv) $R_t - RF_t = a + b\Pi(\frac{A}{BE}) + cHML_t + d\Pi(NIM) + eHML_t + \epsilon_t$						
ME1	1.11**	0.53	0.16	2.41	1.35	0.20
ME2	0.63	0.27	1.17*	1.55	0.58	1.95
ME3	0.62*	0.56*	0.81**	1.99	1.89	2.39
(v) $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t +$ $+ e\Pi(NIM)_t + fSMB_t + \epsilon_t$						
ME1	1.01**	0.42	0.11	2.26	1.09	0.14
ME2	0.58	0.35	1.02*	1.48	0.78	1.74
ME3	0.65**	0.70**	0.6*5	2.14	2.37	1.92

The table presents the intercepts for each size-value portfolio from five different excess return regressions. The full results of regression (i) can be found in table 24 , for (ii) in table 8, for (iii) in table 10, for (iv) in table 13 and for regression (v) in table 12. $\Pi(X)$ refers to the factor based on the variables X as opposed to the variable itself. a is the intercept and t(a) is the t-statistic of the intercept. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Fama and French find.

When SMB and HML are the only explanatory variables used, the intercepts are all negative and fairly large in all portfolios(-0.94 to -1.99%) which consists with that the mean of RM-RF is negative. The big significant intercepts mean that the average premiums of stock returns have a part not explained by SMB and HML. The difference of the intercepts are much smaller than those when market excess return is the only explanatory variable, which would suggest that factors SMB and HML explain strong differences in average returns across portfolios.

In the three factor regressions, using market excess return, HML and SMB as the explanatory variables, and 5-factor regressions, using market excess return, HML, SMB and the A/BE and NIM factors, the intercepts are now positive, in general less significant and with smaller magnitude, which means that these factors in both cases overall do a better job explaining the cross-section of average stock returns.

5.4.1 Testing the Intercepts

The effectiveness of different models can be compared using two methods: mean absolute value, MAV, of intercepts, and GRS F-test(Billou, 2004). While the first one is focused on the average distance from zero of the intercepts, the later one uses both the distance from zero and covariances of the intercepts in order to test the probability that all intercepts are zero. Both methods have been used here, and the results are presented in Table 15.

MAV For the MAV-test the intercepts in table 14 are used to calculate the mean absolute value of the intercepts for each of the five models. The MAV for regressions using market excess return alone (0.519) is lowest, so the intercepts of the regression are closer to zero on average than other ones. This would suggests that CAPM here is the most effective model here. The MAV of the Fama-French three-factor models is however at 0.582, only 0.063

Table 15: Tests of the Intercepts in the Excess Return Regressions Against 0 for the Size-Value Portfolios

Regression from table 14					
	(i)	(ii)	(iii)	(iv)	(v)
F-statistic	3.601	0.826	2.723	0.796	2.799
p-value	0.001	0.595	0.009	0.621	0.008
Rejected on level	0.999	0.405	0.991	0.379	0.992
MAV	0.519	1.527	0.582	0.651	0.610

The table presents the results of tests of the intercepts in table 14, from excess return regressions for size-value portfolios. The F-statistic if the statistic from the GRS F-test. The p-value is the p-value of the same F-statistic with respect to degrees of freedom. Rejected on level refers to at which level of confidence the hypothesis that all intercepts are zero can be rejected. MAV is the mean absolute value of the intercepts for each regression model among the portfolios.

larger than the smallest one, at the five factor model is only another 0.028 greater.

The MAV method does however fail to take into account the confidence intervals of the intercepts. An intercept can be very close to zero in absolute terms, but still have a very low probability of actually being zero if the confidence interval of the intercept is very narrow. This weakness means that the MAV method might not always be very accurate.

F-test The F-tests reject the hypothesis that the intercepts are equal to zero for all the models with good explanatory power, the CAPM, the Fama-French three-factor model and our five-factor model with a confidence level of over 99%. The two models excluding market excess return have far better results in the F-test where we can only reject the hypothesis of intercepts being equal to zero at a 40.5% confidence level when using only HML and SMB as explanatory variables and only with 37.9% confidence level for the four-factor model with market excess return excluded.

The results of Fama and French (1993) showed similar results with very high F-statistics despite good explanatory power.

5.5 Regressions With Quintile Portfolios

While the formation of size-value portfolios would be an optimal set-up for studying the factors based on size and value, it could also limit the correlation of other variables if the portfolios formed would have a distribution of the other measures in it's stock closer to a random sample. In that case the effect of a factor that might actually be important could instead be captured by the market excess return.

To test this the five final models are also tested with a set of quintile portfolios formed with respect to market leverage, book leverage, book-to-market ratio, earnings-price ratio, size, net charge-offs over average loans and net interest margin, the same portfolios as in table 1 on page 23.

5.5.1 The Coefficients and R-Squareds

Summary statistics of the regressions for the final models this time using the quintile portfolios can be found in table 16 while detailed results can be found in the appendix, in tables 27, 28, 29, 30 and 31.

When using market excess return as the only explanatory variable the coefficients are all still strongly significant but the R^2 have in general increased, from an average of 0.72 to an average of 0.82, and with far smaller spread. The smallest R^2 is now at 0.51 compared to 0.41 with the size-value portfolios.

For HML and SMB there is a similar increase in average R^2, an increase of 0.09, with a decrease in the spread again. The coefficients of SMB are significant for 94% of portfolios at the 1% level, while the corresponding number for the size-value portfolios is 67%. For HML there is a similar increase from 33% of the size-value portfolios with coefficients significant on the 1% level to 54%. SMB is still significant for a larger fraction than HML.

When adding the market excess return to the regressions, now forming the Fama-French three-factor model, the average R^2 is yet again increasing, now by 0.04 only though, and the standard deviation of the R^2 has decreased

Table 16: Summary of Excess Return Regressions for Quintile Portfolios

	Mean	Std	p<0.10	p<0.05	p<0.01	Mn(R^2)	Sd(R^2)
(i) $R_t - RF_t = a + b(RM_t - RF_t) + e_t$							
RM-RF	0.96	0.19	100%	100%	100%	0.82	0.10
(ii) $R_t - RF_t = a + bHML_t + cSMB_t + e_t$							
HML	0.48	0.27	74%	71%	51%	0.49	0.15
SMB	-1.16	0.37	97%	97%	94%		
(iii) $R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + e_t$							
RM-RF	0.94	0.12	100%	100%	100%	0.86	0.09
HML	-0.02	0.27	49%	43%	31%		
SMB	-0.07	0.34	54%	54%	46%		
(iv) $R_t - RF_t = a + b\Pi(\frac{A}{BE})_t + cHML_t +$ $+d\Pi(NIM)_t + eSMB_t + e_t$							
A/BE	-0.52	0.29	69%	54%	20%	0.52	0.15
HML	0.38	0.24	60%	49%	23%		
NIM	-0.17	0.25	26%	14%	3%		
SMB	-0.74	0.25	86%	83%	57%		
(v) $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t +$ $+e\Pi(NIM)_t + fSMB_t + e_t$							
RM-RF	0.94	0.12	100%	100%	100%	0.88	0.08
A/BE	0.01	0.30	43%	26%	9%		
HML	0.04	0.24	49%	40%	23%		
NIM	-0.11	0.25	46%	31%	26%		
SMB	-0.10	0.24	40%	29%	6%		

The table presents summary of the results of regressing excess return on a various number of factors for each of the quintile portfolios. $\Pi(X)$ refers to the factor based on X, as opposed to X itself. The variables in the left column refer to which variable that row of data refers to. The mean is the mean of the coefficient of the variable in the left column among the portfolios, std refers to the standard deviation of the same coefficient among the same portfolios. p<q is the fraction of the portfolios displaying a p-value for the coefficient less than q. Mn($R2$) is the mean of the R^2 value for the regression for the portfolios and Sd($R2$) refers to the standard deviation of the same.

again. While the R^2 values now are closer to the results of Fama and French (1993) it is still lower, suggesting a less good fit of their model here. This time however, the coefficients for HML and SMB are both significant for a smaller fraction of the portfolios. This would be expected as the portfolios now are not biased towards these factors. The drop is the largest for HML, whose coefficients change from being significant at the 1% level for 67% of the portfolios to only being that for 31%.

For the model using HML, SMB and the factors based on book leverage and net interest margin the pattern continues, the average R^2 increases by 0.08 and the standard deviation decreases. The fraction of portfolios with significant coefficients for each variable is however fairly unchanged.

The five-factor model continues on showing an increase in average R^2 by 0.06, and a decrease in standard deviation of the same among the portfolios. While the four factors that are added to the market excess return all show significance at more or less the same level compared to each-other at the 10% level, when looking at the 1% level HML and the NIM factor perform far better than the other two. There is a clear increase for the A/BE factor, and a clear decrease for HML and SMB. On the 10% level however both HML and SMB show approximately the same level of significance, which would suggest that the two new variables are a valuable addition rather than just capturing the same variance in portfolio excess returns.

Overall, both the explanatory power and the significance of the variables have increased with the change of portfolios. One possible explanation for this could be that the number of firms in each portfolio for the nine size-value portfolios still is too small for the portfolios to show behaviour like well diversified portfolios. The larger number of firms per portfolio the less impact each firm will have which could result in more consistent portfolio returns over the time period.

While the addition of the two new variables to the Fama-French three-factor model does not show much of an effect in the fraction of variance explained, they are both strongly significant for some portfolios, and on a less strict significance level significant for a similar fraction of portfolios as the HML and SMB.

5.5.2 Testing the Intercepts

Table 17: Tests of the Intercepts in the Excess Return Regressions Against 0 for the Quintile Portfolios

Regressions from table 32					
	(i)	(ii)	(iii)	(iv)	(v)
F-statistic	2.391	1.104	1.971	1.465	2.345
p-value	0.004	0.375	0.020	0.124	0.005
Rejected on level	0.996	0.625	0.980	0.876	0.995
MAV	0.781	1.563	0.719	1.524	0.743

The table presents the results of tests of the intercepts in table 32, from excess return regressions for the quintile portfolios. The F-statistic if the statistic from the GRS F-test. The p-value is the p-value of the same F-statistic with respect to degrees of freedom. Rejected on level refers to at which level of confidence the hypothesis that all intercepts are zero can be rejected. MAV is the mean absolute value of the intercepts for each regression model among the portfolios.

Using the mean absolute values to test the intercepts the results here are similar to those for the size-value portfolios, apart from the far worse performance for the regression without market excess return but with HML, SMB and the factors based on A/BE and NIM, which is almost just as bad as the result for the regressions only using HML and SMB. The overall magnitudes of the mean values are a bit higher. The regression with the lowest MAV is now the Fama-French three factor model, followed by our five-factor model.

Using the GRS F-statistics, there are really just two main differences, the F-statistics for regression (ii) and (iv) has risen a fair bit, we can now reject the hypothesis of the intercepts being zero at a 62.5% level vs a 40.5% level before and a 87.6% level compared to the previous 37.9%.

All in all, none of the models pass any of the f-tests for these portfolios this time either, which confirms the previous results.

5.6 Potential Problems

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5.6.1 Heteroscedasticity

Table 18: Tests of Heteroscedasticity for Size-Value Portfolios

	F-statistic			p-value		
	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
ME1	7.62	4.48	0.28	0.0072	0.0377	0.5957
ME2	3.66	1.52	0.10	0.0595	0.2215	0.7478
ME3	4.48	5.49	0.23	0.0377	0.0218	0.6315

This table presents the result of an F-test of heteroscedasticity for the residuals with respect to the fitted values from the regression $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t + e\Pi(NIM)_t + fSMB_t + \epsilon_t$ on the nine size-value portfolio. The F-statistic is the F-statistic under the assumption of homoscedasticity for the residuals and the p-value is the p-value of the corresponding F-statistic.

As for heteroscedasticity five of the nine portfolios show clear signs of heteroscedasticity when performing the Wooldridge's F-test. Table 18 shows the result when testing the residuals from the five-factor regression. While we cannot reject the hypothesis of homoscedasticity for the high value portfolio or the medium value/medium size portfolio, for the rest of the portfolios we can reject it at a 96% confidence level. Investigating the residuals from other regressions the pattern is the same.

This does however not seem to affect the results to any greater extent. While adjusting for heteroscedasticity using robust standard errors does affect the t-statistics and subsequently the p-values, the magnitude of this change is very small. In table 19 the average change and the standard deviation of the change for the p-values for each coefficient from the five-factor regression for the size-value portfolios can be seen. The p-values for the A/BE factor, HML as well as the intercept does on average actually drop,

Table 19: Tests of Heteroscedasticity for Size-Value Portfolios

$$R_t - RF_t = a + b(RM_t - RF_t) + c\lambda(\frac{A}{BE})_t + dHML_t + e\lambda(NIM)_t + fSMB_t + \epsilon_t$$

	Average	Std.		Average	Std.
a	-0.002	0.014			
RM-RF	0.000	0.000	$p<0.01$	0.001	0.001
A/BE	-0.021	0.102	$0.01<p<0.05$	0.015	0.026
HML	-0.017	0.023	$0.05<p<0.10$	-0.009	0.009
NIM	0.027	0.042	$0.10<p$	-0.010	0.070
SMB	0.000	0.029			

This table presents the change in p-values for the coefficients in the regression: $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t + e\Pi(NIM)_t + fSMB_t + \epsilon_t$ when using robust standard errors for the size-value portfolios. Average is the average change in p-value for the coefficient of the variable in the left column among the nine portfolios and Std. is the standard deviation in change among the portfolios. RM-RF, NIM and SMB refers to the variables in the regression, a to the intercept and NIM and A/BE to the factors based on these variables. For the right half of the table the coefficients has been divided into groups based on their original p-value rather than the variable in front of them.

for market excess return and SMB there is on average zero change while the rest of them increase. The largest average change can be seen in the coefficients for NIM, where it is an increase of 0.027.

While the standard deviation of the changes might seem big, the large changes mainly affect the already non-significant coefficients that can be seen in the bottom half of table 19. For the coefficients with p-values over 0.10 the standard deviation of the change is 0.07. The average change for the p-values below 0.01 is 0.001 with a standard deviation of 0.001, for p-values between 0.01 and 0.05 the average change is 0.015 with a standard deviation of 0.026 and for p-values between 0.05 and 0.10, -0.009 with a standard deviation of 0.009.

This means that in the vast majority of the cases adjusting for heteroscedasticity does not affect the significance of the results, and we can conclude that despite heteroscedasticity being present for some portfolios this should not have any major effects on the results.

5.6.2 The January Effect

Table 20: Tests of Regression Variables for the January Effect

$X_t = a + bJAN_t + \epsilon_t$					
	a	t(a)	b	t(b)	R^2
A/BE	0.06	0.08	-1.32	-0.48	0.00
A/ME	0.01	0.02	-3.31	-1.10	0.02
E/P	0.25	0.30	-1.83	-0.61	0.00
HML	0.11	0.18	3.87	1.82	0.04
NCO/AL	-1.33	-1.55	2.46	0.80	0.01
NIM	0.10	0.17	2.85	1.28	0.02
RM-RF	-2.10	-1.83	-0.12	-0.03	0.00
SMB	0.01	0.02	0.06	0.03	0.00
TERM	0.00	0.00	-0.01	-0.10	0.00
YIELD	-0.04	-1.31	-0.16	-1.48	0.03

This table presents the results of the regressions performed to test if a January effect can be seen in the factors used in the regressions. JAN is a dummy which takes on the value one if the month is January and is zero otherwise. a and b corresponds to the intercept and the coefficient for the January dummy. t(a) and t(b) are the t-statistics of the intercept and the coefficient for JAN. A/BE, A/ME, E/P, NCO/AL and NIM refers to the factors based on these variables, not the variables themselves. HML and SMB correspond to the Fama-French factors with the same name. RM-RF is the weighted market excess return. $TERM_t = (LTRF_t - RF_t) - (LTRF_{t-1} - RF_{t-1})$ and $YIELD_t = RF_t - RF_{t-1}$.

The factors used in the regressions, the returns of the size-value portfolios as well as the residuals of the same portfolios from the five-factor regressions are all tested for the January effect. The results are presented in table 20 and 21. The tests are done by regressing each variable on a January dummy, which is one if the month was January, and zero otherwise.

The coefficients of January dummy have fairly large magnitudes for some factors, especially the market leverage factor (-3.31), HML(3.87) and NIM (2.85). None of these is significantly different from zero though and the R^2 values are also very small.

For the portfolio excess returns there is one portfolio, the one with medium size and low value, which has a coefficient of a large magnitude (-4.59) but

Table 21: Tests of Excess Return and Residuals for the January Effect for Size-Value Portfolios

	$R_t - RF_t = a + bJAN_t + \epsilon_t$					$RES_t = a + bJAN_t + \epsilon_t$				
BE/ ME	a	t(a)	b	t(b)	R^2	a	t(a)	b	t(b)	R^2
	ME1									
1	-0.87	-1.11	0.04	0.01	0.00	-0.78	-1.18	-1.13	-0.48	0.00
2	-0.99	-1.48	-1.30	-0.55	0.00	-1.07	-1.91	-0.24	-0.12	0.00
3	-1.05	-0.92	-1.14	-0.28	0.00	-1.36	-1.50	2.79	0.86	0.01
	ME2									
1	-1.38	-1.35	-4.59	-1.26	0.02	-1.59	-1.66	-1.87	-0.54	0.00
2	-1.61	-1.48	-1.68	-0.43	0.00	-1.70	-1.69	-0.58	-0.16	0.00
3	-0.73	-0.59	0.66	0.15	0.00	-0.79	-0.71	1.39	0.35	0.00
	ME3									
1	-1.62	-1.46	-0.48	-0.12	0.00	-1.50	-1.40	-1.93	-0.50	0.00
2	-1.30	-1.04	-1.19	-0.26	0.00	-1.34	-1.09	-0.76	-0.17	0.00
3	-1.10	-0.75	1.58	0.30	0.00	-1.13	-0.78	1.95	0.38	0.00

This table presents the results of the regressions performed to test if a January effect can be seen in the portfolio excess returns or in the residuals from the five-factor regression for the size-value portoflio. JAN is a dummy which takes on the value one if the month is January and is zero otherwise. a and b corresponds to the intercept and the coefficient for the January dummy. t(a) and t(b) are the t-statistics of the intercept and the coefficient for Jan. $R_t - RF_t$ is the weighted excess return for each portfolio. RES_t is the residual from regression $RM_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t + e\Pi(NIM)_t + fSMB_t + RES_t$.

even here none of the coefficients are significantly different from zero. Looking at the residuals from the five-factor regression the same pattern repeats itself, we have one coefficient of large magnitude (2.79) but none of the coefficients are significant. The R^2 values remain at 0.00 for almost all portfolios, apart from one for the returns where it is at 0.02 and one for the residuals, where it lands at 0.01.

From the results here it is clear that no January effect is visible.

5.6.3 Extreme Observations

Ordinary-least-squares, OLS, may skew the final result in favour for the more extreme observations, even if these are very uncommon. To test the consistency of the results, the final five regressions are redone using least-absolute-deviation, LAD, a method which is less sensitive to potential outliers. A summary of the results are presented in table 22. While the results change, the difference is very small. The coefficients do only undergo some minor changes and while some of the p-values increase slightly the difference is in general at most one less or one more significant coefficient for each variable at a certain level.

5.6.4 The Data Behind the Factors

One could also argue that due to the small sample used to generate factors the factors generated might not be able to explain the variations in returns within the portfolios.

To test this, regressions are repeated using the Fama-French factors for market return, risk free rate, HML and SMB for the European market made available by Ken French.(French, 2014) The results of using these factors to test the Fama-French three-factor model are presented in table 23. While the coefficients for market excess return are still all significant at the 1% level, there are only five out of nine instead of six out of nine significant coefficients for HML at the same level. The real effect is however on SMB, where there

Table 22: Least-Absolute-Deviation Excess Return Regressions on Size-Value Portfolios

	Mean	Std	p<0.10	p<0.05	p<0.01
(i) $R_t - RF_t = a + b(RM_t - RF_t) + e_t$					
RM-RF	0.83	0.27	100%	100%	100%
(ii) $R_t - RF_t = a + bHML_t + cSMB_t + \epsilon_t$					
HML	0.48	0.46	67%	56%	44%
SMB	-0.79	0.56	67%	67%	67%
(iii) $R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + \epsilon_t$					
RM-RF	0.90	0.13	100%	100%	100%
HML	0.01	0.40	78%	78%	56%
SMB	0.24	0.42	78%	78%	78%
(iv) $R_t - RF_t = a + b\Pi(\frac{A}{BE})_t + cHML_t + d\Pi(NIM)_t + eSMB_t + \epsilon_t$					
A/BE	-0.41	0.19	33%	22%	0%
HML	0.46	0.43	56%	44%	33%
NIM	-0.13	0.21	0%	0%	0%
SMB	-0.43	0.45	56%	44%	22%
(v) $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t + e\Pi(NIM)_t + fSMB_t + \epsilon_t$					
RM-RF	0.89	0.11	100%	100%	100%
A/BE	0.06	0.27	22%	22%	11%
HML	0.08	0.39	56%	56%	44%
NIM	-0.09	0.13	33%	33%	0%
SMB	0.18	0.46	56%	44%	22%

The table presents summary of the results of regressing excess return on a various number of factors for each of the size-value portfolios using least-absolute-deviation regressions. $\Pi(X)$ refers to the factor based on X, as opposed to X itself. The variables in the left column refer to which variable that row of data refers to. The mean is the mean of the coefficient of the variable in the left column among the portfolios, std refers to the standard deviation of the same coefficient among the same portfolios. p<q is the fraction of the portfolios displaying a p-value for the coefficient less than q. Mn($R2$) is the mean of the R^2 value for the regression for the portfolios and Sd($R2$) refers to the standard deviation of the same.

Table 23: Test of Official Fama-French Factors

$R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + \epsilon_t$						
	BEME1	BEME2	BEME3	BEME1	BEME2	BEME3
		b			c	
ME1	0.58***	0.37***	0.22***	0.09	0.33	1.89***
ME2	0.85***	0.65***	0.55***	0.37	1.28***	2.09***
ME3	0.93***	0.92***	0.81***	0.44**	1.13***	2.25***
		d				
ME1	0.57**	-0.41**	0.46			
ME2	0.22	0.37	0.32			
ME3	0.11	0.10	0.09			
		R^2			$s(\epsilon)$	
ME1	0.53	0.45	0.43	4.06	3.72	7.05
ME2	0.69	0.70	0.72	4.42	4.75	5.35
ME3	0.70	0.74	0.76	4.77	5.08	5.91

The table presents the results of regressing excess return on HML and SMB for each of the nine size-value portfolios separately using the official Fama-French factors for Europe. b, c and d corresponds to the coefficients for market excess return, HML and SMB. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

is no significant coefficient at the 1% level, while there are five out of nine before.

The R^2 values have also dropped for all portfolios, on average by 0.17. The root mean square errors have also increased for all portfolios, on average by 1.35.

While we cannot prove that our selection of data to create the factors is optimal it is clearly better than to use factors based on the whole European market.

5.6.5 Time Period and Geographical Area

The study is covering the time period 2007-2013, a time period which is both narrow and covers a period of financial crisis, which may affect the results in various directions. The study is also limited to the European Union, which both poses restrictions in form of the number of banks in the sample as well as the geographical market. The first limits the number of well-diversified portfolios possible to create, while the second could skew the results in favour of any special characteristics the European market possesses.

While it is not possible within the study to further investigate to which level these limitations have affected the results, for the future it would be interesting to see if the results would remain consistent if the time period would have been extended or the geographical area changed.

5.7 Summary and Discussion of Results

In order to look at the characteristics of the data set used, portfolios are formed in two ways.

Our data sample is firstly grouped to 5 quintile portfolios based on A/BE, A/ME, BE/ME, E/P, ME, NCO/AL and NIM respectively and the weighted returns of these 5 portfolios are presented in Table 1. Net charge-offs are positively correlated with portfolio returns, while net interest margins have negative correlation with returns except for the lowest quintile portfolio. Both book and market leverages have positive correlation with returns for 3 high quintile(41% to 100%) portfolios.

The same data set is then grouped to 5 quintile portfolios based on stock returns. Means and standard deviations of A/BE, A/ME, BE/ME, E/P, ME, NCO/AL and NIM for all 5 portfolios are presented in Table 2. The banks within lower returns portfolios on average tend to have higher A/BE, A/ME, BE/ME, E/P ratio and larger size.

To test different factors' explanatory power, the regressions are performed for the nine portfolios formed on size and value. The difference between the numbers of firms in largest and smallest size portfolios in our study is not big compared with Fama and French (1993). The banks in the same size portfolios with higher BE/ME tend to have higher market leverage, suggesting that A/ME can be dropped out in the statistics tests due to this high correlation.

Summary statistics of explanatory variables in table 4 and table 5 show that average market excess returns are negative and significantly different from zero. Risk free rate, long risk free rate, YIELD and market excess return are positively auto correlated with that of previous month, while NCO/AL has a negative autocorrelation with that of previous month.

The two leverage based factors have a high positive correlation. Market excess return is negatively correlated with market leverage, book leverage and SMB. YIELD and TERM are only correlated with each other, but not other factors.

When each of the factors is used alone to explain excess portfolio returns, market excess return is significant for all portfolios at 1% level, and it explains about 72% of common variation in stock returns. The two leverage factors have less explanatory power than market excess return but better than all other factors. SMB is at a similar level as the leverage factors, but HML can only explain half amount of variance of that by SMB. The factors based on E/P and NIM are a little bit better than YIELD, TERM and the NCO/AL factor which are bottom performers.

When SMB and HML are explanatory variables, SMB still works better than HML. HML is not significant for the portfolios with the lowest BE/ME, and SMB is not significant for the portfolios with the smallest size. They together can explain less variation in stock returns than market excess return itself.

When market excess return is grouped together with any of other explanatory variables, market excess return does not lose significance, but all other factors than NCO/AL lose explanatory power. This also confirms that market excess return is the most important factor for asset pricing model.

If market excess return is used in combination with SMB and HML, market excess return works still very well and SMB and HML also play important roles. An average R^2 of 0.81 is achieved. SMB works best for the smallest and biggest size portfolios, while HML is most significant for the highest and lowest value portfolios. When one of other explanatory variables is added to Fama French 3-factor model, this additional factor can only increase average R^2 by at most 0.01, which is very small. These results suggest that the effect of most of these addition variables is absorbed by the classical three factors.

Factors based on A/BE and NIM are potential candidates that can help improve the overall explanatory power when they work together with the 3 classical factors. In order to test this, a five factor model is used and the coefficient of the factor based on NIM is significant in 4 portfolios at the 5% level, including all medium size portfolios, while the factor based on book leverage is only significant for 1 portfolio. A last test exclude market excess return from the regressions is done and the results confirm that market excess return is an important factor and it absorbs part of effect from A/BE.

From the results of these statistics tests, it is no doubt that market excess return is important when it is used alone or in combination with other factors. SMB and HML are also useful explaining common variation in stock returns of our sample, but their effects are not as much as they have for non financial firms in Fama and French (1993). Two new factors A/BE and NIM are found useful when they are combined with 3 classical factors.The factors based on A/BE and NIM work better for the portfolios with medium size banks, or small size but medium value banks.

The effectiveness of the models are tested by using MAV and GRS F-tests. The results show that none of the models fulfills the requirement that all intercepts equal to zero, suggesting that the factors can not explain all common variation in stock returns of the banking sector in the EU, and other important risk factors need to be found in future.

6 Conclusions and Implications

Our study finds that market excess return dominates in capturing common variation in portfolio returns of the banks in the European Union, confirming the results of Fama and French (1993) for this section of the market as well. The other two Fama-French factors SMB and HML perform less well than expected, particularly for smaller banks, which confirms the results of Schuermann and Stiroh (2006), suggesting that additional factors might be needed to fully explain the returns, particularly for the smaller banks.

Two factors constructed similarly to HML and SMB, but based on book leverage and based on net interest margin, are potential suggestions for additional factors to be included in the model. They perform less well than HML and SMB for portfolios constructed on value and size. However, for a various range of other portfolios these two factors are at 10% significance level matching HML and SMB in the number of portfolios their coefficients are significant in, making them strong potential candidates. They do however not explain the difference in explanatory power of the model between the smaller and the larger firms.

Based on the results, the research questions can be answered: Market excess return, SMB and HML are important explaining stock returns of public banks in the EU even though SMB and HML have less effect on banks, especially small banks, in the EU than they have on non financial firms in the US. The factors formed on book leverage and net interest margin, where the later is special for the banking sector, might be potentially useful risk factors in explaining stock returns as well.

Our results would suggest that further studies concerning the specific characteristics of smaller banks as well as further testing of other risk factors outside the classical models would be needed.

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7 Appendix

Table 24: Excess Return Regressions With One Variable for Size-Value Portfolios

$R_t - RF_t = a + bX_t + \epsilon_t$									
ME	BE/ME								
	1	2	3	1	2	3	1	2	3
A/BE		b			R^2			$s(\epsilon)$	
1	-0.38***	-0.22**	-0.64***	0.14	0.06	0.18	6.13	5.44	8.76
2	-0.75***	-0.86***	-0.97***	0.30	0.36	0.35	7.25	7.35	8.45
3	-0.996***	-1.236***	-1.596***	0.46	0.56	0.66	6.86	7.05	7.29
A/ME		b			R^2			$s(\epsilon)$	
1	-0.33***	-0.27***	-0.67***	0.12	0.12	0.24	6.19	5.28	8.45
2	-0.60***	-0.72***	-0.95***	0.24	0.31	0.41	7.55	7.66	8.05
3	-0.71***	-1.00***	-1.47***	0.29	0.45	0.69	7.86	7.87	6.94
E/P		b			R^2			$s(\epsilon)$	
1	-0.11	-0.10	-0.27*	0.01	0.02	0.04	6.56	5.57	9.48
2	-0.43***	-0.46 ***	-0.35**	0.13	0.13	0.06	8.11	8.59	10.17
3	-0.39***	-0.63***	-0.75***	0.09	0.18	0.19	8.91	9.56	11.28
HML		b			R^2			$s(\epsilon)$	
1	0.21	0.35***	1.16***	0.03	0.10	0.37	6.52	5.32	7.70
2	0.41**	0.73***	1.22***	0.06	0.16	0.35	8.42	8.42	8.45
3	0.42**	0.84***	1.48***	0.05	0.16	0.36	9.09	9.69	9.99
NCO/AL		b			R^2			$s(\epsilon)$	
1	0.01	0.11	0.28*	0.00	0.02	0.05	6.61	5.55	9.45
2	-0.08	-0.05	0.20	0.00	0.00	0.02	8.66	9.19	10.37
3	-0.14	-0.13	0.20	0.01	0.01	0.01	9.28	10.54	12.41
NIM		b			R^2			$s(\epsilon)$	
1	0.24*	0.21*	0.68***	0.04	0.04	0.14	6.48	5.51	8.97
2	0.32**	0.49*	0.61***	0.04	0.08	0.10	8.50	8.82	9.96
3	0.58***	0.74***	1.29***	0.11	0.14	0.30	8.82	9.81	10.42
RM-RF		b			R^2			$s(\epsilon)$	
1	0.50***	0.41***	0.64***	0.53	0.51	0.41	4.53	3.95	7.40
2	0.80***	0.86***	0.91***	0.80	0.83	0.72	3.83	3.82	5.57
3	0.90***	1.05***	1.22***	0.88	0.93	0.90	3.25	2.77	3.93

$R_t - RF_t = a + bX_t + \epsilon_t$									
ME	BE/ME								
	1	2	3	1	2	3	1	2	3
SMB		b			R^2			$s(\epsilon)$	
1	-0.33**	-0.25**	-0.44**	0.07	0.05	0.06	6.39	5.47	9.41
2	-0.98***	-1.05***	-1.08***	0.35	0.36	0.29	7.00	7.39	8.82
3	-1.25***	-1.55***	-1.82***	0.48	0.58	0.58	6.71	6.82	8.14
TERM		b			R^2			$s(\epsilon)$	
1	8.20	7.76*	8.89	0.03	0.04	0.02	6.55	5.54	9.60
2	13.25*	11.81	19.73***	0.04	0.03	0.07	8.52	9.06	10.11
3	10.38	12.82	9.41	0.02	0.03	0.01	9.29	10.49	12.46
YIELD		b			R^2			$s(\epsilon)$	
1	0.49	-0.82	-1.94	0.00	0.00	0.00	6.65	5.64	9.66
2	3.24	2.93	2.18	0.01	0.01	0.00	8.67	9.18	10.45
3	2.71	3.17	6.21	0.01	0.01	0.02	9.38	10.61	12.43

The table presents the results of regressing excess return on the following factors: the A/BE factor, the A/ME factor, the E/P factor, HML, the NCO/AL factor, the NIM factor, RM-R, SMB, TERM or YIELD one at a time separately for each of the nine size-value portfolios. b corresponds to the coefficient for the explanatory variable. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient in question. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 25: Regressions of Excess Returns on RM-RF and One More Variable for Size-Value Portfolios

$R_t - RF_t = a + b(RM_t - RF_t) + cX_t + \epsilon_t$

	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3
A/BE		b			c			R^2			$s(\epsilon)$	
ME1	0.68***	0.68***	0.73***	0.38***	0.54***	0.17	0.59	0.68	0.42	4.25	3.21	7.42
ME2	0.97***	0.97***	0.9***8	0.34***	0.23**	0.13	0.83	0.84	0.72	3.56	3.72	5.58
ME3	0.93***	0.99***	0.99***	0.05	-0.12	-0.48***	0.88	0.93	0.93	3.26	2.74	3.38
A/ME		b			c			R^2			$s(\epsilon)$	
ME1	0.65***	0.54***	0.59***	0.30***	0.25***	-0.10	0.58	0.55	0.42	4.30	3.77	7.44
ME2	0.97***	0.97***	0.85***	0.34***	0.22**	-0.13	0.84	0.84	0.72	3.47	3.69	5.57
ME3	1.06***	1.07***	0.93***	0.31***	0.03	-0.58***	0.91	0.93	0.95	2.87	2.78	2.67
E/P		b			c			R^2			$s(\epsilon)$	
ME1	0.54***	0.44***	0.66***	0.16**	0.12*	0.06	0.56	0.53	0.42	4.43	3.90	7.44
ME2	0.79***	0.85***	0.94***	-0.04	-0.04	0.12	0.81	0.83	0.72	3.85	3.84	5.56
ME3	0.92***	1.02***	1.18***	0.07	-0.13***	-0.17**	0.88	0.94	0.91	3.24	2.65	3.80
HML		b			c			R^2			$s(\epsilon)$	
ME1	0.57***	0.41***	0.46***	-0.29**	-0.02	0.75***	0.57	0.51	0.53	4.37	3.98	6.64
ME2	0.89***	0.87***	0.79***	-0.38***	-0.05	0.52***	0.84	0.83	0.77	3.45	3.84	5.09
ME3	1.02***	1.08***	1.10***	-0.48***	-0.12*	0.50***	0.93	0.93	0.93	2.43	2.73	3.25
NCO/AL		b			c			R^2			$s(\epsilon)$	
ME1	0.50***	0.41***	0.64***	0.01	0.11*	0.28**	0.53	0.53	0.46	4.56	3.90	7.17
ME2	0.80***	0.86***	0.91***	-0.08	-0.06	0.20**	0.81	0.83	0.74	3.81	3.82	5.42

ME3	0.90***	1.05***	1.22***	-0.15***	-0.14***	0.19***	0.89	0.94	0.91	3.07	2.59	3.71
NIM		b			b			R^2			$s(\epsilon)$	
ME1	0.54***	0.45***	0.59***	-0.19*	-0.15	0.21	0.55	0.52	0.43	4.46	3.91	7.38
ME2	0.90***	0.92***	0.95***	-0.40***	-0.25***	-0.15	0.85	0.84	0.72	3.35	3.66	5.56
ME3	0.94***	1.08***	1.13***	-0.18**	-0.12*	0.39***	0.89	0.93	0.92	3.15	2.72	3.48
SMB		b			c			R^2			$s(\epsilon)$	
ME1	0.75***	0.64***	0.9***5	0.66***	0.59***	0.82***	0.66	0.65	0.51	3.85	3.32	6.80
ME2	0.86***	0.93***	1.01***	0.15	0.17	0.24	0.81	0.83	0.72	3.82	3.79	5.54
ME3	0.86***	0.93***	1.06***	-0.11	-0.33***	-0.42***	0.88	0.94	0.92	3.24	2.50	3.65
TERM		b			c			R^2			$s(\epsilon)$	
ME1	0.49***	0.40***	0.63***	2.94	3.45	2.13	0.54	0.51	0.41	4.56	3.98	7.47
ME2	0.79***	0.85***	0.89***	4.79	2.69	10.25**	0.81	0.83	0.73	3.83	3.84	5.44
ME3	0.91***	1.05***	1.23***	0.68	1.59	-3.72	0.89	0.93	0.90	3.18	2.78	3.95
YIELD		b			c			R^2			$s(\epsilon)$	
ME1	0.50***	0.42***	0.65***	-1.86	-2.77	-4.98	0.54	0.52	0.43	4.56	3.94	7.37
ME2	0.80***	0.86***	0.91***	-0.51	-1.09	-2.09	0.80	0.83	0.72	3.88	3.85	5.59
ME3	0.91***	1.06***	1.22***	-1.56	-1.78	0.52	0.89	0.93	0.90	3.16	2.75	3.98

The table presents the results of regressing excess return on market excess return together with one of the following factors: the A/BE factor, the A/ME factor, the E/P factor, HML, the NCO/AL factor, the NIM factor, SMB, TERM or YIELD once for each of the nine size-value portfolios. b and c corresponds to the coefficients for the market excess return and the additional variable. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient in question. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 26: Excess Return Regressions With RM-RF, HML, SMB and One Variable for Size-Value Portfolios

$$R_t - RF_t = a + b(RM_t - RF_T) + cHML_t + dSMB_t + eX_t + \epsilon_t$$

ME	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3
A/BE		b			c			d			e	
1	0.81***	0.70***	0.75***	-0.35***	0.08	0.69***	0.78***	0.2**8	0.90***	-0.14	0.41***	-0.14
2	1.00***	0.97***	0.91***	-0.31***	0.01	0.59***	-0.06**	-0.01	0.01	0.29**	0.23	0.28
3	0.98***	0.96***	0.90***	-0.49***	-0.10	0.46***	-0.06	-0.38***	-0.29**	-0.05	0.07	-0.20*
A/ME		b			c			d			e	
1	0.81***	0.67***	0.81***	-0.42***	0.10	0.95***	0.75***	0.50***	0.64***	-0.14	0.18	0.30
2	0.98***	0.98***	0.91***	-0.27**	0.20	0.72***	0.09	0.00	0.08	0.15	0.34**	0.27
3	1.00***	0.97***	0.88***	-0.39***	-0.03	0.22**	-0.16*	-0.38***	-0.24**	0.12	0.11	-0.38***
E/P		b			c			d			e	
1	0.83***	0.64***	0.77***	-0.31***	-0.03	0.72***	0.66***	0.58***	0.81***	0.02	0.01	-0.03
2	0.96***	0.94***	0.87***	-0.41***	-0.07	0.54***	0.23**	0.22*	0.14	-0.11*	-0.08	0.14
3	0.98***	0.95***	0.93***	-0.47***	-0.13**	0.50***	-0.12	-0.27***	-0.40***	0.05	-0.09*	-0.06
NCO/AL		b			c			d			e	
1	0.83***	0.65***	0.77***	-0.35***	-0.10	0.71***	0.66***	0.57***	0.79***	0.05	0.09	0.03
2	0.96***	0.94***	0.88***	-0.40***	0.00	0.48***	0.16	0.19	0.21	0.01	-0.07	0.05
3	0.98***	0.95***	0.94***	-0.47***	-0.04	0.44***	-0.09	-0.30***	-0.46***	-0.02	-0.11**	0.10**
NIM		b			c			d			e	
1	0.82***	0.65***	0.77***	-0.33***	0.00	0.71***	0.68***	0.57***	0.81***	0.71	0.66	0.63
2	0.96***	0.95***	0.88***	-0.26***	0.07	0.72***	0.09	0.10	0.10	0.87***	0.85**	0.80***
3	0.98***	0.96***	0.93***	-0.48***	-0.04	0.44***	-0.09	-0.37***	-0.40***	0.93	0.95**	0.95*

$$R_t - RF_t = a + b(RM_t - RF_T) + cHML_t + dSMB_t + eX_t + \epsilon_t$$

	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3	BE ME 1	BE ME 2	BE ME 3 1	BE ME 2	BE ME 3	BE ME
ME															
R^2	A/BE			A/ME			E/P			NCO/AL			NIM		
1	0.71	0.71	0.63	0.71	0.67	0.64	0.71	0.66	0.63	0.71	0.67	0.63	0.71	0.66	0.63
2	0.86	0.84	0.78	0.85	0.85	0.78	0.86	0.84	0.78	0.85	0.84	0.77	0.87	0.85	0.80
3	0.93	0.95	0.95	0.94	0.95	0.96	0.94	0.95	0.95	0.93	0.95	0.95	0.93	0.95	0.95

The table presents the results of regressing excess return on market excess return, HML and SMB together with one of the following factors: the A/BE factor, the A/ME factor, the E/P factor, the NCO/AL factor and the NIM factor, for each of the nine size-value portfolios separately. b, c, d and e corresponds to the coefficients for the market excess return, HML, SMB and the additional variable. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient in question.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 27: Regressions of Excess Returns on RM-RF for Quintile Portfolios

(i) $R_t - RF_t = a + b(RM_t - RF_t) + e_t$					
	Q1	Q2	Q3	Q4	Q5
			b		
A/BE	0.58***	0.69***	0.90***	1.01***	1.17***
A/ME	0.67***	0.92***	0.87***	1.10***	1.27***
BE/ME	0.86***	0.88***	1.00***	1.14***	1.18***
E/P	0.92***	0.94***	0.98***	1.00***	1.27***
ME	0.39***	0.66***	0.83***	0.96***	1.09***
NCO/AL	0.98***	1.07***	1.15***	1.13***	0.98***
NIM	1.05***	1.20***	1.01***	0.86***	0.98***
			R^2		
A/BE	0.67	0.77	0.74	0.92	0.95
A/ME	0.77	0.82	0.89	0.90	0.92
BE/ME	0.84	0.85	0.87	0.91	0.85
E/P	0.76	0.86	0.86	0.90	0.75
ME	0.51	0.76	0.84	0.87	0.96
NCO/AL	0.70	0.55	0.86	0.88	0.68
NIM	0.91	0.86	0.91	0.87	0.79

The table presents the results of regressing excess return on market excess return for each of the quintile portfolios separately. b corresponds to the coefficient for market excess return. The variables in the left column refer to which variable that set of portfolios has been constructed with respect too. Q1 refers to the first quintile, Q2 to the second and so on. The intercepts are presented in table 32 for 75. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 28: Regressions of Excess Returns on HML and SMB for Quintile Portfolios

(ii) $R_t - RF_t = a + bHML_t + cSMB_t + e_t$					
	Q1	Q2	Q3	Q4	Q5
			b		
A/BE	0.21	0.16	0.40**	0.44***	0.64***
A/ME	0.13	0.08	0.25	0.69***	0.90***
BE/ME	0.07	0.08	0.43***	0.78***	1.08***
E/P	0.48**	0.37**	0.24	0.55***	0.88***
ME	0.36***	0.47***	0.46***	0.55***	0.49***
NCO/AL	1.09***	0.83***	0.36*	0.50 **	0.38
NIM	0.62***	0.43**	0.52***	0.57***	0.15
			c		
A/BE	-0.46***	-0.70***	-1.10***	-1.36***	-1.46***
A/ME	-0.67***	-1.20***	-1.13***	-1.42***	-1.56***
BE/ME	-1.10***	-1.17***	-1.37***	-1.29***	-1.42***
E/P	-1.02***	-1.06***	-1.40***	-1.23***	-1.64***
ME	-0.15	-0.31**	-0.81***	-1.03***	-1.49***
NCO/AL	-0.91***	-1.27***	-1.56***	-1.36***	-1.65***
NIM	-1.25***	-1.70***	-1.29***	-0.92***	-1.22***
			R^2		
A/BE	0.18	0.27	0.42	0.62	0.62
A/ME	0.26	0.42	0.50	0.67	0.66
BE/ME	0.41	0.46	0.59	0.57	0.71
E/P	0.40	0.42	0.57	0.57	0.58
ME	0.18	0.20	0.38	0.46	0.68
NCO/AL	0.53	0.39	0.54	0.49	0.65
NIM	0.56	0.60	0.60	0.50	0.38

The table presents the results of regressing excess return on HML and SMB for each of the quintile portfolios separately. b and c corresponds to the coefficients for HML and SMB. The variables in the left column refer to which variable that set of portfolios has been constructed with respect too. Q1 refers to the first quintile, Q2 to the second and so on. The intercepts are presented in table 32 for 75. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 29: Regressions of Excess Returns on RM-RF, HML and SMB for Quintile Portfolios

(iii) $R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + e_t$					
	Q1	Q2	Q3	Q4	Q5
			b		
A/BE	0.82***	0.89***	0.90***	0.89***	1.07***
A/ME	0.88***	1.03***	0.89***	0.89***	1.08***
BE/ME	0.99***	0.96***	0.88***	1.07***	0.87***
E/P	0.98***	1.04***	0.91***	0.93***	0.99***
ME	0.56***	0.99***	0.95***	1.00***	0.93***
NCO/AL	0.87***	0.91***	1.09***	1.14***	0.61***
NIM	0.99***	1.04***	0.90***	0.85***	1.11***
			c		
A/BE	-0.22	-0.31***	-0.08	-0.02	0.08
A/ME	-0.33***	-0.46***	-0.22***	0.23***	0.34***
BE/ME	-0.45***	-0.42***	-0.04	0.22**	0.62***
E/P	-0.03	-0.17*	-0.24***	0.06	0.36**
ME	0.07	-0.04	-0.04	0.03	0.01
NCO/AL	0.64***	0.35	-0.21*	-0.09	0.06
NIM	0.10	-0.11	0.05	0.12	-0.43***
			d		
A/BE	0.50***	0.34***	-0.05	-0.33***	-0.22***
A/ME	0.36***	0.00	-0.09	-0.38***	-0.30***
BE/ME	0.05	-0.06	-0.34***	-0.05	-0.40***
E/P	0.12	0.15	-0.34***	-0.15	-0.49**
ME	0.51***	0.84***	0.30***	0.13	-0.40***
NCO/AL	0.09	-0.21	-0.28**	-0.03	-0.94***
NIM	-0.09	-0.49***	-0.23**	0.07	0.07
			R^2		
A/BE	0.76	0.83	0.74	0.93	0.96
A/ME	0.84	0.87	0.90	0.93	0.95
BE/ME	0.89	0.90	0.88	0.91	0.92
E/P	0.76	0.87	0.89	0.90	0.78
ME	0.64	0.94	0.86	0.87	0.98
NCO/AL	0.77	0.56	0.87	0.88	0.77
NIM	0.91	0.88	0.92	0.87	0.82

The table presents the results of regressing excess return on market excess reteurn, HML and SMB for each of the quintile portfolios separately. b, c and d corresponds to the coefficients for market excess return, HML and SMB. The variables in the left column refer to which variable that set of portfolios has been constructed with respect too. Q1 refers to the first quintile, Q2 to the second and so on. The intercepts are presented in table 32 for 75. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient. $s(\epsilon)$ is the standard error, adjusted for degrees of freedom.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 30: Regressions of Excess Returns on HML, SMB, A/BE and NIM Factors for Quintile Portfolios

(iv) $R_t - RF_t = a + b\lambda(\frac{A}{BE})_t + cHML_t + d\lambda(NIM)_t + eSMB_t + \epsilon_t$					
	Q1	Q2	Q3	Q4	Q5
			b		
A/BE	0.38	-0.30	-0.51*	-0.64***	-0.66**
A/ME	0.05	-0.53**	-0.61**	-0.54**	-0.67**
BE/ME	-0.35	-0.37	-0.63**	-0.52*	-0.64***
E/P	-0.70**	-0.44	-0.59**	-0.27	-1.13***
ME	-0.06	-0.43**	-0.57**	-0.28	-0.63***
NCO/AL	-0.81***	-0.11	-0.87***	-0.70**	-0.91***
NIM	-0.35	-0.95***	-0.55**	-0.39*	-0.73**
			c		
A/BE	0.38**	0.12	0.49**	0.32*	0.36*
A/ME	0.23	0.10	0.14	0.51***	0.74***
BE/ME	0.03	-0.02	0.37*	0.71***	0.86***
E/P	0.47**	0.27	0.14	0.46**	0.72***
ME	0.29**	0.38**	0.44**	0.62***	0.33*
NCO/AL	0.96***	0.47	0.14	0.27	0.20
NIM	0.51**	0.04	0.41**	0.63***	0.32
			d		
A/BE	-0.09	-0.12	-0.55**	-0.19	0.13
A/ME	-0.18	-0.41*	-0.19	0.00	-0.15
BE/ME	-0.17	-0.05	-0.32*	-0.23	0.02
E/P	-0.45**	-0.10	-0.21	-0.01	-0.44*
ME	0.10	-0.10	-0.37*	-0.34	-0.10
NCO/AL	-0.30	0.66**	-0.15	0.00	-0.26
NIM	-0.01	0.16	-0.14	-0.40**	-0.86***

(iv) $R_t - RF_t = a + b\lambda(\frac{A}{BE})_t + cHML_t +$ $+ d\lambda(NIM)_t + eSMB_t + \epsilon_t$					
	Q1	Q2	Q3	Q4	Q5
			e		
A/BE	-0.83***	-0.47*	-0.80**	-0.84***	-0.82***
A/ME	-0.77***	-0.83***	-0.63**	-0.93***	-0.98***
BE/ME	-0.82***	-0.84***	-0.89***	-0.88***	-0.83***
E/P	-0.51	-0.69**	-0.92***	-0.99***	-0.73**
ME	-0.06	0.06	-0.39	-0.88***	-0.94***
NCO/AL	-0.26	-0.97**	-0.80**	-0.72**	-0.89***
NIM	-0.93***	-0.78**	-0.83***	-0.68***	-0.80**
			R^2		
A/BE	0.22	0.29	0.48	0.66	0.65
A/ME	0.27	0.46	0.55	0.69	0.69
BE/ME	0.42	0.47	0.63	0.59	0.74
E/P	0.45	0.44	0.60	0.57	0.65
ME	0.18	0.23	0.43	0.48	0.71
NCO/AL	0.58	0.43	0.59	0.53	0.71
NIM	0.57	0.67	0.63	0.54	0.51

The table presents the results of regressing excess return on the A/BE factor, HML, the NIM factor and SMB once for each of the quintile portfolios. $\Pi(X)$ refers to the factor based on X, as opposed to X itself. b, c, d and e correspond to the coefficients in the regression above. The variables in the left column refer to which variable that set of portfolios has been constructed with respect too. Q1 refers to the first quintile, Q2 to the second and so on. The intercepts are presented in table 14 for 75. The starts signify at which level each coefficient is significantly different from zero, the p-value for the coefficient.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 31: Regressions of Excess Returns on RM-RF, HML, SMB and A/BE and NIM Factors for Quintile Portfolios

(v) $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t + dHML_t +$
$+e\Pi(NIM)_t + fSMB_t + \epsilon_t$

	Q1	Q2	Q3	Q4	Q5
			b		
A/BE	0.94***	0.92***	0.91***	0.87***	1.06***
A/ME	0.96***	1.05***	0.88***	0.89***	1.07***
BE/ME	1.02***	0.98***	0.87***	1.08***	0.85***
E/P	0.96***	1.06***	0.91***	0.97***	0.92***
ME	0.59***	1.00***	0.95***	1.05***	0.92***
NCO/AL	0.82***	0.95***	1.06***	1.13***	0.53***
NIM	1.02***	0.98***	0.90***	0.87***	1.11***
			c		
A/BE	0.90***	0.22*	-0.01	-0.16	-0.07
A/ME	0.59***	0.05	-0.12	-0.05	-0.08
BE/ME	0.21*	0.17	-0.15	0.07	-0.17
E/P	-0.17	0.15	-0.09	0.27**	-0.63**
ME	0.27**	0.12*	-0.05	0.30**	-0.12**
NCO/AL	-0.36*	0.42**	-0.29*	-0.07	-0.62***
NIM	0.22*	-0.41	-0.05	0.09	-0.12
			d		
A/BE	0.03	-0.22**	0.16	0.00	-0.03
A/ME	-0.12*	-0.28***	-0.19**	0.19**	0.35***
BE/ME	-0.34***	-0.38***	0.05	0.32***	0.54***
E/P	0.11	-0.11	-0.19*	0.11	0.38**
ME	0.08	0.01	0.09	0.24**	-0.01
NCO/AL	0.66***	0.12	-0.24*	-0.15	0.00
NIM	0.13	-0.32**	0.08	0.31***	-0.08
			e		
A/BE	-0.03	-0.07	-0.50***	-0.14*	0.19***
A/ME	-0.12*	-0.35***	-0.14*	0.05	-0.08
BE/ME	-0.11	0.01	-0.26**	-0.17*	0.08
E/P	-0.40***	-0.04	-0.15	0.05	-0.39**
ME	0.14	-0.04	-0.31***	-0.27***	-0.04
NCO/AL	-0.25	0.71***	-0.09	0.07	-0.23
NIM	0.05	0.21*	-0.09	-0.34***	-0.80***

(v) $R_t - RF_t = a + b(RM_t - RF_t) + c\Pi(\frac{A}{BE})_t +$ $dHML_t + e\Pi(NIM)_t + fSMB_t + \epsilon_t$					
	Q1	Q2	Q3	Q4	Q5
			f		
A/BE	-0.19**	0.16	-0.18	-0.25**	-0.11
A/ME	-0.12	-0.13	-0.04	-0.33**	-0.26**
BE/ME	-0.14	-0.18	-0.30**	-0.15	-0.26
E/P	0.14	0.02	-0.31**	-0.34**	-0.11
ME	0.34**	0.73***	0.25*	-0.18	-0.32***
NCO/AL	0.30	-0.33	-0.09	0.05	-0.53**
NIM	-0.25*	-0.12	-0.22*	-0.09	-0.05
			R^2		
A/BE	0.93	0.89	0.91	0.93	0.95
BE/ME	0.90	0.90	0.89	0.92	0.92
E/P	0.78	0.88	0.89	0.91	0.81
ME	0.67	0.94	0.88	0.90	0.98
NCO/AL	0.78	0.60	0.88	0.88	0.79
NIM	0.92	0.90	0.92	0.90	0.92

The table presents the results of regressing excess return on market excess return, the A/BE factor, HML, the NIM factor and SMB once for each of the quintile portfolios. $\Pi(X)$ refers to the factor based on X, as opposed to X itself. b, c, d, e and f correspond to the coefficients in the regression above. The variables in the left column refer to which variable that set of portfolios have been constructed with respect too. Q1 refers to the first quintile, Q2 to the second and so on. The intercepts are presented in table 14 for 75. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 32: Intercepts from the Excess Stock Returns Regression for Quintile Portfolios

	Q1	Q2	Q3	Q4	Q5
(i) $R_t - RF_t = a + b(RM_t - RF_t) + e_t$					
A/BE	-0.55	0.11	0.03	0.69*	1.40***
A/ME	-0.01	0.28	0.38	0.86**	1.79***
BE/ME	0.32	0.11	1.20***	0.62	1.87***
E/P	1.04*	0.60	0.46	0.50	2.56***
ME	-0.08	-0.01	0.67	0.43	0.99***
NCO/AL	0.31	0.88	1.27**	1.68***	1.66**
NIM	1.04***	1.47**	0.67*	0.35	0.44
(ii) $R_t - RF_t = a + bHML_t + cSMB_t + e_t$					
A/BE	-1.90***	-1.45*	-2.11**	-1.70**	-1.44*
A/ME	-1.50**	-1.75**	-1.62**	-1.85**	-1.39
BE/ME	-1.56*	-1.82**	-1.17	-2.21**	-1.21
E/P	-1.19	-1.60*	-1.78**	-1.93**	-0.60
ME	-1.08*	-1.64**	-1.33*	-1.90**	-1.60**
NCO/AL	-2.34**	-1.84	-1.39	-1.01	-0.65
NIM	-1.53*	-1.34	-1.76**	-1.76**	-1.74*
(iii) $R_t - RF_t = a + b(RM_t - RF_t) + cHML_t + dSMB_t + e_t$					
A/BE	0.09	0.70*	0.06	0.44	1.14***
A/ME	0.63*	0.74	0.53	0.31	1.20***
BE/ME	0.82**	0.48	0.96**	0.36	0.90**
E/P	1.16*	0.90**	0.42	0.31	1.79**
ME	0.27	0.73***	0.96**	0.51	0.65***
NCO/AL	-0.26	0.35	1.24**	1.75***	0.82
NIM	0.86**	1.17**	0.42	0.29	0.93
(iv) $R_t - RF_t = a + b\lambda(\frac{A}{BE})_t + cHML_t + d\lambda(NIM)_t + eSMB_t + e_t$					
A/BE	-1.90***	-1.43*	-2.03**	-1.65**	-1.43*
A/ME	-1.48**	-1.68*	-1.58**	-1.82**	-1.35
BE/ME	-1.52*	-1.80**	-1.11	-2.16**	-1.18
E/P	-1.11	-1.57*	-1.73**	-1.92**	-0.51
ME	-1.09*	-1.61**	-1.27	-1.86**	-1.56**
NCO/AL	-2.28***	-1.91	-1.34	-0.98	-0.58
NIM	-1.51*	-1.32	-1.72**	-1.71**	-1.62*

	Q1	Q2	Q3	Q4	Q5
(v) $R_t - RF_t = a + b(RM_t - RF_t) + c\lambda(\frac{A}{BE})_t + dHML_t +$ $+ f\lambda(NIM)_t + gSMB_t + e_t$					
A/BE	0.34	0.77**	0.15	0.42	1.08***
A/ME	0.81***	0.81*	0.52	0.29	1.19***
BE/ME	0.90**	0.53	0.96**	0.41	0.84*
E/P	1.18*	0.95*	0.42	0.38	1.68**
ME	0.33	0.78***	1.00**	0.64	0.62***
NCO/AL	-0.32	0.35	1.17**	1.72***	0.69
NIM	0.92**	1.02*	0.42	0.38	1.03**

The table presents the intercepts for each quintile portfolio from five different excess return regressions. The full results of regression (i) can be found in table 27 , for (ii) in table 28, for (iii) in table 29, for (v) in table 30 and for regression (iv) in table 31. $\Pi(X)$ refers to the factor based on the variables X as opposed to the variable itself. a is the intercept and t(a) is the t-statistic of the intercept. The stars signify at which level each coefficient is significantly different from zero, the p-value for the coefficient.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$