The Cross-Section of Expected Returns

The Case of S&P 500 1997-2017

by

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September 2019

Master's Thesis Presented to

Ritsumeikan Asia Pacific University

in Partial Fulfillment of the Requirements for the Degree of

Master of Business administration.

Dedication

To my grandmother Mei who passed away in the waiting of this day.

Acknowledgments

I want to express my gratitude to my supervisor professor Nakajima Katsushi who always pushed me to perform better than I believe I could. He accepted me as his student and help me perform close to all my potential, challenge me to learn new topics and provide encouragement. Even though I know he is not keen on tokens of appreciation, I want him to know I admire him.

My friends Rez, Josh, and Alex who offer me their houses and families and were there in the moments when I felt lost. Their friendship and companionship are something that I will treasure for a long time after I leave APU. My Mexican friends, Panda, Vic, and Sergio your belief on me and you're proud on have me as a friend have always been a source of motivation. Marita your support and craziness where key components of some of the most fun moments during these last two years.

Finally, to my family who took this leap of faith with me and has supported me and encourages me along this academic journey. Mother, your constant academic encouragement and accomplishments have always inspired me. Father, your perspective and righteousness have always helped me see the bigger picture of life. Sister, your constant support and capacity to overcome your own problems have been a source of inspiration and proudness. Grandmother, your support emotional and financial if your trust and belief on me were the catalysts to this adventure. Finally, My Uncle Nayar who have believed on me for a long time and whose support has been key to this dream been achieved.

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Certification Page

I, Rodriguez Jimenez Rodrigo Aaron (Student ID 52117631) hereby declare that the contents of this master's Thesis are original and true, and have not been submitted at any other university or educational institution for the award of degree or diploma.

All the information derived from other published or unpublished sources has been cited and acknowledged appropriately.

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2019/05/30

Abstract

This paper studies the Fama-French factors when constructed from the S&P 500 index. Its objective is to know if they retain their explanatory power when constructed from a smaller sample. It also seeks to create a system of macros and VBA codes to simplify the analysis of the data obtained via the Mergent Online database that is available for APU students, and to provide investment decision based on these results to select a portfolio to beat the market.

The resulting factors constructed from the data obtained for this study do not maintain their explanatory power and while it doesn't mean that the use of indexes should be discarded there is a need for more study. As a consequence of this while a portfolio can be selected the safer investment route is to simply use the market portfolio. Vbas and macros where elaborated although further automatization is possible.

1.Introduction

The understanding of the reason for the returns of US stocks has been one of the most studied topics in the realm of Finance. Historically using the asset pricing Model (T, 1979) the main explanatory reason has been the β of the portfolio or the individual companies.

This concept is so integrated into Financial thinking that is still taught until today (Nakayama, 2017) and used in the prediction of the cost of equity for companies, among other uses. However, starting in 1992 with the publication of the first paper on the explanation of the cross-section of average returns by Fama-French (Fama & French, Jun. 1992), new thinking has been developed that indicates that β is only not useful but has no explanatory power over the returns.

From Fama-French 1992 and 1993 (Fama & French, Common risk factors in the returns on stocks and bonds, 1993) the empirical variables of size and the relation between the book equity and market equity relate have been recognized for its explanatory power on the return of stocks on the US market and as a consequence they in conjunction with the risk free rate have been recognized as the most basic factors in any multi-factor model..

This paper plans to use the basis established by the Fama-French three-factor asset model and apply them in the following way.

a) The original paper and the updated version of the Fama-French 2015 universe encompass almost all the companies listed in the US stock markets (e.g., Nasdaq and NYSE). In contrast, this research uses an Appendix, in this case, the S&P 500 as the market portfolio and the source of the companies to create the factors because whether the Fama-French three-factor asset model still holds in the smaller sample has been less explored. If it holds, this paper can provide researchers with the method to study other countries’ markets, where full stock information beyond Appendixes may not be fully available.

b) *Programming.* While it’s possible to create these factors using a variety of programming languages, such as R and Python, the APU information system does not have access to direct databases in a way that can easily be linked into these languages. It’s my intention to create a semi-automatized system to streamline the access and processing of the data available through the school provided databases. Its objective is to help students without advanced programming skills to obtain and process big amounts of information. This is done using free and commonly available programs such as Microsoft Excel and Google Chrome/ Mozilla Firefox.

c) The first step of this study is to use the three factors as proposed by Fama-French(Fama & French, Common risk factors in the returns on stocks and bonds, 1993). The second step requires the application of these results to search for a portfolio that can be the market..

This paper uses the S&P 500 Appendix as the universe of stocks that represent the market and regress the return on the Appendix on factors constructed from the returns of the companies contained on it.

The results of the study can be summarized as follows. The strength of the explanatory power of the factors is basically nullified. This seems to be a consequence of the inconsistency of the companies available every quarter and cannot be discarded that the smaller size of the sample might also be affecting the results.

While this does not invalidate the future use of indexes for this kind of analysis it certainly calls into question them. It is necessary then to make further studies with more consistent data to finally accept or reject the use of these tools when doing investment analysis.

As a consequence of this for this study it was imposable to select a portfolio that can beat the market or a portfolio in general in a reliable way. Therefore, if presented with a situation in which the information is incomplete and forced to decide the safer decision that can be taken is to go for the market portfolio.

Programming wise it was found that using a combination of plugins, VBA and macros linked with gaming hardware it is possible to automatize to an acceptable degree the ability to download and process the data available on the APU provided databases. However, this process still required supervision by those executing the code to verify the integrity of the results. Excerpt of the general code is included in this paper as annexes to be reviewed as necessary and will be provided on a documented and easily understandable way later to the school for its distribution to those who want to use the Mergent Online database for their research.

The process goes as follow. Using Mergent online in conjunction with JSON scripts, created with Kantu Plug-in for Google Chrome/Mozilla Firefox, that allows an automated Bulk download of financial information of the S&P 500 companies. The independent variables and the returns that are going to be explained are created using this information. The regressions of these variables are done, and it is inspected how they capture the variation of the returns. An explanation of the programming hurdle's and code is followed with annexes that cover the code used for the analysis. Followed by a conclusion with the selection of the portfolio that can beat the market such one be found.

2. Models

The explanatory variables for the time series returns are those based on the S&P 500, which is used as a mimic to the market portfolio. Mimicking for size, book equity, market equity, and structural factors. The returns to be explained are 25 portfolios created on size and book to market equity.

2.1Returns

The Variables are those that had been deemed important for the explanation of the stock returns. These variables are model after those proposed by Fama-French in their 1993 paper (Fama & French, Common risk factors in the returns on stocks and bonds, 1993). As explained the modeling process although familiar it is changed by period and the source of them. Which allow the test to provide an interesting viewpoint and evaluate if the explanatory power is kept.

2.1.1 Stock Market Factors

Motivation. When first proposed by Fama-French in 1992 (Fama & French, Jun. 1992), the book to market equity seemed like an ad hoc variable, but the results of the experiment realized by them showed that the relationship is tied to economic fundamentals. Companies with a low BE/ME, that is low stock price compared to their book valuation, will have a bad performance of their assets while, companies with a Small BE/ME will have consistent earnings.

This is understood as BE/ME is an indicator of the economic health of a company and reflects the position of the company regarding its, leverage, uncertainty and the likelihood of dividends. The premium of risk is integrated and explained by this indicator, which makes it ideal as a proxy for it in the analysis.

Posterior studies such as Dichev (Dichev, 1998) found a link between the likelihood of bankruptcy and financial distress with companies with low returns. This seems to be a contradiction to the fact that high BE/ME companies report higher earnings as a premium for distress risk.

The S&P 500 criteria of selection of companies exclude companies with this type of risk, therefore, the use of BE/ME explanatory power can be lower than on normal cases using a broad market. This lower BE/ME companies must have a different reason than performance and can be a cause for further analysis when using Appendix studies (Griffin, Are the Fama and French factors global or country-specific?, 2002).

S&P 500 contain financial companies, a type that was excluded by Fama-French on its original study. Posterior studies by Barber and Lyon (Barber & Lyon, Jun., 1997) found that the relation of BE/ME regarding this type of companies has no substantial difference to that of non-financial companies. This provides certainty that the results will not be greatly distorted by the usage of this kind of companies, although, its unknown what difference might exist if they are excluded, this might be addressed in a posterior study.

Size. Is a profitability indicator. As identified by Fama-French (Fama & French, Jun. 1992) it was mentioned that the importance of it was identified after the 1980's recession. When controlling form BE/ME it was observed that smaller firms tend to have lower returns than Bigger firms. During that period, it was observed a long depression on smaller firms return.

It's important to the present study to see if the 2008 crisis had a similar effect during the study period on this paper and the recuperation of the economy was like that of the original study or was there any variance on it.

2.2 Materials, Methods of Data collection and Construction

As proposed by Fama-French(Fama & French, Common risk factors in the returns on stocks and bonds, 1993)six portfolios are constructed on size and BE/ME. These portfolios are constructed to reflect the underlying risk factors related to size and book to market equity. This secures a familiar replication of the original study. Significant changes to the construction of these block were made to provide a more concise study.

2.2.1 The explanatory Factors

From 1997 to 2017, the S&P 500 stocks as shown in the Mergent Online Database (Mergent, Inc, 2018) where searched. The companies included were those that the Mergent online database displayed as December of 2018 when the data was extracted. Is important to mention that some problems where encountered, those occurred because of the agreement between Mergent online and Ritsumeikan Asia Pacific University, the 500 companies were not available only those based on the US consequently the study was restricted to 472 companies.

The data was obtained by searching by Appendix in the advanced tab of the database. This gave off the list of the companies included in the S&P 500. The data selected for downloading for every company was the closing daily closing price for the period of January 1997 to December of 2017. Complemented with the income statement, and its balance sheet in a standardized quarterly form, in a scale of thousand and reported in US dollars to avoid the problem of have a date that is non-comparable. This was saved as a custom search in the Mergent System.

Mergent online has the problem that only can download information on pdf, Excel, HTML or display it on the same browser, this is a problem for the use of the information. A script using the web plugin Kantu tool was developed for the download of the information in bulk without having to go for every company or pages of companies and having to select the parameters individually. The main complication encountered during this action was that if downloaded in batch, all the information of the companies selected were integrated into one page or sheet, individually of the format desired. It was decided to download every company individually, 472 unique excel pages were downloaded one for every company. These were combined in four, one hundred pages excel files and one 72 and then these unto one, 472 pages, using code taken from albeits (Cheusheva, 2018). The automation code using Kantu selected every company in an individual way and then downloaded the data according to the custom search saved beforehand.

Once the master Excel was, obtained it was determined that the required data to create the portfolios was for market equity, the shares outstanding, and the price of those share at the date that the quarterly statements where created, should that date land in a non-working date for the stock market the closer past date was selected. For book equity, the total equity as reported was utilized. The BE/ME was then created by the division of the equity over the market equity.

These data as copied to an individual page where it was all compiled with the help of a script obtained from GitHub user ijd65 (ijd65, 2019). These allowed a fast and concise structuring of the important information for every company. The code, of course, was tailored to the needs of the specific excel file used to create the current study.

The data then was divided into two: one for the Market Equity and one for the BE/ME relation. To analyze Market Equity, the process was as follows: the companies where order grouped by quarter using the reported dates of their financial statements. The grouped information is order from bigger to smaller for every independent quarter. Some companies have no information for a quarter, this may be because the company didn't exist or had not joined the stock market on that date. This is especially true in the case of technology companies that were created during the 2000s or later. Another possible reason is that a company as dropped from the S&P 500 Appendix, the empty data for every quarter was removed. The BE/ME companies followed a similar system, they were grouped by quarter and order form bigger to smaller, companies with missing data or negative BE/ME were excluded to replicate the basic rules of Fama-French.

Independent macros for every step exist and where created. Both follow the same logic although the breakpoints for the creations are different and described as follows. For the Market Equity, the median of every group was calculated and the using a colored function the upper part was colored one type while the below one was colored a second one. Also, a numerical marker was added to the side, 1 for the Big and 0 for the Small. This was repeated for every one of the 84 quarters contained in the studied period. For the BE/ME portfolios, they were divided in the top 30% the bottom 30% and center 40%. As with the previous case these were marked in different colors and a numerical marker was added to identify them. 1 for High, 0 for medium and -1 for Low. The macros to color them were created with conditional formatting as the basis and only the breakpoints of mediums for the BS and top

30% bottom 30% for the BE/ME case. It's important to note that if the code is review it only covers one individual period given, the complexity of creating a cycle for the 84 quartiles a shortcut was used with the help of a gaming mouse and its macro abilities to execute keyboard and mouse command in a cycle.

The Market Equity groups were divided in two while the BE/ME was divided into three. As it is with the original study the division are arbitrary and are just meant to be a replication of the original constructing block. No other options where contemplated because of this. But as the last 28 years of study of Fama-French regression don't suggest that the divisions are wrong or that should be improved as they are, but certainly, if the information would appear to suggest a different division of the data it should be contemplated.

The returns were calculated for every company in the S&P 500 using the closing price of their stock at the end of every month with the only exception of the month of January 1997 as the date for the 31 of December of 1996 was not downloaded. This means that February is calculated using the 28 of February data and the 31 of January data.

Using the five groups, two for the Market Equity and three for the BE/ME, six portfolios are created (S/L, S/M, SH, B/L, B/M, BH) in the intersections of the groups. As an example, we show that the portfolio S/L will contain all the stocks in the small group of Market Equity and the low group of BE/ME. All the Portfolios are constructed every quarter, and the weighted average of the returns are calculated monthly. This means that the returns based on the portfolio S/L for the first quarter of 1998 will contain the data for the months of January, February and March all of 1998. The quarterly returns are calculated from these weighted average monthly returns. Companies with missing data or that had a negative BE/ME are not used or contemplated in the creation of these six portfolios.

To create these portfolios both sets of data were added to the same page always first the BE/ME and in second place the Market equity ones. The macro proceeds to search in the first matrix (BE/ME) the date to calculate, then it creates a group that encompasses the BE/ME the company's ticker and Appendix and identifying number. In the second group, it proceeds to insert four empty columns in the date to compare. In these columns it first copies the identifying number, in a second column it assigns the respective letter that corresponds to the identifying number (H, M, L) then it creates the respective portfolio based on ifs therefore if H in one case and Number for the Big or Small identifier. These means a company with an identifier of 0 in Small or big portfolio and a -1 in BE/ME identifier will be assigned the portfolio S/L. These are repeated for every company in the quarter to analyze and then in the eighty-four, quarters.

The companies are grouped by portfolio and a second macro following a similar procedure proceeds to copy the returns to the correspondent company in every portfolio and quarter. From there a third macro calculates the weighted average returns for every month and for every portfolio these means that for example, February 1997 will have six average returns one for S/L, one for S/M and so on. It's important to note that unique Fama-French (Fama & French, Common risk factors in the returns on stocks and bonds, 1993) that use CompuStat data and wait two years of repeatedly appearance, in this case we take every company as it is included or excluded in the S&P 500, however, as mentioned before the S&P 500 is not updated every month or quarter but is the historical behavior of the companies included in the S&P 500 during the period of October- December 2018 when the data was obtained. Is important to note that the total number of companies used to create every portfolio and may not contain 472 companies for every quarter.

Size. The portfolio that it used to absorb the variance related to the size of the companies is SMB. It is monthly calculated using the difference, of the simple average of the small portfolios (S/L, S/M, S/H) and the big portfolios (B/L. B/M, B/H). These means that the SMB portfolio is the difference of the returns on small and big stock portfolios with the same weighted average book to market equity as intended by Fama-French. This should then free the portfolios of the influence of BE/ME giving priority to the difference between small and big stock differences.

BE/ME. This relation is captured in the portfolio HML8high Minus low) and as its names imply is the difference between high and low BE/ME companies. This is calculated in the following way, every month the difference between the simple average of the Low portfolio (S/L, B/L) and the simple average of the High portfolios (S/H and B/H). This relation should be free of the effects of the size on the portfolios as intended by Fama-French (Fama & French, Jun. 1992).

Market. To imitate the market (RM) performance the monthly returns of the S&P 500 Appendix as reported by Yahoo Finance was used (Yahoo! Finance, 2018). These means that the whole S&P 500 Appendix as was composed in every month returns are used which provides a difference with the one used during the creation of the portfolios. The Risk-Free Rate (RF) is the monthly returns on the three-month Treasury bill rate as reported by the St Louis Fed (Board of Governors of the Federal Reserve System (US), 2018). A quarterly bill is used to maintain consistency with the quarterly creation of the portfolios to analyze. Before Calculating the difference between RM-RF give us the excess of return of the market portfolio and the risk-free rate. This is then quarterlies to have the same time frame as the other factors.

2.2.3. The returns to be explained

The dependent variable for the regressions 25 stocks portfolios. These are constructed in a similar way to the 6 previous portfolios. Every quarter the companies are ranked by Market Equity in one case and by BE/ME in the second. Companies without data or negative BE/ME are excluded in a similar fashion. The data is separated in five quintiles, five for market equity and five for BE/ME. The intersection between these five and five groups is what gives the 25 portfolios. Once again, the monthly returns of the stocks of every company are attached to them and the monthly weighted average of every portfolio is calculated. The quarterly returns are calculated from these weighted average monthly returns

A similar macro that creates the portfolios, groups and calculates the weighted averages exist, the only difference is then in the number of portfolios created and the identifying numbers that came with them. Instead of 2 and 3, the quintiles are use and the identifiers for Market equity are B, 2,3,4, S and for BE/ME, H,2,3,4, L.

Table 2.1 shows that the companies are evenly distributed on all the quintiles with around 80 companies each the only exception would be the size quintiles 3 and small with 79 and 78 respectably. If seen on BE/ME, it found that all have 80 companies exactly. This result is different from that of Fama-French as in their case the most companies resided in the quintile of smallest size while the big size had fewer companies. It's important to note that one result that is similar is that of the market percentage. In the original study, the big size quintile had most of the market with 74% on average. Using only S&P500 I found that this quintile has 72% of the market a remarkable similar result. In the case of the small companies this is also similar as in this study I found that it encompasses only 1.9% of the market while Fama-French found less than .70%.

Another result that closely resembles that of the original finding is that of big and successful companies' intersection for low BE/ME and Big size quintiles as it is responsible for 24% of the whole market. This allows the idea that results tend to mirror between each other no matter the number of companies involved or the time frame if the main structural process is repeated. One interesting thing indeed is why the average firms by quintiles turned to be so like almost equal among all of them it would suggest that there is no normal distribution as there seem to be highly homogenous.

I believe this is because of the use of the S&P 500 Appendix as it is already a curated collection of companies, and one more possible reason is the fact that the amount of companies varies greatly on the time frame because of the way the companies were selected as explained before. The consequences of this homogeneity are not yet truly comprehended.

Table 2.1

Descriptive Statistics for 25 stock portfolios formed on size and Book-to market Equity 1997-2017 S&P 500 20 years on 84 quarters

	Book-to-market equity (BE/ME) quintiles				
	High	2	3	4	Low
Size Quintile	Average of annual averages of firm size				
Big	65083752.2	92627259.7	84310028.9	72324786.8	93949594.7
2	5432676.66	5378520.13	5398093.14	5372012.65	5495215.03
3	9561404.09	9293406.4	9461774.21	9496154.07	9698609.58
4	17949498.9	18252599.5	17891228.3	17426672.3	17574677.5
Small	2745177.92	2855354.66	2885179.63	2898697.55	2764199.81
	Average of annual percent of market value in the portfolio				
Big	7.68%	17.15%	12.45%	9.88%	24.84%
2	0.82%	0.90%	0.86%	0.84%	0.71%
3	1.54%	1.30%	1.48%	1.59%	1.52%
4	2.90%	2.83%	3.08%	2.93%	2.73%
Small	0.43%	0.38%	0.42%	0.42%	0.32%
	High	2	3	4	Low
	Average of Annual B/E ratios for portfolio				
Big	0.95	0.25	0.37	0.53	0.13
2	1.06	0.25	0.37	0.53	0.13
3	0.94	0.25	0.37	0.54	0.13
4	0.90	0.25	0.37	0.53	0.12
Small	1.29	0.25	0.37	0.54	0.13
	Average of the annual number of firms in the portfolio				
Big	11.51	19.08	14.51	13.49	22.48
2	16.57	17.17	16.98	16.64	13.73
3	16.49	14.33	16.08	17.27	15.80
4	16.08	15.48	17.35	16.68	15.65
Small	19.38	14.60	15.76	16.80	12.36

The 25 portfolios are formed as follows. Using Mergent online the S&P 500 Appendix companies were obtained on December 13, 2018. Balance sheet, daily closing price and income statement for the period of January 1997-December 2017 was extracted in a quarterly standardize in thousands. Closing Price, Size was calculated as shares outstanding times the closing price (ME) for the quarter reported date.

Every Quarter size was divided into five quintiles and order form bigger to smaller. The Book equity was taken from the balance sheet as quarterly reported under the part of total equity. And divided by the Market Equity (ME) on every quarter and was divided into five quintiles and order form High to low.

It's important to note that the S&P 500 was formed as reported and December 2018 and the history of closing price, balance sheet and income statement historic where downloaded for those companies. The full S&P500 was not available given the current agreement between Mergent and Ritsumeikan Asia Pacific University. A total of 472 companies were used.

The statistics were calculated at every financial quarter when every portfolio is created and the averaged on the 20 years

Table 2.2

Summary statistics for the quarterly dependent and explanatory returns in the regressions of table 3.1 to 4.3
January 1997-Decembre 2017. 84 observations.

Name	Mean	Std	
Independent Variables			
ER	0.012	0.082	0.007
SMB	-0.419	1.07	1.15
HML	-0.426	1.12	1.24

Dependent variables 25 Portfolios BE/ME quintiles

	Mean's					SD				
	High	2	3	4	Low	High	2	3	4	Low
Big	1.53%	3.75%	2.30%	2.27%	5.62%	0.135	0.074	0.079	0.091	0.088
2	-0.05%	5.92%	4.39%	3.13%	8.58%	0.114	0.097	0.087	0.102	0.103
3	0.47%	5.61%	4.10%	2.71%	9.50%	0.115	0.106	0.093	0.098	0.136
4	0.78%	4.60%	3.41%	2.59%	7.18%	0.105	0.088	0.090	0.072	0.099
Small	0.42%	5.82%	4.07%	3.75%	10.93%	0.140	0.114	0.132	0.117	0.181

SMB (small minus big) and HML (High minus low) are portfolios constructed from the intersection of three portfolios based on BE/ME and two based on size. SMB represents the quarterly rate of the monthly weighted average of the returns of the small size portfolio minus the quarterly rate of the monthly weighted average of the big return's portfolio. HML is the quarterly rate of the monthly weighted average of the returns of the High BE/ME portfolios minus the low BE/ME portfolios. ER (excess returns) is the quarterly rate of the monthly S&P 500 returns during the 1997-2017 period, minus the risk-free rate and it is the quarterly rate of the monthly returns of the three-month Treasury bill as observed at the beginning of the month.

The 25 portfolios that make the dependent variables are the quarterly rate of the monthly weighted returns of portfolios created every financial quarter. The companies on the S&P 500 get ranked every month on size and divided on quintiles this is intercepted with the portfolios created by the quintiles of the ranking of these companies on BE/ME. Every financial quarter these portfolios are remade.

3. Common variation in returns

The data were analyzed using IBM SPSS which allow us to obtain far more information from every individual analysis that doing a multiple regression just using Microsoft Excel. The following information is provided given the ANOVA test that was made for every individual portfolio of the dependent variable. Is important to note that the way it was made is that ANOVA is an extra analysis given by SPSS when conducting a multiple regression analysis. Is important to explain that all the regressions were made two times one only using the independent variables SMB and HML and a second one with SMB, HML and Excess Returns.

It's important first to understand the characteristics of the data to be used in the time series regressions. First, the average value of the Excess Return RM-RF is -.42%(SD=1.12) monthly this is a complete difference from the original one of 0.43% in the original study (Fama & French, Jun. 1992). There is a big difference from the original study. With the new quarterly date there is no real parallelism to the original study. Is with this that it decided to tackle one point that although mentioned never really seen in dept n the original study is the explanatory power of the selected portfolio SMB and HML on the selected return on a statistical way.

In this study, the ANOVA results are also shown which can indeed provide an interesting perspective on the relation between the variables and the dependent variables Table 3.1 shows that ANOVA results are done for every one of the regressions and portfolios.

As seen the ANOVA results tend to grow as more variables are involved and with 95% of confidence level, its significance only grows when applied to the full model and even there it barely goes lower than P >0.005. This says that while there is a big link between

HMB and SMB as explanatory variables it is possible to see that the importance in the context of the information provided it's not enough to explain the dependent variables.

When only reviewed on the Excess returns the P values are all over 0.317 with the top ones over 0.956 this clearly shows that the relation between excess returns and the dependent variables is inexistent. When reviewing the SMB and HML factors on its own we can observer that the *P* values are smaller but still none of them pass the threshold of 0.05 only for 3L it comes close with 0.56.

3.1 Variation on returns

In the time series regression, the more important data we can obtain are slopes and R^2 as this tells us if the factors selected indeed capture the variation on the returns of the stock. As with Fama-French the regressions are done in multiple steps the first one is only using the market-related factor ER(excess returns) in the second case is using the SMB(Small minus Big) and HML (High minus Low) portfolios and finally the three factors. The independent variables used are introduce at time *t* while the dependent variables to be explained are at time *t+1* as we are trying to see if the past information has any explanatory power over the future results of the portfolios.

All the regressions were done using IBM SPSS with a 95% confidence level and *Enter* method with Durbin-Watson for residual treatment. A previous method using *Stepwise* method was tried to see a possible variation on the explanatory power of the selected variables. This resulted in many cases where the regression was impossible to execute. Some of the variables or all were excluded for some of the portfolios. Specifically, portfolio B2, this shows a trend where B2 is a consistent problematic one when using statistical analysis.

Table 3.1

ANOVA Results on SMB, HML, ER and the excess returns on stocks. January 1997-Decembre 2017 84 quarters

Dependent variable: the excess of returns on 25 portfolios formed on size and book-to-market equity

Size quintiles	Book-to-market equity (BE/ME) quintiles									
	High	2	3	4	Low	High	2	3	4	Low
	$R_{(t+1)}-RF_{(t+1)}=a+b[RM_{(t)}-RF_{(t)}]+e_{(t)}$					P				
Big	0.028	0.347	0.003	0.194	0.027	.868	.557	.956	.661	.869
2	0.650	0.034	0.186	0.086	0.249	.422	.854	.668	.770	.619
3	1.01	0.067	0.018	1.09	0.204	.317	.796	.895	.299	.653
4	0.635	0.049	0.243	0.580	0.376	.428	.826	.623	.448	.541
Small	0.358	1.13	0.131	0.058	1.99	.551	.292	.718	.810	.162
	$R_{(t+1)}-RF_{(t+1)}=a+sSMB_{(t)}+hHML_{(t)}+e_{(t)}$					P				
Big	1.30	0.221	1.41	0.069	1.55	.278	.802	.250	.933	.219
2	0.122	0.398	0.547	0.179	1.73	.886	.673	.581	.836	.183
3	1.16	0.360	0.367	0.855	2.99	.318	.699	.694	.429	.056
4	0.740	1.01	0.385	0.340	2.58	.481	.368	.682	.713	.082
Small	0.071	0.565	0.399	0.342	2.75	.931	.571	.672	.712	.070
	$R_{(t+1)}-RF_{(t+1)}=a+b[RM_{(t)}-RF_{(t)}]+sSMB_{(t)}+hHML_{(t)}+e_{(t)}$					P				
Big	4.64	3.91	3.85	1.04	3.57	.005	.012	.013	.379	.018
2	1.69	0.452	0.622	0.349	1.89	.177	.716	.603	.790	.138
3	2.48	0.769	1.70	1.70	2.01	.067	.515	.174	.173	.120
4	2.07	2.24	1.27	1.70	3.34	.111	.090	.290	.175	.023
Small	2.03	0.415	0.812	1.03	2.89	.117	.743	.491	.384	.041

ANOVA results. Before every regression, the ANOVA coefficient and significance value are shown. In the first it’s between ER, excess returns, quarterly rate constructed from monthly S&P 500 Appendix minus monthly three-month treasury bill rate). In the second case SMB(Small minus Big) and HML(High Minus Low), created as the quarterly rate of the monthly weighted average of the returns on the S&P 500 stocks. For SMB order on Size and is the Small size sock minus the Big ones. On HML are ranked on (BE/ME) and is the High minus the Low BE/ME portfolios.

The 25 portfolios that make the dependent variables are the quarterly rates of the monthly weighted returns of portfolios created every financial quarter. The companies on the S&P 500 get ranked every month on size and divided on quintiles this is intercepted with the portfolios created by the quintiles of the ranking of these companies on BE/ME. Every financial quarter these portfolios are remade.

Market. This regression captures the effect using the market to explain the results. It is possible to see that there is no explanatory power at all confirming the information already provided by the ANOVA test. The R^2 values all tend to 0. The higher value is closer to explain only 1.4% of the variation of the results. The β for all portfolios are all under 0.2 with *t* values below the threshold of 2,-2. At this point we can observe big differences with the original works of Fama-French as from this point the explanatory power of these variables was already visible. (Fama & French, Common risk factors in the returns on stocks and bonds, 1993)

In table 3.3 we have the regression only using the two portfolios created SMB and HML we can observe that they actually have a bigger explanatory power that using only the Excess Returns. While the R^2 are never above the 0.05 it's possible to see that they actually tend to 0.01 and at last 4 *t* values above 2, -2. These *t* values are all in the low quintiles and the small ones. This again confirms the ANOVA results in which these quintiles are the ones getting close to P>0.05. This indicates that the SMB and HML factors do have a relation with the dependent variables but 4 quintiles of a total of 50 are not enough to say that indeed in have real explanatory power.

In table 3.4 we can see the regression using the three proposed variables HML, SMB, and the market. When using like this we have a considerable increase in the R^2 with values above 0.1 and most of the above 0.05. The *t* values are finally above 2 for over 15 of the portfolios for Excess returns close to 15 for SMB and 8 for HML. It is possible to see that in a general way more than half of the independent variables are finally over the t value of 2, -2. While it could be argued then that we have finally found a result that has explanatory power the R^2 makes clear that a 10% of explanation is not enough to consider any results coming from them are significant.

Table 3.2

Regression of excess of returns S&P 500 on the market excess of returns January 1997 December 2017.
84 quarters.

$$R_{(t+1)}-RF_{(t+1)}=a+b[RM_{(t)}-RF_{(t)}])+e_{(t)}$$

Dependent variable: excess of returns on 25 portfolios formed on size and book-to-market equity

Size quintiles	High	2	3	4	Low	High	2	3	4	Low
	Book-to-market equity(BE/ME) quintiles									
	b					*t(b)*				
Big	-0.031	0.059	0.006	0.055	-0.020	-0.167	0.589	0.055	0.441	-0.165
2	0.124	0.024	0.051	0.040	-0.070	0.806	0.185	0.431	0.293	-0.499
3	0.156	-0.037	-0.017	0.138	-0.083	1.01	-0.259	-0.133	1.04	-0.451
4	0.113	0.026	0.060	0.075	-0.082	0.797	0.220	0.493	0.762	-0.613
Small	0.113	-0.163	-0.065	-0.038	-0.343	0.598	-1.06	-0.362	-0.241	-1.41
	R^2					*e(b)*				
Big	0.000	0.004	0.000	0.002	0.000	0.136	0.074	0.080	0.092	0.088
2	0.008	0.000	0.002	0.001	0.003	0.114	0.097	0.088	0.102	0.104
3	0.012	0.001	0.000	0.013	0.003	0.115	0.107	0.094	0.098	0.137
4	0.008	0.001	0.003	0.007	0.005	0.105	0.088	0.090	0.073	0.099
Small	0.004	0.014	0.002	0.001	0.024	0.140	0.114	0.133	0.117	0.180

ER, excess returns, quarterly rate constructed from monthly S&P 500 Appendix minus monthly three-month treasury bill rate). In the second case SMB(Small minus Big) and HML(High Minus Low), created as the quarterly rate of the monthly weighted average of the returns on the S&P 500 stocks. For SMB order on Size and is the Small size sock minus the Big ones. On HML are ranked on (BE/ME) and is the High minus the Low BE/ME portfolios.

The 25 portfolios that make the dependent variables are the quarterly rates of the monthly weighted returns of portfolios created every financial quarter. The companies on the S&P 500 get ranked every month on size and divided on quintiles this is intercepted with the portfolios created by the quintiles of the ranking of these companies on BE/ME. Every financial quarter these portfolios are remade

Table 3.3

Regression of excess of returns S&P 500 on the market excess of returns January 1997 December 2017. 84 quarters

$$R_{(t+1)}-RF_{(t+1)}=a+\text{sSMB}_{(t)}+\text{hHML}_{(t)}+e_{(t)}$$

Dependent variable: the excess of returns on 25 portfolios formed on size and book-to-market equity

Size quintiles	Book-to-market equity(BE/ME) quintiles									
	High	2	3	4	Low	High	2	3	4	Low
	s					*t(s)*				
Big	0.015	0.009	0.022	-0.001	0.027	0.576	0.650	1.51	-0.063	1.65
2	-0.007	0.009	0.007	-0.006	0.033	-0.331	0.516	0.406	-0.323	1.69
3	-0.022	0.017	0.013	-0.019	0.044	-1.03	0.848	0.708	-1.03	1.74
4	-0.014	0.018	-0.006	-0.007	0.039	-0.712	1.11	-0.379	-0.494	2.12
Small	0.000	0.014	0.022	0.012	0.078	0.006	0.654	0.883	0.559	2.33
	h					t(h)				
Big	0.008	-0.008	-0.024	0.004	-0.027	0.342	-0.622	-1.67	0.253	-1.72
2	0.010	-0.015	-0.014	0.010	-0.034	0.477	-0.831	-0.868	0.546	-1.84
3	0.031	-0.014	-0.006	0.023	-0.058	1.48	-0.724	-0.329	1.30	-2.40
4	0.022	-0.022	0.012	0.010	-0.039	1.14	-1.42	0.750	0.775	-2.22
Small	0.005	-0.002	-0.016	-0.003	-0.059	0.202	-0.089	-0.662	-0.135	-1.83
	R^2					s(e)				
Big	0.032	0.006	0.034	0.002	0.037	0.135	0.075	0.079	0.093	0.087
2	0.003	0.010	0.013	0.004	0.042	0.115	0.097	0.088	0.103	0.102
3	0.028	0.009	0.009	0.021	0.070	0.115	0.107	0.094	0.098	0.133
4	0.018	0.025	0.010	0.008	0.060	0.105	0.088	0.091	0.073	0.097
Small	0.002	0.014	0.010	0.008	0.064	0.142	0.115	0.133	0.118	0.178

ER, excess returns, quarterly rate constructed from monthly S&P 500 Appendix minus monthly three-month treasury bill rate). In the second case SMB(Small minus Big) and HML(High Minus Low), created as the quarterly rate of the monthly weighted average of the returns on the S&P 500 stocks. For SMB order on Size and is the Small size sock minus the Big ones. On HML are ranked on (BE/ME) and is the High minus the Low BE/ME portfolios.

The 25 portfolios that make the dependent variables are the quarterly rates of the monthly weighted returns of portfolios created every financial quarter. The companies on the S&P 500 get ranked every month on size and divided on quintiles this is intercepted with the portfolios created by the quintiles of the ranking of these companies on BE/ME. Every financial quarter these portfolios are remade

Table 3.4

Regression of excess of returns S&P 500 on the market excess of returns January 1997 December 2017 84 quarters

$$R_{(t+1)}-RF_{(t+1)}=a+b[RM_{(t)}-RF_{(t)}]+sSMB_{(t)}+hHML_{(t)}+e_{(t)}$$

Dependent variable: the excess of returns on 25 portfolios formed on size and book-to-market equity

Size quintiles	Book-to-market equity(BE/ME) quintiles									
	High	2	3	4	Low	High	2	3	4	Low
			B					*t(b)*		
Big	1.72	0.959	0.894	0.642	0.925	3.32	3.35	2.91	1.73	2.71
2	1.00	0.299	0.316	0.347	0.608	2.19	0.751	0.880	0.830	1.47
3	1.02	0.546	0.782	0.719	0.181	2.23	1.26	2.08	1.83	0.333
4	0.906	0.749	0.634	0.609	0.834	2.16	2.14	1.74	2.09	2.15
Small	1.362	-0.168	0.689	0.734	1.24	2.43	-0.357	1.28	1.55	1.74
			s					*t(s)*		
Big	0.209	0.118	0.123	0.072	0.132	3.30	3.36	3.29	1.57	3.16
2	0.106	0.043	0.042	0.033	0.101	1.90	0.890	0.967	0.646	2.00
3	0.093	0.079	0.101	0.062	0.064	1.67	1.49	2.20	1.30	0.963
4	0.088	0.103	0.065	0.062	0.133	1.72	2.42	1.47	1.75	2.81
Small	0.154	-0.005	0.100	0.095	0.218	2.26	-0.084	1.52	1.65	2.51
			H					*t(h)*		
Big	-0.086	-0.061	-0.073	-0.031	-0.078	-2.36	-3.02	-3.36	-1.18	-3.23
2	-0.045	-0.031	-0.031	-0.009	-0.068	-1.40	-1.10	-1.23	-0.305	-2.31
3	-0.026	-0.044	-0.049	-0.017	-0.068	-0.792	-1.44	-1.83	-0.598	-1.75
4	-0.028	-0.064	-0.023	-0.023	-0.085	-0.953	-2.58	-0.881	-1.14	-3.10
Small	-0.070	0.007	-0.054	-0.043	-0.127	-1.77	0.223	-1.41	-1.29	-2.52
			R^2					*e(t)*		
Big	0.152	0.129	0.128	0.038	0.119	0.127	0.070	0.075	0.091	0.084
2	0.060	0.017	0.023	0.013	0.067	0.112	0.098	0.088	0.103	0.102
3	0.086	0.028	0.061	0.061	0.071	0.112	0.107	0.092	0.097	0.134
4	0.073	0.078	0.046	0.061	0.113	0.103	0.086	0.089	0.071	0.095
Small	0.071	0.016	0.030	0.038	0.099	0.137	0.115	0.133	0.117	0.175

. ER, excess returns, quarterly rate constructed from monthly S&P 500 Appendix minus monthly three-month treasury bill rate). In the second case SMB(Small minus Big) and HML(High Minus Low), created as the quarterly rate of the monthly weighted average of the returns on the S&P 500 stocks. For SMB order on Size and is the Small size sock minus the Big ones. On HML are ranked on (BE/ME) and is the High minus the Low BE/ME portfolios.

The 25 portfolios that make the dependent variables are the quarterly rates of the monthly weighted returns of portfolios created every financial quarter. The companies on the S&P 500 get ranked every month on size and divided on quintiles this is intercepted with the portfolios created by the quintiles of the ranking of these companies on BE/ME. Every financial quarter these portfolios are remade

4. Discussion

The times series regressions have some apparent results. First, it that market β alone has no explanatory power over the returns. It is necessary to add more factors that can add more explanatory power to that relation. Second, SMB and HML as seen on their own have some explanatory power on the cross-section of the returns of stocks especially on the low quintile area however the level of explanation of the results it barely close to 1% of them. Third, when used in tandem the three factors certainly have greater explanatory power, however, with the information currently available for this study it is completely unimportant and with close to 10% percent the information that can be confirmed from them is not enough to make any real investment decision.

Fama French 1992 (Fama & French, Jun. 1992) and the in 1993 (Fama & French, Common risk factors in the returns on stocks and bonds, 1993) proposed and reaffirmed the idea that these three factors are one of the most important explanatory powers on understanding the cross-section of US stocks, the question then seems to be if when the factors are made from a smaller sample as the S&P 500, the explanatory power is kept or it dilutes. Not seen on this light the utility of this exercise can certainly be doubt. Let's review some of the important information we could obtain from the construction of the portfolios using the S&P 500. The distribution of the number of companies by quintile is similar between them while when using the whole market most of the companies are grouped in the small and lower area of the portfolios. This is because the S&P 500 is a committee selected Appendix and not a pure rule-based Appendix. (Standard & Poor's, 2016)

This seems to explain why the market, when used on isolation, has an almost null explanatory power than when proposed by Fama-French 1992 and 1993. The process of construction of the Appendix appears to dilute part of the variations that would have existed such a broader selection had been chosen. Another factor that seems to absorb some of the explanatory power is the actual number of companies used. As mentioned in the data part, the S&P 500 was selected in December of 2018 and it reflects its composition at that moment. The historical data of those companies was used in the period of 1997-2017. This means that companies that do not exist or were not publicly traded or were withdrawn from the S&P 500 during this period are not considered. Combined with a problem of information available from Mergent, this means that the initial universe was not of 500 companies but of 472. The sample from December of 2017, using the portfolio formation criteria landed us with a total of only 405 companies, on the third trimester of 2017, this number increases to 453 only to continuously decrease to its minimum of 312 on the first trimester of 1997.

Is also important to note that while Fama and French (Fama & French, Common risk factors in the returns on stocks and bonds, 1993) didn't consider financial companies on their study because of the thought that the high leverage of them could distort the results. The S&P 500 considered this kind of company's and so does this study, it was not tested if the removal of these companies can substantially change the explanatory power of the factors.

4.1 Portfolio selection

As mention at the beginning of this paper the third objective of this paper was to know if it was possible to find a portfolio that could beat the market. This is a daunting proposition as the existence of a Jensen's alpha before the introduction of the Fama-French three-factor model was usually explained with the β obtained from the CAPM. For this paper we have found that the CAPM, table 3.2, we know has no real explanatory power over the results.

Non the less I decided to calculate the Jensen alpha and see if there is a significant difference when obtained from the CAPM and the Fama-French factors.

We are looking for alphas higher than 1 that have statistically significant and if they don't exist it is important to know if they are higher than the one obtains from the CAPM. The importance of this resides form the fact that from the publication of Fama-French it has been generally accepted that the alphas are basically inexistent and that their appearance is more because of chance that from portfolio management. In this case I believe that the fact that both results are statistically different and significant can be attributed to the difference in the explanatory power between CAPM and Fama-French more than any other reason.

Table 4.1

Jensen alpha calculated on 25 portfolios and the difference between them. 84 quarters

Size quintiles	Book-to-market equity(BE/ME) quintiles				
	High	2	3	4	Low
	$\alpha_{jp}=\sum^{T}_{T=1}[R_{Pt}-(RF_t+\beta_{rf}[FM_t-FR_t])]/T$				
Big	-2.04	-2.02	-2.04	-2.04	-2.00
2	-2.06	-2.00	-2.02	-2.03	-1.97
3	-2.06	-2.00	-2.02	-2.03	-1.96
4	-2.05	-2.01	-2.02	-2.03	-1.98
Small	-2.06	-2.00	-2.02	-2.02	-1.95
	$\alpha'_{jp}=\sum^{T}_{T=1}[R_{Pt}-(RF_t+\beta_{rf,p}[FM_t-FR_t])+\beta_{SMB,p}SMB_t+\beta_{HML,p}HML]/T$				
Big	-2.01	-2.01	-2.03	-2.03	-1.99
2	-2.05	-2.00	-2.01	-2.02	-1.97
3	-2.04	-2.00	-2.01	-2.02	-1.97
4	-2.04	-2.01	-2.01	-2.02	-1.98
Small	-2.04	-2.00	-2.01	-2.01	-1.93
	CAPM-[FAMA-FRENCH] lower is better				
Big	-0.03	-0.01	-0.01	-0.01	-0.01
2	-0.01	0.00	0.00	-0.01	-0.01
3	-0.02	-0.01	-0.01	-0.01	0.01
4	-0.02	-0.01	-0.01	-0.01	-0.01
Small	-0.02	0.00	-0.01	-0.01	-0.02

Jensen's alpha averages calculated for CAPM and Fama-French. At every quarter the Jensen's alpha was calculated using the β obtain from their corresponding regression. Jensen's alpha was then simply averaged. For the third part of the table the difference between CAPM and Fama-French was calculated as a simple subtraction. Given the negative values of Jensen's alpha's in general the closer to 0 the better.

Table 4.2

Paired Samples T-Test on CAPM and Fama-French, Jensen's alpha. 84 quarters compared.

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Pair 1	FBH - CBH	0.029	0.052	0.006	0.018	0.040	5.09	83	0.000
Pair 2	FB2 - CB2	0.012	0.026	0.003	0.006	0.018	4.23	83	0.000
Pair 3	FB3 - CB3	0.010	0.028	0.003	0.004	0.016	3.13	83	0.002
Pair 4	FB4 - CB4	0.009	0.017	0.002	0.006	0.013	5.00	83	0.000
Pair 5	FBL - CBL	0.010	0.030	0.003	0.004	0.017	3.10	83	0.003
Pair 6	F2H - C2H	0.014	0.026	0.003	0.009	0.020	5.04	83	0.000
Pair 7	F22 - C22	0.001	0.012	0.001	-0.001	0.004	1.11	83	0.272
Pair 8	F23 - C23	0.001	0.013	0.001	-0.002	0.004	0.89	83	0.376
Pair 9	F24 - C24	0.006	0.011	0.001	0.004	0.009	5.10	83	0.000
Pair 10	F2L - C2L	0.005	0.026	0.003	0.000	0.011	1.86	83	0.066
Pair 11	F3H - C3H	0.017	0.031	0.003	0.011	0.024	5.10	83	0.000
Pair 12	F32 - C32	0.007	0.018	0.002	0.003	0.011	3.66	83	0.000
Pair 13	F34 - C34	0.012	0.021	0.002	0.007	0.016	5.09	83	0.000
Pair 14	F3L - C3L	-0.005	0.035	0.004	-0.013	0.003	-1.33	83	0.188
Pair 15	F4H - C4H	0.015	0.027	0.003	0.009	0.021	5.17	83	0.000
Pair 16	F42 - C42	0.007	0.024	0.003	0.002	0.012	2.67	83	0.009
Pair 17	F43 - C43	0.010	0.019	0.002	0.006	0.015	5.18	83	0.000
Pair 18	F44 - C44	0.009	0.017	0.002	0.006	0.013	5.17	83	0.000
Pair 19	F4L - C4L	0.008	0.032	0.004	0.001	0.015	2.34	83	0.022

Pair 20	FSH - CSH	0.019	0.036	0.004	0.011	0.027	4.90	83	0.000
Pair 21	FS2 - CS2	0.001	0.005	0.001	0.000	0.002	2.24	83	0.028
Pair 22	FS3 - CS3	0.010	0.022	0.002	0.005	0.014	3.98	83	0.000
Pair 23	FS4 - CS4	0.012	0.022	0.002	0.007	0.017	4.89	83	0.000
Pair 24	FSL - CSL	0.018	0.049	0.005	0.007	0.028	3.30	83	0.001

T-test calculated on the portfolio pairs. The F at the begging corresponds to Fama-French while the C to CAPM. This means that portfolio FBH is the Jensen's alpha of portfolio Big, High obtain from the β's obtains from Fama-French regression. The same is true for those with C.

A T-test is calculated to review if the differences are statistically significant and it is founded that with 95% of certainty that they are. Therefore, if a portfolio had to be selected and the only information available where choose the S&P 500 or any of the portfolio we calculated giving the lower explanatory power we have founded I would suggest to any investor to stick to the market portfolio and only in secondary matter either an investment on Big/High companies or Small and High or Low.

4.2 Programming lessons

While the Fama French analysis was certainly the main core of this paper. The secondary objective given the current resources available in APU was to develop a way in which most students could to have a possibility to download, analyze and use bigger amounts of data without the need to advanced programming skills. A series of macros and JSON based scripts were developed to overcome the difficulties found during the creation of the portfolios. The present area will discuss the programming code, hurdles, pre-requisites and solutions that were founded during the creation of the Fama-French Factors.

Mergent Online (Mergent, Inc, 2018) is one of the databases that have a good repository of financial information in multiple Appendixes with very detailed information. It is the main platform used by many APU finance students that want to have a reliable database to have access to this information. Since many of the free available sources such as Yahoo Finance discontinued its API and Google has had reports of problems with some of the information displayed. Stronger information platforms such as Bloomberg are currently out of the option for students. Mergent such as Bloomberg have API's that can be connected to platforms such as *R* and *Python* and use the programming capabilities to create the portfolios, do the statistical analysis and present it in a fast and reliable form. This requires advanced programming skills and a good enough computer that can run the programs necessary to do the necessary transactions, sadly that capabilities are not available in the current Mergent deal with APU and Bloomberg, in general, is not available.

The Mergent platform, as mention in the data part of this paper, is not a very effective and user-friendly platform when analyzing big amounts of data. The inability to download big amounts of data that can be easily processed is not available. The Kantu complement for Google Chrome and Mozilla Firefox allow the user to automatize tasks that otherwise would be too repetitive or ineffectual. With the ability to record screen actions in a Similar way to the Macro recorder on Microsoft Excel. The recorded actions can be done on the various ways either by coordinates on the screen or by Object Character Recognition(OCR) of the information. The OCR is required to have an exact match, therefore, if modifications are done to a record to select different links or parts of the page is imperative to modify the code to an exact match of the text displayed.

Mergent Online shows information on groups of 25 companies by page and require selecting every company and add it to an analysis tab. From there, a secondary tab opens to process the companies. The different options for dates, indicators, and multiple parameters must be selected here, we format of the resulting file and download the data. Once the download button has been clicked it, depending on the number of companies, the variables, and the time frame selected, the time for obtaining a file can range from 10 seconds to close to five minutes. In the case for One company financial information in a quarterly range and daily closing prices for 20 years, an average of 2 minutes was required. Is important to note that the Kantu system cannot select in a consistent way some of the variables. Is then important to use the capability of Mergent to save search query's, this allows to search files to be saved with different search variables that can be introduced on the Macro without the need to remake the whole script.

The scripts can be configured for auto-execute, using different capabilities given by Kantu to export and disseminate the code. This JSON scripts can be edited on Notepad which allows anyone to modify the data and to adapt it to meet their needs.

JSON Script. The script, available in Annex 1, has a process in which it repeats the following cycle, it select one company, as the ability to analyze it becomes available proceeds to activate the next tab where it selects the company to analyze, loads the variables template, selects Microsoft Excel as the download format and wait 120 seconds till the download is completed after that it all closes the new tabs and returns to the main list where it proceeds to the next company in the list.

Extra plugins. It's important to note that because of the limitations of Kantu is necessary to run the script of a new browser window, and it is necessary to install a secondary plugin that forces the pop-up windows to load to load as a new tab in the browser, this because the analyze area and the variable template selection in Mergent natively display as pop-up windows and Kantu lacks the abilities to work in different windows.

Excel Code. The excel code is divided into multiple small programs, some of them have the same functions just divided. For example, in the case of forming the 25 portfolios and the Factors. The used code is included as Annex 2 onwards.

The first code was not developed by me but used one freely available by the albeits web page (Cheusheva, 2018). Its function is to unify Excel files as a worksheet of a workbook. This, as described in the data part of this paper, is what combined all my individual Excel files with every company into one file. The Negative part of it is that a file of that size with Macros enable is taxing in CPU capabilities of the host computer and will take time to load and process.

The general lesson learned during the excel programming as will be seen regarding data manipulation is not difficult on principle, the operations needed are not difficult in nature. Have all the data been equal on size and dimensions, the macros could have been created using macro recording capabilities without the need for coding it, is my belief. Given the different dates and sizes of the data, the main challenge was in finding a way to process it given these dynamic qualities. The necessity of anchor points that were equal through all the data was necessary. It was also found that the excel code did not automatically recognize all the dates as a date field and was necessary to activate the cells. This action would make excel assign them as dates and recognize them in a way that allows comparison of the information. This makes necessary to create extra steps on one of the macros to allow for this to occur. The biggest problem during this first part of the script making was then the necessity to compare and match dates, however, a secondary problem was found dates in the format dd/MM/YYYY or MM/dd/YYYY could not be used. If one search for the date 28/02/1998(February two) but the closing day for the stock market was 27 the match system must be non-exact in the bigger code, as not on all the cases the publish dates of the quarterly financials had a correspondent closing price, in cases like this the match process would not automatically bring 27/02/1998. The way the process takes place in excel is to compare the full chain as a string, not as a date, therefore, the partial match that was closer to the dating would have been 28/02/XXXX as the main comparison points come from left to right in the matching process. The founded solution was to change the formatting system at the operating software level in a date format YYYY-MM-DD. In this case, the main matching part of the string is the year, followed by the month and only then the day, such no exact exists the lower closest one would be selected.

The last part, regarding the selection of closing prices and the formation of BE/ME, size and related rows. It was decided that all were to have the same starting column and row and only the ending was unknown. The idea behind this was that no dynamic matching system would be required there and the process to consolidate this information on a master sheet then could be sped up if the information was always on the same area of a sheet. This was done using a modified code of the one created by the user. (ijd65, 2019)

Once consolidated the information was moved to a new workbook. This to have a more efficient file that didn't waste memory and processor resources with unused sheets and macros. As described in the data section the process to create the 25 portfolios and the Fama-French factors the codes are basically the same the only differences are on the number of portfolios created or the way the division is made, using quintiles or arbitrary functions available through the dynamic formatting.

As with the previous part the main problem is how to analyze changing dates and groups of data. One of the advantages is that the clusters of data are the same size according to which portfolios are being made. Anchors are needed as in with the previous cases, the match function integrated on Excel was used to select repetitive information from static points on the worksheets. This allowed me to have starting points from where the R1C1 formulas can be deployed by basically counting the rows and columns around this anchor points as seen in the code.

Cheat. As mentioned in the data sections, one free card that I had during the making of these codes was a gaming mouse. This allowed me to avoid automatization on a more forceful degree. The anchors instead of exact match functions could take the form of only the selected cell for some processes. As R1C1 allow us to move the active cell to one we chose. With the execution of the macros embedded on the gaming mouse, any physical movement was skipped as the size of the data clusters were the same, the position of the new anchor on the new data cluster was always x number of cells from the previous one. Another cheat, using gaming peripherals, was the ability to select, erase, insert and use keyboard functions that are difficult to code on an Excel macro and doing them manually could lead to mistakes that can be difficult to spot given the amounts of data. This was used when the data needed to be cleaned, eliminating noise columns, empty cells and in many cases preparing the data according to the analysis that I was to do. For example, when deciding to have the count of companies by portfolios, the size of the companies and the date columns where on the same sheet and cluster, these columns had to be erased. This cleaning process was done with the use of the gaming mouse.

About automatization. The process here described allows the user to concentrate on deciding how the data is going to be used for their model. However, one important comment that I must make clear is that this code should not take things for granted. What I mean here is that the code, when used correctly, will solve many of the struggles of moving unnecessary data the way it is presented to us from Mergent online. But this doesn't mean just execute and leave. It is necessary to be present and supervise the execution and that the data results are what is required. In the case of Kantu, small bugs inherent to the plugin can make in occasions the script to collapse or glitch which makes necessary after every run to review that the data download was the required one and to be there to solve small hiccups that can occur during its execution.

The code once is cleaned and properly documented will be of great help to the APU students and professors that have not the coding experience or time to search for these tools. The modifications necessary for them to tailor it to individual needs are not demanding of advanced coding skills and in many cases, the only requirement is logical thought.

4.3 Open questions

As any academical exercise, many questions are left open beyond what is answered or because of what was answered here.

First, This means that appendix studies are non-relevant? I cannot come to a real conclusion for this one there exist a real possibility that the fact that not the real composition of S&P500 existence for every quarter had a real effect on the factors. A more detailed study is necessary either using the full S&P 500 or other indexes that are only facts based and not committee constructed.

Second, Those the ANOVA results mean Fama-French results are not trustworthy? Once again a more detailed study, this time using the same factors a Fama-French might be necessary to measure if the ANOVA results change

Programming related questions exist. If Excel alone is used complete automation is possible? Because of time constraints, shortcuts with the gaming mouse were taken but once the code is properly documented anyone with knowledge of VBA should be able to make this code that does not require external add-ons.

5. Conclusion

This paper accomplishes its goal of creating Fama-French factors using the S&P 500 Appendix with the aid of programming tools to process the data available to APU students. The hurdles created because of the system limitations of the Mergent Online databases and the Excel files it produces can be overcome by a series of scripts, deployed with the use of free to use plugins that run on common web browsers. While Excel VBA provides a strong tool for data manipulation and cleaning. While some shortcuts where use with the aid of gaming hardware that allowed to simplify the programming necessary to fully automatize the process, it still is robust enough to process big amounts of data. This scripts and code are in process of proper documentation to be put to the avail of those in the school that may need them as an aid in their research.

The results found however that the factors constructed had lost almost all its explanatory power. And while it true that as more are included this explanatory power increases. The percentage of the variance explained by them remains too small to satisfactory affirm that they explain the changes in the result. More detailed studies are necessary to accept or reject the use of indexes as a substitution of the whole market when constructing Fama-French.

For APU students that want to use Fama-French as an addition to their research or the Mergent Online platform, the codes created here can provide them with an aid that can simplify their workload. Allowing them to create more complex models or to study a higher amount of data.

This forces us to reject the hypothesis that Fama-French factors maintain their explanatory power when used on the S&P500 Appendix during the 1997-2017 period. And because of this a portfolio formed from within the Appendix cannot reliably be used for investment opportunities and beat the market. Is the conclusion of this writer then that if having only the information as described in this paper the more reliable investment option is the market portfolio in this case understood as the S&P 500.

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Appendices

Appendix 1 22


```
"Name": "test individual",
"CreationDate": "2019-4-12",
"Commands": [
  {
    "Command": "type",
    "Target": "name=chkopt[]",
    "Value": "5583"
  },
  {
    "Command": "clickAt",
    "Target": "name=chkopt[]",
    "Value": "5,6"
  },
  {
    "Command": "clickAt",
    "Target": "id=analysislist",
    "Value": "204,11"
  },
  {
    "Command": "select",
    "Target": "id=analysislist",
    "Value": "label=Add Currently Selected Companies"
  },
  {
    "Command": "pause",
    "Target": "200",
    "Value": "-18,-80"
  },
    "Command": "clickAt",
    "Target": "link=Company Analysis List (1/500)",
    "Value": "83,12"
  },
  {
    "Command": "selectWindow",
    "Target": "tab=1",
    "Value": ""
  },
  {
    "Command": "clickAt",
    "Target": "name=Add All Item",
    "Value": "24,10"
  },
  {
    "Command": "clickAt",
"Target": "link=Load Report Template",
    "Value": "52,6"
  },
  {
    "Command": "selectWindow",
    "Target": "tab=2",
    "Value": ""
  },
  {
    "Command": "clickAt",
    "Target": "link=MY project",
    "Value": "25,5"
  },
     {
 {
    "Command": "selectWindow",
    "Target": "tab=1",
    "Value": ""
  },
  {
    "Command": "pause",
    "Target": "3000",
    "Value": ""
  },
 {
    "Command": "clickAt",
    "Target": "id=dataitemsmenurow1",
    "Value": "7,6"
  },
   {
    "Command": "clickAt",
    "Target": "id=reportformat",
    "Value": "267,17"
  },
  {
    "Command": "select",
    "Target": "id=reportformat",
    "Value": "label=Microsoft Excel format"
  },
  {
    "Command": "click",
    "Target": "name=Create Multiple Company Report",
    "Value": ""
  },
  {
    "Command": "onDownload",
   "Target": "*.xlsx",
    "Value": "true"
  },
  {
    "Command": "pause",
    "Target": "12000",
    "Value": "true"
  },
  {
    "Command": "clickAt",
    "Target": "name=Remove All Item",
                "Value": "18,8"
  },
  {
    "Command": "clickAt",
    "Target": "link=Clear All",
    "Value": "17,9"
  },
 {
    "Command": "selectWindow",
    "Target": "tab=0",
    "Value": ""
  },
  {
    "Command": "selectWindow",
    "Target": "TAB=CLOSEALLOTHER",
    "Value": ""
  },
 "Value": "204,11"
  },
  {
    "Command": "select",
    "Target": "id=analysislist",
    "Value": "label=Add Currently Selected Companies"
  },
  {
    "Command": "pause",
    "Target": "200",
    "Value": "-18,-80"
  },
  {
    "Command": "clickAt",
    "Target": "link=Company Analysis List (1/500)",
    "Value": "83,12"
```


Example of JSON code for Kantu plugin. this code includes one full download of a file plus the first steps of the next company selection. The Code is organized in columns. And repeats itself 24 more times as every Mergent Online page has 25 companies in total.

Appendix 2

```
Attribute VB_Name = "Módulo3"
Option Explicit

Sub Separarclosingpricestep1()
Attribute Separarclosingpricestep1.VB_ProcData.VB_Invoke_Func = " \n14"

Dim LastColumn         As Long
Dim Col                As Long
Dim nullCell           As Range
Dim Rng                As Range
Dim datacell           As Range

Dim WS_Count As Integer
Dim i As Integer
.
        WS_Count = ActiveWorkbook.Worksheets.Count
        For i = 1 To 1

        With ActiveWorkbook.Worksheets(i)
    Set datacell = Columns("A").Find(What:="Pricing Information")
    LastColumn = .Cells(datacell.Row, .Columns.Count).End(xlToLeft).Column
          For Col = 1 To 1
           Set nullCell = Columns(Col).Find(What:="Company Financials")

       ' for debug : print address of "NULL" and Row (per Column)
       Debug.Print nullCell.Address & " ; " & nullCell.Row
       Set Rng = Range(Cells(datacell.Row + 1, Col), Cells(nullCell.Row - 1, Col))
       Rng.Select
          Selection.TextToColumns Destination:=Range(Cells(datacell.Row + 1, Col), Cells(nullCell.Row - 1, Col)),
DataType:=xlDelimited, _
       TextQualifier:=xlDoubleQuote, ConsecutiveDelimiter:=True, Tab:=False, _
       Semicolon:=False, Comma:=False, Space:=True, Other:=True, OtherChar:= _
       ":", FieldInfo:=Array(Array(1, 5), Array(2, 1)), TrailingMinusNumbers:=True
       Debug.Print Rng.Address
    Next Col

 End With
Range(Cells(datacell.Row, Col), Cells(nullCell.Row - 1, Col)).Select
    Next i
End Sub
```

Code created that select the space between company financials and closing price as a range and divide the closing date from the closing price on a dynamic way regardless of the amount of data. It's necessary to have the computer date format set to YYYY-MM-dd to avoid miss-match between dates when using vlookup/Appendix: match function to compare dates.

Appendix 3

```
Sub sharesoutsclosingpricestep3()
Attribute sharesoutsclosingpricestep3.VB_ProcData.VB_Invoke_Func = " \n14"
'
' Macro4 Macro
'
'Dim LastColumn         As Long
Dim celda              As Range
Dim nullCell           As Range
Dim Rng                As Range
Dim datacell           As Range
Dim rng1               As Range
Dim datos              As Range
Dim LastRow            As Range
Dim shares             As Range
Dim eqt                As Range
Dim c                  As Integer
Dim colnum             As Integer

Set datacell = Columns("A").Find(What:="Pricing")
Set nullCell = Columns("A").Find(What:="Company Financials")
Set celda = Columns("A").Find(What:="Standardized Quarterly Income Statement")
Set shares = Columns("A").Find(What:="Shares Outstanding")
Set eqt = Columns("A").Find(What:="Total Equity")
Set Rng = Range(Cells(datacell.Row + 1, "A"), Cells(nullCell.Row - 1, "B"))
Set LastRow = Columns("A").Find(What:="Standardized Quarterly Income Statement")
'Set rng1 = Range(Cells(celda.Row - 1, "B"))
  ' Rng.Select
'   celda.Select
For colnum = 1 To 256

        Set datos = Cells(LastRow.Row + 1, colnum)
        Cells(LastRow.Row + 1, colnum).Select
        ActiveCell.FormulaR1C1 = "" & datos & ""
Next colnum

   Cells(celda.Row - 1, "B").Select
   ActiveCell.FormulaR1C1 = "=VLOOKUP(R[2]C," & Rng.Address(ReferenceStyle:=xlR1C1) & ",2,TRUE)"
   Cells(celda.Row - 1, "B").Select
   Selection.AutoFill Destination:=Range(Cells(celda.Row - 1, "B"), Cells(celda.Row - 1, "FR")), Type:=xlFillDefault
  ' Range("B704:FL704").Select
   Range("H5").Select
   ActiveCell.FormulaR1C1 = "Price"
   Range("H6").Select
   ActiveCell.FormulaR1C1 = "Shares"
   Range("H7").Select
   ActiveCell.FormulaR1C1 = "size"
   'Range("H6").Select
  ' ActiveCell.FormulaR1C1 = ""
   Range(Cells(celda.Row + 1, "A"), Cells(celda.Row + 1, "FR")).Select
   Selection.Copy
   Range("H4").Select
   ActiveSheet.Paste
   Range(Cells(shares.Row, "B"), Cells(shares.Row, "FR")).Select
   Selection.Copy
   Range("I6").Select
   ActiveSheet.Paste
   Range(Cells(celda.Row - 1, "B"), Cells(celda.Row - 1, "FR")).Select
   Selection.Copy
   Range("I5").Select
   Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks:=False, Transpose:=False
```

```
   'Set Shares = Range(Cells(celda.Row - 1, "B"), Cells(celda.Row - 1, "FL"))
  ' Set Price = Range(Cells(celda.Row + 2, "B"), Cells(celda.Row + 2, "FL"))
   Range("I7").Select
   ActiveCell.FormulaR1C1 = "= R[-2]C*R[-1]C"
   Range("I7").Select
   'Range("I5").Select
   Selection.AutoFill Destination:=Range("I7:FY7"), Type:=xlFillDefault
   'Range("I5:FT5").Select
   Range("H8").Select
   ActiveCell.FormulaR1C1 = "BE"
   Range(Cells(eqt.Row, "B"), Cells(eqt.Row, "FR")).Select
   Selection.Copy
   Range("I8").Select
   ActiveSheet.Paste
   Range("H9").Select
   ActiveCell.FormulaR1C1 = "BE/ME"
   Range("I9").Select
  ' Application.CutCopyMode = False
   'ActiveCell.FormulaR1C1 = "= " & celda & " + 4 *R[-1]C"
   ActiveCell.FormulaR1C1 = "= R[-1]C/R[-2]C"
   Range("I9").Select
   Selection.AutoFill Destination:=Range("I9:FY9"), Type:=xlFillDefault
   'Range("I6:FT6").Select
   Range("H9").Select

End Sub
```

Code created with the purpose of activating the dates in the financial quarter report date. Compare and obtain the closing price for that date. Copy and calculate, equity, BE, size, BE/ME and standardize the location of this information on every sheet on the workbook.

Appendix 4

```
Sub Test4()
   Dim sh As Worksheet
   Dim sh1 As Worksheet
   Dim DestSh As Worksheet
   Dim Last As Long
   If SheetExists("Master") = True Then
      MsgBox "The sheet Master already exist"
      Exit Sub
   End If
   Application.ScreenUpdating = False
   Set DestSh = Worksheets.Add
   DestSh.Name = "Master"
   For Each sh In ThisWorkbook.Worksheets
   If sh.Name <> DestSh.Name Then
            If sh.UsedRange.Count > 1 Then
               Last = LastRow(DestSh)
               sh.Range("H4:GG4").Copy DestSh.Cells(Last + 1, 1)
               sh.Range("H9:GG9").Copy
               DestSh.Cells(Last + 2, 1).Select
               Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, Skipblanks:=False, Transpose:=False

         End If
      End If
   Next
   Application.ScreenUpdating = True
End Sub

Function LastRow(sh As Worksheet)
   On Error Resume Next
   LastRow = sh.Cells.Find(What:="*", _
                     After:=sh.Range("A1"), _
                     Lookat:=xlPart, _
                     LookIn:=xlFormulas, _
                     SearchOrder:=xlByRows, _
                     SearchDirection:=xlPrevious, _
                     MatchCase:=False).Row
   On Error GoTo 0
End Function

Function Lastcol(sh As Worksheet)
   On Error Resume Next
   Lastcol = sh.Cells.Find(What:="*", _
                     After:=sh.Range("A1"), _
                     Lookat:=xlPart, _
                     LookIn:=xlFormulas, _
                     SearchOrder:=xlByColumns, _
                     SearchDirection:=xlPrevious, _
                     MatchCase:=False).Column
   On Error GoTo 0
End Function
Function SheetExists(SName As String, _
                Optional ByVal WB As Workbook) As Boolean
   On Error Resume Next
   If WB Is Nothing Then Set WB = ThisWorkbook
   SheetExists = CBool(Len(Sheets(SName).Name))
End Function
```

Code created to copy the financial information. The macro points and stores in memory the number of sheets in the workbook. Evaluate for the existence of a Master sheet where the copy data will be paste. Shall this page exist the macro

will finish. The macro then will review in the master page which is the last row with information and will copy the selected data from every sheet on to the next empty row.
A modification of this code is also used to copy the closing price dates and prices by changing the source range. Based on the code of idj65 (ijd65, 2019)

Appendix 5

```
Attribute VB_Name = "Módulo1"
Sub coloresquintiles()
Attribute coloresquintiles.VB_ProcData.VB_Invoke_Func = " \n14"
'
' coloresquintiles Macro
'
Dim matriz As Range
Dim q1 As Range
Dim q2 As Range
Dim q3 As Range
Dim q4 As Range
'
    Range(Selection, Selection.End(xlDown)).Select
    Set matriz = Range(Selection, Selection.End(xlDown))
    Set q1 = Cells(475, matriz.Column)
    Set q2 = Cells(476, matriz.Column)
    Set q3 = Cells(477, matriz.Column)
    Set q4 = Cells(478, matriz.Column)
    Application.CutCopyMode = False
    Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlLess, _
        Formula1:="=" & q1 & ""
    Selection.FormatConditions(Selection.FormatConditions.Count).SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorAppendix = xlAutomatic
        .Color = 255
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False
    ActiveWindow.SmallScroll Down:=-51
    Application.CutCopyMode = False
    Application.CutCopyMode = False
    Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlBetween, _
        Formula1:="=" & q1 & "", Formula2:="=" & q2 & ""
    Selection.FormatConditions(Selection.FormatConditions.Count).SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorAppendix = xlAutomatic
        .Color = 65535
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False
    Application.CutCopyMode = False
    Application.CutCopyMode = False
    Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlBetween, _
        Formula1:="=" & q2 & "", Formula2:="=" & q3 & ""
    Selection.FormatConditions(Selection.FormatConditions.Count).SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorAppendix = xlAutomatic
        .Color = 5296274
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False
    Application.CutCopyMode = False
    Application.CutCopyMode = False
    Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlBetween, _
        Formula1:="=" & q3 & "", Formula2:="=" & q4 & ""
    Selection.FormatConditions(Selection.FormatConditions.Count).SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorAppendix = xlAutomatic
        .Color = 15773696
        .TintAndShade = 0
```

```
    End With
    Selection.FormatConditions(1).StopIfTrue = False
    Application.CutCopyMode = False
    Selection.FormatConditions.Add Type:=xlCellValue, Operator:=xlGreater, _
        Formula1:="=" & q4 & ""
    Selection.FormatConditions(Selection.FormatConditions.Count).SetFirstPriority
    With Selection.FormatConditions(1).Interior
        .PatternColorAppendix = xlAutomatic
        .Color = 10498160
        .TintAndShade = 0
    End With
    Selection.FormatConditions(1).StopIfTrue = False
End Sub

Sub quintiles()
Attribute quintiles.VB_ProcData.VB_Invoke_Func = " \n14"
'
Dim celda As Range
Dim matriz As Range
'
    Set celda = ActiveCell
    Range(Selection, Selection.End(xlDown)).Select
    Set matriz = Range(Selection, Selection.End(xlDown))
    Cells(475, matriz.Column).Select
    ActiveCell.FormulaR1C1 = "=PERCENTILE.EXC(" & matriz.Address(ReferenceStyle:=xlR1C1) & ",0.2)"
    Cells(476, matriz.Column).Select
    ActiveCell.FormulaR1C1 = "=PERCENTILE.EXC(" & matriz.Address(ReferenceStyle:=xlR1C1) & ",0.4)"
    Cells(477, matriz.Column).Select
    ActiveCell.FormulaR1C1 = "=PERCENTILE.EXC(" & matriz.Address(ReferenceStyle:=xlR1C1) & ",0.6)"
    Cells(478, matriz.Column).Select
    ActiveCell.FormulaR1C1 = "=PERCENTILE.EXC(" & matriz.Address(ReferenceStyle:=xlR1C1) & ",0.8)"
    Cells(479, matriz.Column).Select
    celda.Select
End Sub
Sub Seleccionarnegativos()

    Dim lastrow As Range
    Dim xRg As Range
    Dim yRg As Range
    Dim celda As Range
    Dim columna As Integer

    With ThisWorkbook.Worksheets("bemequintiles")
        Set celda = ActiveCell
        columna = ActiveCell.Column - 3
        Set lastrow = Range(Selection, Selection.End(xlDown))
        Application.ScreenUpdating = False
        For Each xRg In lastrow
            If xRg.Value < 0 Then
                If yRg Is Nothing Then
                    Set yRg = Cells(xRg.Row, celda.Column - 2).Resize(, 3)
                Else
                    Set yRg = Union(yRg, Cells(xRg.Row, celda.Column - 2).Resize(, 3))
                End If
            End If
        Next xRg
        Application.ScreenUpdating = True
    End With

    If Not yRg Is Nothing Then yRg.Select
    yRg.Value = ""
    celda.Select
```

```
End Sub

Sub quintiles3macros()

  Seleccionarnegativos
  quintiles
  coloresquintiles

End Sub
```

Code used for, removing negatives from BE/ME, creation of quintiles and coloring them. The last macro quintiles3macros. Execute the previous three on order. Seleccionarnegativos search the data for negative BE/ME and select the ticker and BE/ME cells and erase them. The quintiles create the quintile breakpoints on the lower part. The coloresquintiles macro uses the format conditioning function in conjunction with the previously created quintile breakpoint to color every part according to them.

Appendix 6

```
Attribute VB_Name = "Módulo2"
Sub q5()
    Dim lastrow As Range
    Dim xRg As Range
    Dim yRg As Range
    Dim celda As Range
    Dim columna As Integer
    Dim q1 As Range
    Dim q2 As Range
    Dim q3 As Range
    Dim q4 As Range

    With ThisWorkbook.Worksheets("Hoja3")
        Set celda = ActiveCell
        Set q1 = Cells(475, celda.Column)
        Set q2 = Cells(476, celda.Column)
        Set q3 = Cells(477, celda.Column)
        Set q4 = Cells(478, celda.Column)
        columna = ActiveCell.Column - 1
        Set lastrow = Range(Selection, Selection.End(xlDown))
        Application.ScreenUpdating = False
        For Each xRg In lastrow
            If xRg.Value > q4 Then
                If yRg Is Nothing Then
                    Set yRg = Cells(xRg.Row, columna)
                Else
                    Set yRg = Union(yRg, Cells(xRg.Row, celda.Column - 1))
                End If
            End If
        Next xRg
        Application.ScreenUpdating = True
    End With

    If Not yRg Is Nothing Then yRg.Select
    yRg.Value = "5"
    celda.Select
End Sub
Sub q4()

    Dim lastrow As Range
    Dim xRg As Range
    Dim yRg As Range
    Dim celda As Range
    Dim columna As Integer
    Dim q1 As Range
    Dim q2 As Range
    Dim q3 As Range
    Dim q4 As Range

    With ThisWorkbook.Worksheets("Hoja3")
        Set celda = ActiveCell
        Set q1 = Cells(475, celda.Column)
        Set q2 = Cells(476, celda.Column)
        Set q3 = Cells(477, celda.Column)
        Set q4 = Cells(478, celda.Column)
        columna = ActiveCell.Column - 1
        Set lastrow = Range(Selection, Selection.End(xlDown))
        Application.ScreenUpdating = False
        For Each xRg In lastrow
            If xRg.Value <= q4 And xRg.Value >= q3 Then
```

```
            If yRg Is Nothing Then
                Set yRg = Cells(xRg.Row, columna)
            Else
                Set yRg = Union(yRg, Cells(xRg.Row, celda.Column - 1))
            End If
        End If
    Next xRg
    Application.ScreenUpdating = True
  End With

  If Not yRg Is Nothing Then yRg.Select
  yRg.Value = "4"
  celda.Select
End Sub

Sub q3()

  Dim lastrow As Range
  Dim xRg As Range
  Dim yRg As Range
  Dim celda As Range
  Dim columna As Integer
  Dim q1 As Range
  Dim q2 As Range
  Dim q3 As Range
  Dim q4 As Range

  With ThisWorkbook.Worksheets("Hoja3")
    Set celda = ActiveCell
    Set q1 = Cells(475, celda.Column)
    Set q2 = Cells(476, celda.Column)
    Set q3 = Cells(477, celda.Column)
    Set q4 = Cells(478, celda.Column)
    columna = ActiveCell.Column - 1
    Set lastrow = Range(Selection, Selection.End(xlDown))
    Application.ScreenUpdating = False
    For Each xRg In lastrow
        If xRg.Value < q3 And xRg.Value >= q2 Then
            If yRg Is Nothing Then
                Set yRg = Cells(xRg.Row, columna)
            Else
                Set yRg = Union(yRg, Cells(xRg.Row, celda.Column - 1))
            End If
        End If
    Next xRg
    Application.ScreenUpdating = True
  End With

  If Not yRg Is Nothing Then yRg.Select
  yRg.Value = "3"
  celda.Select
End Sub

Sub q2()
  Dim lastrow As Range
  Dim xRg As Range
  Dim yRg As Range
  Dim celda As Range
  Dim columna As Integer
  Dim q1 As Range
  Dim q2 As Range
  Dim q3 As Range
```

```
    Dim q4 As Range
'

    With ThisWorkbook.Worksheets("Hoja3")
        Set celda = ActiveCell
        Set q1 = Cells(475, celda.Column)
        Set q2 = Cells(476, celda.Column)
        Set q3 = Cells(477, celda.Column)
        Set q4 = Cells(478, celda.Column)
        columna = ActiveCell.Column - 1
        Set lastrow = Range(Selection, Selection.End(xlDown))
        Application.ScreenUpdating = False
        For Each xRg In lastrow
            If xRg.Value < q2 And xRg.Value >= q1 Then
                If yRg Is Nothing Then
                    Set yRg = Cells(xRg.Row, columna)
                Else
                    Set yRg = Union(yRg, Cells(xRg.Row, celda.Column - 1))
                End If
            End If
        Next xRg
        Application.ScreenUpdating = True
    End With

    If Not yRg Is Nothing Then yRg.Select
    yRg.Value = "2"
    celda.Select
End Sub

Sub q1()
    Dim lastrow As Range
    Dim xRg As Range
    Dim yRg As Range
    Dim celda As Range
    Dim columna As Integer
    Dim q1 As Range
    Dim q2 As Range
    Dim q3 As Range
    Dim q4 As Range

    With ThisWorkbook.Worksheets("Hoja3")
        Set celda = ActiveCell
        Set q1 = Cells(475, celda.Column)
        Set q2 = Cells(476, celda.Column)
        Set q3 = Cells(477, celda.Column)
        Set q4 = Cells(478, celda.Column)
        columna = ActiveCell.Column - 1
        Set lastrow = Range(Selection, Selection.End(xlDown))
        Application.ScreenUpdating = False
        For Each xRg In lastrow
            If xRg.Value < q1 Then
                If yRg Is Nothing Then
                    Set yRg = Cells(xRg.Row, columna)
                Else
                    Set yRg = Union(yRg, Cells(xRg.Row, celda.Column - 1))
                End If
            End If
        Next xRg
        Application.ScreenUpdating = True
    End With

    If Not yRg Is Nothing Then yRg.Select
```

```
    yRg.Value = "1"
    celda.Select
End Sub

Sub quintilesidentificador()
Attribute quintilesidentificador.VB_ProcData.VB_Invoke_Func = "w\n14"

q5
q4
q3
q2
q1

End Sub
```

These codes insert an identifying number next to the BE/ME according to the quintiles created in the previous code. All are divided as an independent macro and the last one runs the 5 macros on order.

Appendix 7

```
Sub portafolios()
Attribute portafolios.VB_ProcData.VB_Invoke_Func = "w\n14"

Dim selectedRng As Range
Dim celda As Range
Dim fecha As Range
Dim sml As Range
Dim matriz As Range
Dim ticker As Range
'Error handling; for good measure.
'On Error Resume Next
'Define selected range.
Application.Selection.EntireColumn.Insert
Application.Selection.EntireColumn.Insert
Application.Selection.EntireColumn.Insert
Application.Selection.EntireColumn.Insert
Set celda = ActiveCell
Set fecha = Cells(ActiveCell.Row - 1, ActiveCell.Column - 1)
Set sml = Rows(1).Find(What:=fecha.Value)
Set matriz = Range(sml.Address, Cells(sml.Row + 472, sml.Column - 2))
Cells(celda.Row, celda.Column).Select
ActiveCell.FormulaR1C1 = "=VLOOKUP(RC[-3]," & matriz.Address(ReferenceStyle:=xlR1C1) & ",2,FALSE)"
Cells(2, celda.Column).Select
Selection.AutoFill Destination:=Range(Cells(celda.Row, celda.Column), Cells(celda.Row + 472, celda.Column)),
Type:=xlFillDefault
celda.Select
Cells(celda.Row, celda.Column + 1).Select
Set celda = ActiveCell
ActiveCell.FormulaR1C1 = "=IF(RC[-1]=1,""H"",IF(RC[-1]=0,""M"",""L""))"
Cells(2, celda.Column).Select
Selection.AutoFill Destination:=Range(Cells(celda.Row, celda.Column), Cells(celda.Row + 472, celda.Column)),
Type:=xlFillDefault
celda.Select
Cells(celda.Row, celda.Column + 1).Select
Set celda = ActiveCell
Cells(celda.Row - 1, celda.Column).Value = "Portfolio"
ActiveCell.FormulaR1C1 = "=IF(RC[-4]=1,CONCATENATE(""B"",RC[-1]),CONCATENATE(""S"",RC[-1]))"
Cells(2, celda.Column).Select
Selection.AutoFill Destination:=Range(Cells(celda.Row, celda.Column), Cells(celda.Row + 472, celda.Column)),
Type:=xlFillDefault
celda.Select
Cells(celda.Row, celda.Column + 1).Select
Set celda = ActiveCell
Cells(celda.Row - 1, celda.Column).Value = "BE/ME"
ActiveCell.FormulaR1C1 = "=VLOOKUP(RC[-6]," & matriz.Address(ReferenceStyle:=xlR1C1) & ",3,FALSE)"
Cells(2, celda.Column).Select
Selection.AutoFill Destination:=Range(Cells(celda.Row, celda.Column), Cells(celda.Row + 472, celda.Column)),
Type:=xlFillDefault
celda.Select
Columns(celda.Column - 2).Select
Selection.EntireColumn.Hidden = True
Columns(celda.Column - 3).Select
Selection.EntireColumn.Hidden = True
Cells(2, celda.Column + 4).Select
End Sub
```

Code to create the portfolios this one is to create the HML one but the process is the same for the SMB and 25 portfolios. Where they compare the identifier numbers and concatenate them to create the portfolios. It also copies the BE/ME for every one of them to have Date, ticker, size, HML, the portfolio name and the identifiers for the original size breakers and HML breakers.

Appendix 8

```
Attribute VB_Name = "Módulo4"
Sub weightedaverage6port()
Attribute weightedaverage6port.VB_ProcData.VB_Invoke_Func = " \n14"
Dim celda As Range
Dim porfolio As Range
Dim Sum1 As Range
Dim Sum2 As Range
Dim Sum3 As Range
Dim size As Range


Set celda = ActiveCell
Set portfolio = Range(Cells(celda.Row + 1, celda.Column - 1), Cells(454, celda.Column - 1))
Set Sum1 = Range(Cells(celda.Row + 1, celda.Column + 1), Cells(454, celda.Column + 1))
Set Sum2 = Range(Cells(celda.Row + 1, celda.Column + 2), Cells(454, celda.Column + 2))
Set Sum3 = Range(Cells(celda.Row + 1, celda.Column + 3), Cells(454, celda.Column + 3))
Set size = Range(Cells(celda.Row + 1, celda.Column - 2), Cells(454, celda.Column - 2))

Cells(457, celda.Column).Value = "SH"
Cells(458, celda.Column).Value = "SM"
Cells(459, celda.Column).Value = "SL"
Cells(460, celda.Column).Value = "BH"
Cells(461, celda.Column).Value = "BM"
Cells(462, celda.Column).Value = "BL"
'      "=SUMPRODUCT(--(R2C11:R454C11=""SM""),R2C10:R454C10,R[-467]C:R[-15]C)"
Cells(457, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SH""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(457, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SH""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(457, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SH""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(458, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SM"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SM""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(458, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SM"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SM""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(458, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SM"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
```

```
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=SM""","
& Sum3.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(459, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=SL""","
& Sum1.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(459, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=SL""","
& Sum2.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(459, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=SL""","
& Sum3.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(460, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BH""","
& Sum1.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(460, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BH""","
& Sum2.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(460, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BH""","
& Sum3.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(461, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BM"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BM""","
& Sum1.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(461, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BM"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BM""","
& Sum2.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(461, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BM"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BM""","
& Sum3.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
Cells(462, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ","""=BL""","
& Sum1.Address(ReferenceStyle:=xlR1C1) & ","""<>"""")"
```

```
Cells(462, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BL"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BL""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(462, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BL"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BL""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(celda.Row, celda.Column + 8).Select
End Sub

Sub weightedaverage25port()
Attribute weightedaverage25port.VB_ProcData.VB_Invoke_Func = "w\n14"

Dim celda As Range
Dim porfolio As Range
Dim Sum1 As Range
Dim Sum2 As Range
Dim Sum3 As Range
Dim port As Range
Dim size As Range

Set celda = ActiveCell
Set portfolio = Range(Cells(celda.Row + 1, celda.Column - 1), Cells(454, celda.Column - 1))
Set Sum1 = Range(Cells(celda.Row + 1, celda.Column + 1), Cells(454, celda.Column + 1))
Set Sum2 = Range(Cells(celda.Row + 1, celda.Column + 2), Cells(454, celda.Column + 2))
Set Sum3 = Range(Cells(celda.Row + 1, celda.Column + 3), Cells(454, celda.Column + 3))
Set size = Range(Cells(celda.Row + 1, celda.Column - 2), Cells(454, celda.Column - 2))

Cells(457, celda.Column).Value = "BH"
Cells(458, celda.Column).Value = "B2"
Cells(459, celda.Column).Value = "B3"
Cells(460, celda.Column).Value = "B4"
Cells(461, celda.Column).Value = "BL"
Cells(462, celda.Column).Value = "2H"
Cells(463, celda.Column).Value = "22"
Cells(464, celda.Column).Value = "23"
Cells(465, celda.Column).Value = "24"
Cells(466, celda.Column).Value = "2L"
Cells(467, celda.Column).Value = "3H"
Cells(468, celda.Column).Value = "32"
Cells(469, celda.Column).Value = "33"
Cells(470, celda.Column).Value = "34"
Cells(471, celda.Column).Value = "3L"
Cells(472, celda.Column).Value = "4H"
Cells(473, celda.Column).Value = "42"
Cells(474, celda.Column).Value = "43"
Cells(475, celda.Column).Value = "44"
Cells(476, celda.Column).Value = "4L"
Cells(477, celda.Column).Value = "SH"
Cells(478, celda.Column).Value = "S2"
Cells(479, celda.Column).Value = "S3"
Cells(480, celda.Column).Value = "S4"
Cells(481, celda.Column).Value = "SL"

Cells(457, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
```

```
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BH"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BH""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(457, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BH"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BH""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(457, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BH"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BH""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(458, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B2"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B2""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(458, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B2"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B2""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(458, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B2"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B2""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(459, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B3"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B3""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(459, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B3"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B3""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(459, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B3"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B3""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(460, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
"=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B4"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B4""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(460, celda.Column + 2).Select
```

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ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B4"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B4""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(460, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""B4"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=B4""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(461, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BL""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(461, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BL""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(461, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""BL"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=BL""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(462, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""2H"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=2H""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(462, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""2H"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=2H""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(462, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""2H"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=2H""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(463, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""22"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=22""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(463, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""22"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=22""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
```

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Cells(463, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""22"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=22""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(464, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""23"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=23""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(464, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""23"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=23""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(464, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""23"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=23""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(465, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""24"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=24""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(465, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""24"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=24""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(465, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""24"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=24""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(466, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""2L"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=2L""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(466, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""2L"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=2L""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(466, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""2L"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
```

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size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=2L""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(467, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""3H"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=3H""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(467, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""3H"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=3H""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(467, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""3H"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=3H""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(468, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""32"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=32""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(468, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""32"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=32""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(468, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""32"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=32""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(469, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""33"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=33""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(469, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""33"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=33""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(469, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""33"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=33""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(470, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
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    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""34"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=34""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(470, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""34"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=34""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(470, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""34"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=34""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(471, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""3L"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=3L""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(471, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""3L"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=3L""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(471, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""3L"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=3L""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(472, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""4H"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=4H""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(472, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""4H"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=4H""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(472, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""4H"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=4H""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(473, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""42"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=42""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(473, celda.Column + 2).Select
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ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""42"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=42""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(473, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""42"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=42""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(474, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""43"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=43""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(474, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""43"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=43""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(474, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""43"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=43""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(475, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""44"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=44""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(475, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""44"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=44""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(475, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""44"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=44""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(476, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""4L"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=4L""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(476, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""4L"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=4L""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
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Cells(476, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""4L"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=4L""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(477, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SH""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(477, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SH""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(477, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SH"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SH""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(478, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S2"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S2""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(478, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S2"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S2""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(478, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S2"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S2""," &
Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"

Cells(479, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S3"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S3""," &
Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(479, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S3"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S3""," &
Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"")"
Cells(479, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S3"")," &
size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" &
```

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size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S3""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"

Cells(480, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S4"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S4""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"
Cells(480, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S4"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S4""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"
Cells(480, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""S4"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=S4""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"

Cells(481, celda.Column + 1).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SL"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum1.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SL""," & Sum1.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"
Cells(481, celda.Column + 2).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SL"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum2.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SL""," & Sum2.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"
Cells(481, celda.Column + 3).Select
ActiveCell.FormulaR1C1 = _
    "=SUMPRODUCT(--(" & portfolio.Address(ReferenceStyle:=xlR1C1) & "=""SL"")," & size.Address(ReferenceStyle:=xlR1C1) & "," & Sum3.Address(ReferenceStyle:=xlR1C1) & ")/SUMIFS(" & size.Address(ReferenceStyle:=xlR1C1) & "," & portfolio.Address(ReferenceStyle:=xlR1C1) & ",""=SL""," & Sum3.Address(ReferenceStyle:=xlR1C1) & ",""<>"""")"
Cells(celda.Row, celda.Column + 8).Select

End Sub
```

This code creates the weighted averages for both the HML and SMB factors.