The influence of firm-specific variables and liquidity on the NYSE and the NASDAQ stock and ETF market from 2009 until 2018

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Abstract

Based on data from July 2009 up to and including June 2018, this thesis researches the effect of the Fama and French (2015a) five-factor model, augmented with the earnings-to-price ratio and three liquidity factors on the NASDAQ and NYSE stock and ETF market. Besides the actual effect of the various variables, also the differences within the stock and ETF markets will be evaluated. The large difference between the excess returns of the NASDAQ and NYSE in both markets endorses a research isolating the two. Even though the high t-statistics, the factors do not seem to resonate with the returns of the stock market, due to a very low R-squared and high AIC compared to the research of Fama and French. This is essentially the same for the ETF market, possibly resulting from the negative excess return.

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1. Introduction

The history of financial markets is mainly situated in Europe. One of the earliest transcriptions of a loan is found in Mesopotamia, Greece, originating from 1796 B.C. (Goetzmann, 2016). Additionally, the first building specifically designed to be a stock exchange was in 1531, the 'Handelsbeurs' in Antwerp, Belgium. Further, the Dutch East Indian Company (VOC) was the first large company issuing 'stocks' (The Economist, 2013). Last, the first stock market crash happened in the Netherlands as well, when the tulips skyrocketed in prices before tumbling down within the 1630s (Goldgar, 2018).

Currently, the United States is the epicentre of the financial markets. The last three decades, the United States' domestic market capitalization fluctuated around the 42% of the World's market capitalization, mainly held by the NYSE and the NASDAQ (The World Bank, 2018). Historically, the largest European financial market, the London Stock Exchange[1], is only 19 years older than the largest American financial market, the NYSE, founded in respectively 1773 and 1792. In that time, the NYSE had very little regulations compared to the LSE, which might be the reason for the large difference in market capitalization (Beattie, 2017).

The NYSE is the largest financial market as it provided a low-regulated marketplace, however also due to its sheer longevity. Compared to the NYSE, the NASDAQ is still very young being only 47 years old. Market capitalization consists of two variables, the amount of shares multiplied by the value of those shares. The NASDAQ has lower fees, hence situating itself as attractive for firms that are not on the market yet, causing it to be the market with the most amount of listed companies in spite of being so much younger. However, this paper will focus on the second variable, the value of the shares. Abnormal returns, the growth that cannot be explained by the market trend, has been in the centre of attention for decades. This thesis will dive deeper into the understanding of differences between the NASDAQ and the NYSE stock market utilizing firm-specific variables in accordance with the Fama and French five-factor model (2015a).

Can firm-specific risk factors explain the differences in abnormal returns for the NYSE and NASDAQ stock and ETF market from July 2009 until June 2018?

[1] Historically as the Euronext is the largest since the Great Recession of 2008 (Federation of European Securities Exchanges, 2018)

The augmentation of current research will involve two extensions of the current five-factor model, a new, more current time span and the fairly new ETF market. The first extension will be the inclusion of a measure of liquidity as additional risk factor. To test whether liquidity is also a risk factor that is priced by the market in the form of higher excess returns I will construct three different measures of liquidity. The second extension will be the comparison in power of explanation between the earnings-to-price ratio and the book-to-market ratio. According to Fama and French (1996) these factors are interchangeable. I will investigate whether this is still the case when focusing on the difference between the NYSE and NASDAQ stock exchanges, as the NASDAQ comprises of many technology firms with high intangibles and goodwill, which are hard to estimate and may have too much influence on the actual book value.

Social relevance is most evident in a better understanding of the difference between the risk factors caused by the variety in firms and the difference in selling the securities on the NASDAQ and NYSE stock and ETF market. Scientific relevance is apparent in the combination of one of the most researched difference between the NASDAQ and NYSE, the execution cost, and one of the most iconic work in the stock market research, the Fama and French models. For both social and scientific relevance, everything is tested in a newer timeframe, and in a new market in order to test whether old estimations are still relevant today.

The following section, the literature review, will contain a discussion on previous papers. Thereafter, the data necessary for this paper will be illuminated, together with the methodology section, where more insight into the transformations of the data will be provided, as well as a specification of the descriptive statistics and the methodology. Subsequently, the results will be determined and discussed. Lastly, this thesis will be completed with a conclusion, discussion and a recommendation for further research.

Interestingly, the large difference between the excess returns of the NASDAQ and NYSE in both markets favours a research isolating the two. The risk factors do not seem to explain the deviations of the excess returns. Even though the high t-statistics, the R-squared is very low and the AIC very high compared to the research of Fama and French (2015a). This is essentially the same for the ETF market, possibly resulting from the negative excess return.

2. Literature review

2.1 History on capital asset pricing

The indirect relationship between risk and return became eminent after the publication of Markowitz (1952) about the Modern Portfolio Theory. He combined the variance of an asset, as symbolization of the risk of the asset, and expected return. Assuming that investors are risk-averse, the predicted return is maximized given a certain risk, or vice versa, the predicted risk is minimized given an expected return. According to this theorem, diversification of risk is possible with assets that have uncorrelated prices.

The Modern Portfolio Theory was the basis on which the Capital Asset Pricing Model (CAPM) was build, exposing the direct relationship between risk and return, marking the beginning of asset pricing theory. The CAPM was developed simultaneously by various economists, however Sharpe (1964) is most known for his work, earning him the Nobel Prize for Economics in 1990. However in academic papers the CAPM is often referred to as the Sharpe-Lintner CAPM, as Lintner (1965) extended the paper of Sharpe by solving some remaining questions. The resulting CAPM states that the expected return is depended on the risk free rate, and the susceptibility of the stock to the performance of the market, the regression is as follows:

$$E(R_i) = R_f + [E(R_M) - R_f]\beta_{iM}$$

An important step in the development of the Fama and French model is the paper of Jensen in 1968. The addition of time-varying risk free rates, index and market returns, and a time- and index-varying error term, revealed the possibility to make a time-series regression of the CAPM. This implies that the alpha, or Jensen's alpha, should be zero whenever the risk premium of an asset is explained by its sensitivity to the performance of the market. If Jensen's alpha is not zero, there are other factors influencing the performance of the asset. The resulting augmented regression:

$$R_{it} - R_{ft} = \alpha_i + \beta_{iM}\left[E(R_{Mt}) - R_{ft}\right] + \varepsilon_{it}$$

Between 1970 and 1990 the relationship between average return and a variety of firm-specific variables are documented. Stattman (1980) reveals a positive association of average return and book-to-market ratio. Banz (1981) finds a negative relation with size, while Basu (1977) documents a positive association with the earnings-to-price ratio, and Bhandari (1988)

finds a positive relation with leverage as well. In 1992, Fama and French published two papers on this subject. The first paper researched all of the previously mentioned variables' effects in the cross-section on expected return with the use of the Sharpe-Lintner CAPM (Fama & French, 1992a). However, the second paper is of more interest for this research, as it focused on the time-series analysis of the expected return, leading to the Fama and French three-factor model (Fama & French, 1992b). They combined the size and book-to-market effects with the market effects and Jensen's Alpha as written by Black, Jensen and Scholes in 1972. Finally, as an extension to their own work we arrive at the paper on which this thesis' theories are built upon, the five-factor model in which Fama and French (2015a) add the robustness of profitability and relative investment behaviour. Concluding the history of asset pricing and the relationship between risk and return with the Fama and French five-factor model:

$$R_{it} - Rf_t = \alpha_i + \beta_i\left[R_{Mt} - R_{ft}\right] + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \varepsilon_{it}$$

2.2 History on liquidity

Liquidity is defined as *'the ability or ease with which assets can be converted into cash.'* (Dictionary.com, 2019) Cash is the basis of liquidity and is the most liquid form of capital as buying or selling money does not lower its value. The most prudent initial theory around liquidity is probably the Liquidity Preference Theory of John Keynes (1936), taught in many macroeconomics courses. In a nutshell he claims that investors demand higher returns on bonds that have a longer maturity. In other words, the longer the maturity, the less liquid the capital is, the higher the compensation should be.

In the last 50 years many proxies for liquidity in the capital market are presented, however the initial proxy is documented by Demsetz (1968). Demsetz explains that if an investor wants to sell (buy) assets, he can wait until a buyer (seller) presents itself and they can make a transaction, or he sells (buys) the assets immediately to (from) a market maker at a discounted (marked-up) price. This price difference is called the ask-bid spread, and is a proxy for liquidity as it is the cost for selling or buying the asset directly.

Other proxies of liquidity are amongst others the Glosten-Harris model (1988), the Hasbrouck-Foster-Viswanathan model (1993)[2], amortized spread (Chalmers and Kadlec, 1998), and the ratio of a stock absolute daily return to its daily dollar volume, averaged over

[2] As labelled by Michael J. Brennan & Avanidhar Subrahmanyam (1996)

some period (Amihud, 2002). However, most interesting for this study might be the research of Amihud and Mendelson (1986), who initiated the combination of the ask-bid spread and the CAPM in order to gain insights in the risk effect of illiquidity. They find that the ask-bid spread increases returns even though it is only significantly when combined with the size effect, however they conclude that illiquidity causes a risk premium.

The bid-ask spread is possibly the most interesting liquidity proxy as the bid-ask spread is widely covered in literature between the NYSE and NASDAQ. Most research towards the differences in stock prices in the NASDAQ and NYSE is based on the execution costs, for example Huang and Stoll (1995). The main difference between the markets is the way of trading the stocks. The NASDAQ is a dealer market, where investors buy and sell stocks for the dealer's ask and bid price respectively. The NYSE is an auction market, the highest bidding prices and the lowest asking prices are matched and the trade is made. This results in higher execution costs for the NASDAQ, as measured by a variety of spread measures, therefore decreasing liquidity, and increasing the risk of buying a stock.

2.3 Exchange Traded Funds

The first ETF was publicly available in 1993, however it has become increasingly more popular since 2000. The most prolific explanation about ETF's is written by Gary Gastineau in 2001. ETF shares are securities of a trust in which it is comparable as a mutual trust fund. However, unlike a trust fund it is tradeable throughout the day, just like a stock. A commonly used example is the SPDR trust as it is the first and largest ETF, and it holds all stocks in the S&P 500.

The lack of research towards ETF performance with the five-factor model, or any number of factors for that matter, provides little to estimate any results. The biggest research towards mutual funds is done by Carhart (1997) who uses previous work and augments this with various own contributions. The main finding is the fact that, after transaction costs, the mutual funds underperform compared to indices after correcting for survivor bias. However using the one-year momentum technique (Jegadeesh & Titman, 1993) as extension of the three factor model, he finds that funds work really well when investing in previous winners, and in a smaller extend in smaller firms. According to Gastineau (2004) ETFs have been underperforming compared to their most alike product, the traditional index funds. Like the

mutual funds have, due to the administrative cost and limitations of the SEC of creation and trading of the ETF.

3. Data & Methodology

3.1 The data sample

In order to make an as fair as possible comparison between two stock markets it is important to take the maturity of the NASDAQ and influential macroeconomic events into consideration. For years the NYSE and NASDAQ composite indices grew at the same rate. The hype of initial public offerings (IPOs) of internet start-ups on the NASDAQ around 1995 caused the NASDAQ to grow faster than the NYSE, as can be seen in figure 1. The NASDAQ peaked on the 10th of March 2000, losing its profit of 2000 within three weeks. The trigger of the burst of the bubble is unclear and heavily debated, however from September 2000 onwards, the months were dominated by negative results. According to NBER the peak of the burst happened in March 2001, however, the aftermath of the burst extended until October 2003, the estimated end of the dot-com bubble.

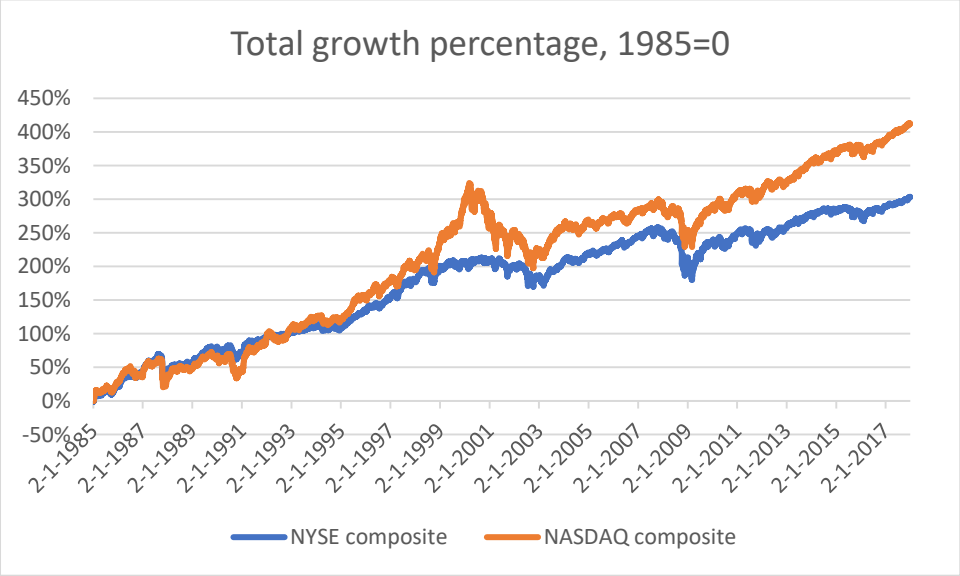

Figure 1. Total growth of the NYSE and NASDAQ composite indices, 1985=0

The following major event was the financial crisis of 2008. Many suggest that the fall of the Lehmann Brothers on the 15th of September 2008, was the trigger, causing the entire financial market to freeze, and subsequently the stop on loans (The Independent, 2018). Around March 2009 the composites started to slowly rise again, and the worst of the financial crisis was

reconciled with, although, according to NBER[3], the great recession was not officially over until June 2009.

Taking previous into consideration the most suitable period for the research is July 2009 until June 2018. It is highly unlikely that the results of the timeframe before the end of the great recession will be of any relevance for today's market due to the tremendous change a macro-economic event as a crash has on the financial market. Considering this with the time restriction this thesis is tied to and data capacity issues, it seems most relevant to consider the time after the great recession. In consideration with previous work, the portfolios will be rebalanced every first of July, hence data after June 2018 will not be accounted for.

Now the sample period is established, the approach to congregate the actual data can be determined. The NASDAQ website[4] provides an Excel sheet on all listed firms on both the NASDAQ and the NYSE, including the symbol, market capitalization, country, IPO year and subsector. In order to use these symbols to assemble the necessary data from Datastream it is compulsory to include the country code (U:) to the NYSE firms and an at sign (@:) for NASDAQ firms as described by the Erasmus data team[5]. By using the 'concatenate' regression in Excel, the extensive list of firms is easily changed to the format necessary to download the Datastream data. By using the Datastream add-in 'Static Request' in Excel the Datastream code (DSCD), listing dates (BDATE) and last updated price of the stock (TIME) can be obtained. The Datastream codes for the companies of interest can be used to retrieve the accounting variables through the 'Time-Series Request'. All data is measured in daily intervals.

The other necessary sample is a list of all exchange traded funds on the NYSE and NASDAQ. The first step was to obtain all exchange traded funds listed in America through the database of Bloomberg, simultaneously achieving their CUSIP code. By using the Datastream add-in 'Static Request' in Excel the financial market (EXNAME[6]) the respective exchange traded funds are traded on can be retrieved, as well as the Datastream code (DSCD[6]), listing dates (BDATE[6]) and last updated price of the ETF (TIME[6]) can be obtained. Utilizing the Datastream code and the 'Time-Series Request' all necessary data can be downloaded. All data is again measured in daily intervals.

[3] https://www.nber.org/cycles.html
[4] https://www.nasdaq.com/screening/company-list.aspx
[5] https://datateamoftheeur.wordpress.com/2016/03/31/us-tickers-to-datastream-mnemonics/

3.2 The firm specific risk factors

3.2.1 Data collection

In order to compare the results to preceding literature by Fama and French (1992a, 2015a), the firm specific risk variables are defined as illustrated in the paper on the five-factor model by Fama and French (2015a). The adopted codes are provided in addition to the explanation as these are necessary to retrieve the variables from Datastream and Worldscope with the Time Series Request add-in in Excel, provided by Datastream. SMB (small minus big) is defined as a risk proxy measuring the additional risk small firms have compared to big firms. The portfolios are created by the difference of current and the preceding June market equity conform Fama and French (1992a), calculated by multiplying the stock price and the shares outstanding (MV[6]).

HML (high minus low) is the second factor of the FF three-factor model, which proxies the risk of firms with a high book equity compared to the market value. Firms with enduring low earnings are likely to have high B/M value. BE is defined as *"the COMPUSTAT book value of stockholders' equity, plus balance sheet deferred taxes and investment tax credit (if available), minus the book value of preferred stock"*, which is closely emulated by WC03501[6]. Restating the MV from SMB for the market value.

RMW (robust minus weak) is a profitability factor, whereby robust profitability is anticipated to have high profitability in the future, therefore expected return and risk for disappointing results are higher. Profitability is proxied by the operating profit of the preceding year (revenue minus the cost of goods sold and minus selling, general and administrative expenses), defined by WC01250[6], all divided by the book equity defined as in previous variable.

$$Profitability_{it} = \frac{operating\ profit_{prev\ year}}{book\ equity_{prev\ year}}$$

Lastly, CMA (conservative minus aggressive) is an investment factor, whereby conservative investment leads to higher cash flows, expected return and consequently risk. It is proxied by the total assets of t-1 minus the total assets of t-2, divided by the total assets at t-2 (WC02999[6]).

[6] All codes are the symbols used within Datastream

$$Investment_{it} = \frac{Total\ assets_{prev\ year} - Total\ assets_{2\ years\ ago}}{Total\ assets_{2\ years\ ago}}$$

The augmented firm specific risk variables are in the form earnings-to-price ratio and a liquidity factor. Fama and French (1996) suggest that firms with continuously low earnings normally have high B/M. However, as previously mentioned, the presumed large difference between the B/M ratios of NYSE and NASDAQ firms might have influence on the results in their paper. High E/P ratios are considered to be the result of a relatively lower price for their respective earnings. This is due to a higher expected risk, consequently increases the expected return of the investor, additionally receiving a higher risk premium,. The cause of higher risk is undetermined and also not important. It is proxied by the firms' earnings per share based on profit after tax, minority interest and preferred dividends without extraordinary items. When corporation tax is not reported, it is estimated by Datastream (WC05201[6]).

Liquidity has many proxies as it can be interpreted in various manners. For this paper, three methods are used as main proxies of which all are directly influenced by the difference in market structure and the variety of firms traded on the markets. The comparison multiple variables can provide additional information whether the variables are suitable proxies for liquidity. Two proxies are based on the direct difference in the effect of a dealer market and auction market, the bid-ask spread. The bid-ask spread has many augmentation, unfortunately most use intraday variables which cannot be operated due to a lack of information during trading days. First, (1) the original spread is adopted, which is calculated by the bid price minus the ask price (PB – PA[6]) (Demsetz, 1968). Second, (2) as defined by Amihud and Mendelson (1986), the amortized spread is handled. Moreover, this is calculated by the stock price minus the midpoint of the actual bid-ask spread, subsequently multiplied by the amount of traded shares, and divided by the dollar amount of outstanding shares, known as market value. All variables are previously adopted, except for the dollar amount of traded shares, which is VO[6]. The bid-ask spread seems to be an ad hoc variable as the actual definition of liquidity, the ease to trade an asset, is intuitively resembled by trading volume. Therefore, the third and last utilized proxy for (3) liquidity defined as Amihud provided in 2002, in which he uses the average ratio of the daily absolute return to the dollar trading volume on that day. The trading volume is probably influenced by the bid-ask spread as the larger the spread, the lower the trading volume.

$$Liquidity\ 1_{it} = Bid\ Price_{it} - Ask\ price_{it}$$

$$Liquidity\ 2_{it} = \left(P_{it} - \frac{Bid\ Price_{it} + Ask\ price_{it}}{2}\right) * \frac{Amount\ of\ shares\ traded}{MV}$$

$$Liquidity\ 3_{it} = \frac{\sum_1^{D_{iy}} |R_{iy}|}{D_{iy}} * \frac{1}{VO_{ivyd}}$$

3.2.2 Risk factors creation

The gathered data is adopted to create the risk factors. SMB is the difference of the average return on a portfolio of small stocks and the return on a portfolio of big stocks. HML is the mean return of a high B/M portfolio minus a low B/M portfolio return. RMW is the disparity in mean return between a portfolio of robust profitability and a portfolio of weak profitability. CMA is the difference between a portfolio of stocks of low and high investment firms. The EP is the difference between the mean return of a portfolio of stocks with high E/P firms and low E/P firms. Last, the $LIQ_{1,2,3}$ is the average return on a portfolio with low liquidity minus the average return on a highly liquid portfolio.

There are many different options to create the portfolios, which is incremental to results of the paper. The 2 x 2 sorting method is preferred by Fama and French (2016), whereas the 5 x 5 sorting method is in accordance to previous literature based on the sorting method of Lakonishok, Shleifer & Vishny (1994). The portfolios are always equally weighted, hence the 2 x 2 sorting methods have a breakpoint on the 50th percentile, while the 5 x 5 sorting method will have breakpoints on the 20th, 40th, 60th and 80th percentile. The main focus will be on the 5 x 5 sorting method as it provides more insight to the differences in portfolios, and is a way to correct for short sighted conclusions. This will be discussed in section 3.5.2. The 2 x 2 sorting method is briefly tested in the end to make sure that it does not have a significant impact on the results. In previous research, portfolios are both monthly as well as yearly rebalanced. However, most of the accounting variables are only updated once or twice per year. In order to create an as fair as possible comparison between variables, only yearly reallocation will be employed. The yearly reallocation will be after June, so the year will run from July up to and including June, based on all previous work by Fama and French. In total 2 sets of risk factors will be created, one for NASDAQ and one for NYSE. The construction of the risk variables can be found in table 1. From now on the variables are denoted by the abbreviations y, beta, SMB, HML, RMW, CMA, EP, LIQ_1, LIQ_2 and LIQ_3 to avoid persistent long names.

Table 1 – **construction of the risk variables**

Construction of SMB, HML, RMW, CMA, EP and the liquidity factors. In the following table the calculation of the factors and the sorting methods are explained. The portfolios are equally weighted. The labels for 5 x 5 sorting method will be:

- SMB; small (S), small-medium (SM), medium (M), medium-big (MB) and big (B)
- HML; high (H), high-neutral (HN), neutral (N), neutral-low (NL) and low (L)
- RMW; robust (R), robust-neutral (RN), neutral (N), neutral-weak (NW) and weak (W)
- CMA; conservative (C), conservative-neutral (CN), neutral (N), neutral-aggressive (NA), and aggressive (A)
- EP; high (H), high-neutral (HN), neutral (N), neutral-low (NL) and low (L)
- LIQ; slow (Sl), slow-neutral (SN), neutral (N), neutral-fast (NF) and fast (F)

Sort	**Factors and their components**
2 x 2 sort – size	SMB = S – B
2 x 2 sort – B/M	HML = H – Lo
2 x 2 sort – Operating Profit	RMW = R – W
2 x 2 sort – Investment	CMA = C – A
2 x 2 sort – E/P	EP = Ma – Mi
2 x 2 sort – Liquidity 1 / 2 / 3	LIQ = Sl – F
5 x 5 sort – size	SMB = (SH + SHN + SN + SNL + SL + SR + SRN + SN + SNW + SW + SC + SCN + SN + SNA + SA + SSl + SSN + SN + SNF + SF + SMH + SMHN + SMN + SMNL + SML + SMR + SMRN + SMN + SMNW + SMW + SM + SMCN + SMN + SMNA + SMA + SMSl + SMSN + SMN + SMNF + SMF) / 40 - (BH + BHN + BN + BNL + BL + BR + BRN + BN + BNW + BW + BC + BCN + BN + BNA + BA + BSl + BSN + BN + BNF + BF + BMH + BMHN + BMN + BMNL + BML + BMR + BMRN + BMN + BMNW + BMW + BM + BMCN + BMN + BMNA + BMA + BMSl + BMBN + BMN + BMNF + BMF) / 40
5 x 5 sort – B/M & EP	HML = (HS + HSM + HM + HMB + HB + HR + HRN + HN + HNW + HW + HC + HCN + HN + HNA + HA + HSl + HSN + HN + HNF + HF + HNS + HNSM + HNM + HNMB + HNB + HNR + HNRN + HNN + HNNW + HNW + HNC + HNCN + HNN + HNNA + HNA + HNSl + HNSN + HNN + HNNF + HNF) / 40 - (LS + LSM + LM + LMB + LB + LR + LRN + LN + LNW + LW + LC + LCN + LN + LNA + LA + LSl + LSN + LN + LNF + LF + NLS + NLSM + NLM + NLMB + NLB + NLR + NLRN + NLN + NLNW + NLW + NLC + NLCN + NLN + NLNA + NLA + NLSl + NLSN + NLN + NLNF + NLF) / 40
5 x 5 sort – Operating Profit	RMW = (RS + RSM + RM + RMB + RB + RH + RHN + RN + RNL + RL + RC + RCN + RN + RNA + RA + RSl + RSN + RN + RNF + RF + RNS + RNSM + RNM + RNMB + RNB + RNH + RNHN + RNN + RNNL + RNL + RNC + RNCN + RNN + RNNA + RNA + RNSl + RNSN + RNN + RNNF + RNF) / 40 – (WS + WSM + WM + WMB + WB + WH + WHN + WN + WNL + WL + WC + WCN + WN + WNA + WA + WSl + WSN + WN + WNF + WF + NWS + NWSM + NWM + NWMB + NWB + NWH + NWHN + NWN + NWNL + NWL + NWC + NWCN + NWN + NWNA + NWA + NWSl + NWSN + NWN + NWNF + NWF) / 40
5 x 5 sort – Investment	CMA = (CS + CSM + CM + CMB + CB + CH + CHN + CN + CNL + CL + CR + CRN + CN + CNW + CW + CSl + CSN + CN + CNF + CF + CNS + CNSM + CNM + CNMB + CNB + CNH + CNHN + CNN + CNNL + CNL + CNR + CNRN + CNN + CNNW + CNW + CNSl + CNSN + CNN + CNNF + CNF) / 40 – (AS + ASM + AM + AMB + AB + AH + AHN + AN + ANL + AL + AR + ARN + AN + ANW + AW + ASl + ASN + AN + ANF + AF + NAS + NASM + NAM + NAMB + NAB + NAH + NAHN + NAN + NANL + NAL + NAR + NARN + NAN + NANW + NAW + NASl + NASN + NAN + NANF + NAF) / 40
5 x 5 sort – Liquidity 1 / 2 / 3	LIQ = (SlS + SlSM +SlM + SlMB + SlB + SlH + SlHN + SlN + SlNL + SlL + SlR + SlRN + SlN + SlNW + SlW + SlC + SlCN + SlN + SlNA + SlA + SNS + SNSM +SNM + SNMB + SNB + SNH + SNHN + SNN + SNNL + SNL + SNR + SNRN + SNN + SNNW + SNW + SNC + SNCN + SNN + SNNA + SNA) / 40 - (FS + FSM +FM + FMB + FB + FH + FHN + FN + FNL + FL + FR + FRN + FN + FNW + FW + FC + FCN + FN + FNA + FA + NFS + NFSM +NFM + NFMB + NFB + NFH + NFHN + NFN + NFNL + NFL + NFR + NFRN + NFN + NFNW + NFW + NFC + NFCN + NFN + NFNA + NFA) / 40

3.2.3 Descriptive statistics

The table below depicts descriptive statistics of average monthly returns of the risk variables. The large differences between the mean returns for both markets provides a good impression for the importance of testing both markets separately. Surprisingly, there are multiple variables with a negative mean, indicating that the risk variables changed in their influence on the return. Intriguing is the higher t-statistic for the EPS than the HML on the NASDAQ. Whereas on the NYSE, the HML is statistically significant, while EPS is not, again indicating the importance of testing both markets. The liquidity risk variables obtain higher average returns for the NASDAQ compared to the NYSE, indicating that indeed the NASDAQ has higher execution costs, therefore lower liquidity, and thus a higher risk premium for illiquid stocks.

Table 2 & 3 – summary statistics NASDAQ stock and NYSE stocks

Summary statistics of and t-value of the risk variables on NASDAQ stock market

Variable	Observations	Mean	Std. Dev.	Min	Max	t-statistic
y	179,204	0.060503	16.6541	-1.00117	6998.998	1.5379
beta	179,204	-0.00183	0.009658	-0.03874	0.029917	-80.2491***
SMB	180,311	0.017043	0.13361	-0.12129	1.261291	54.1659***
HML	180,311	0.009896	0.13911	-0.41751	1.280478	30.2081***
CMA	149,619	0.133167	0.980853	-0.04669	8.07712	52.5153***
RMW	180,311	-0.00912	0.117265	-1.10338	0.14927	-33.0124***
EPS	180,311	0.103467	0.847512	-0.12908	7.641727	51.8403***
LIQ_1	180,311	0.009927	0.132569	-0.37964	1.229217	31.7955***
LIQ_2	180,311	0.039624	0.203834	-.0409068	1.89002	82.5448***
LIQ_3	165,943	0.013028	0.172491	-0.52231	1.54132	30.7661***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Summary statistics and t-value of the risk variables on NYSE stock market

Variable	Observations	Mean	Std. Dev.	Min	Max	t-statistic
y	172,797	0.009706	0.235255	-0.9983	86.3595	17.1497***
beta	172,797	-0.00173	0.009196	-0.03239	0.026786	-77.9786***
SMB	173,525	0.005868	0.023459	-0.04861	0.129997	104.192***
HML	173,525	0.001477	0.018404	-0.02622	0.116507	33.4319***
CMA	143,356	-0.0005	0.01795	-0.11303	0.027252	-10.4754***
RMW	173,525	0.002058	0.020584	-0.10449	0.042218	41.6561***
EPS	173,525	1.31E-05	0.026479	-0.07017	0.129394	0.2063
LIQ_1	173,525	-0.00253	0.024623	-0.20811	0.027856	-42.8041***
LIQ_2	173,525	0.006089	0.025929	-0.04223	0.210779	97.8188***
LIQ_3	159,477	-0.00252	0.015701	-0.11052	0.024648	-64.1128***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

3.3 Performing the tests

3.3.1 The stock market tests

The amount of tests are quite extensive where variations are based on portfolio sortation, the three liquidity risk factors, the relation between earnings-to-price versus the market-to-book ratio and the dataset (the stock and ETF market on NYSE and NASDAQ). Starting with a test of all combinations of the risk factors on all portfolios created for the NYSE, NASDAQ, and combined sample. In accordance with previous research, the following regression is tested with

STATA, where i depends on the firms within the portfolios and the risk factors only depend on time:

$$R_{it} - Rf_t = \alpha_i + \beta_i[R_{Mt} - R_{ft}] + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + \varepsilon_{it}$$

In testing the large amount of firms and portfolios, two test statistics are used. The first test is the t-test, which is used for each individual risk factor in order to see whether the risk factors have statistical significance within the given regression. Significant influence is perceived at a significance level of 5% which is estimated at a t statistic of 1.96 or more, which is the most commonly used t statistic. Possibly the most important factor is Jensen's alpha, as the alpha describes the abnormal return that is not explained by the risk factors. When it is not statistically significantly different from 0, (almost) all variations of the abnormal returns are explained by the tested factors. As a second statistic, also the AIC and BIC scores can be measured to scope the relevance of adding another variable. By definition, decreases the R-squared with the addition of an extra variable, however there is the potential of losing information. As solution Akaike developed the AIC in 1973, and Schwarz developed the BIC in 1978, both are commonly used to determine the most suitable amount of independent variables. They both compound the goodness of fit with the maximum likelihood and the potential loss of information in the amount of estimates, in order to calculate the best amount of independent variables. The only difference is the weights put on importance of the goodness of fit and the loss of information and they don't vary too much, hence we calculate both in order to make a good assessment especially if it is on the treshold of suitable or not. The lowest AIC or BIC score is the most suitable, however an important note is the cardinal ordering of both scores, hence the scores cannot be transferred in time or depending on the creation of portfolios. Although both AIC and BIC are inspected, as they don't provide any different throughout the entire paper, only the AIC will be denoted.

3.3.2 Earnings-to-price ratio versus book-to-market ratio

The E/P ratio consists of an accounting variable and a variable based on market value, just like the B/M value. As described in the beginning, the book value consists of values that are unreliable, especially for firms relying on estimated values such as Facebook. Depending on the results of the previous NYSE and NASDAQ the regression tests and summary statistics can be chosen.

Again, multiple statistics can be reviewed to calculate differences in effects of the multiple variables. First of all, the t statistics of the E/P and B/M of the portfolio size and rebalancing period. A higher t statistic means higher impact, and hence more deviations from the abnormal returns. However, there might be an argument that these are not directly reflecting the differences between the two variables, and are merely measuring the impact in that specific test. Also, the AIC and BIC are taken into consideration to measure whether the variables are of importance. The paired t-test is normally used for comparing two different dependent variables when the independent variables are related, which is the case[7].

$$R_{it} - Rf_t = \alpha_i + \beta_i\left[R_{Mt} - R_{ft}\right] + s_i SMB_t + e_i EP_t + r_i RMW_t + c_i CMA_t + \varepsilon_{it}$$

3.3.3 Liquidity risk factors

The tests for the liquidity factors will primarily comprise of the same steps as already taken in previous sections. Depending on the results of the E/P versus the B/M ratios, either will be used to test the effect of the different risk factors. All liquidity factors will be used with all other combinations of the risk factors on all portfolios created for the NYSE, NASDAQ, and combined sample. The three liquidity factors will not be in same test, as they should have a high correlation due to running the same variables, hence the risk on multicollinearity and therefore inconclusive results should be taken into account. The liquidity regression is also tested with STATA, where i depends on the firms within the portfolios and the risk factors only depend on time, except for the liquidity factor where the n determines the method of liquidity calculation, and the EP or HML, for demonstration, the HML is used for this regression:

$$R_{it} - Rf_t = \alpha_i + \beta_i\left[R_{Mt} - R_{ft}\right] + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + l_i LIQ_{nt} + \varepsilon_{it}$$

The same test statistics as for the previous risk variables are used. The t-test to investigate individual significance, and the AIC and BIC to measure the importance of an additional independent variable. As can be seen in the table below, the three liquidity factors are highly correlated, meaning that they should not have very different results.

Table 4 & 5 – correlation between liquidity factors on NASDAQ and NYSE stock markets

Correlation of the liquidity factors on the NASDAQ stock market

Correlation NASDAQ	LIQ_1	LIQ_2	LIQ_3
LIQ_1	1.0000		
LIQ_2	0.9935	1.0000	
LIQ_3	0.9428	0.9719	1.0000

[7] https://statistics.laerd.com/stata-tutorials/paired-t-test-using-stata.php

Correlation of the liquidity factors on the NYSE stock market

Correlation NYSE	LIQ_1	LIQ_2	LIQ_3
LIQ_1	1.0000		
LIQ_2	-0.6675	1.0000	
LIQ_3	-0.8018	0.5769	1.0000

3.3.4 The ETF market

Unlike the NYSE and NASDAQ sample, the ETF market will be regressed to their own risk factors, as well as being tested against the risk factors obtained on the Fama and French website[8]. The attained portfolio sample from Fama and French is the 5 x 5 portfolio with daily values. The choice to use already established risk factors was made due to a limitation of data in the continuous reweighting of the stocks within the various exchange traded funds. The normal sample period will be tested. All procedures of the stock market will be reproduced into calculating the difference between the ETFs on the NASDAQ and NYSE, except for the portfolio tests. The portfolios that can be created are on the size of the ETFs, to see if the small ETFs have the same abnormal returns as the small firms. Also, the liquidity factors can be reproduced based on the asking and bidding price as well as volume of trades per day. Considering this is not the original assessment, only the total sample will be regressed against the risk factors.

3.4 Confirmation tests

Many papers discuss certain anomalies or other tests that might influence the validity of the paper. These will not be tested on all samples, only on the best performing methods. The exact methods are chosen after the result section, and therefore can differ between portfolio selection, E/P or B/M, and the liquidity variables. It will be tested on both the NASDAQ and NYSE stock and ETF market. Besides the topics discussed below, one reoccurring debate in papers containing smaller companies is the survivorship bias. Where poorly performing large companies can survive a few rough years, smaller companies have a higher chance of filing for bankruptcy, and fall out of the sample. Hence, only the best companies remain in the small cap sample, and the small company portfolio retrieve unjustified higher returns. In my sample, respectively for the NASDAQ and NYSE sample, 0.7% and 0.3% did not report a price on the last day of the sample period. There should be no surprise that it did not influence the results.

[8] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

3.4.1 Stock pricing anomalies

Stock pricing anomalies are reoccurring discrepancies of abnormal returns not explainable by asset pricing methods of which the first was found by Cross (1973), the weekend effect. As I test monthly returns for the stock markets, the Monday effect is not of interest. Quickly regressing a Monday dummy does not provide significant results on the ETF market and will therefore not be disclosed. However, quite quickly after Cross' paper, Rozeff and Kinney (1976) published a paper on January, which constituted of yearly abnormal high returns. A well-established theory is introduced by D'Mello, Ferris, and Hwang (2003), the theory of tax-loss selling states that capital losses are incurred in order to decrease the taxable income. Anomalies caused by behavioural decisions should fade away with the resulting awareness after the publication of these papers as stated by Marquering, Nisser and Valla (2006). As taxable income is not based on behavioural decisions, it is one of the anomalies still prudent to test.

This effect can quite easily be tested with the use of a dummy variable. A dummy variable is binary, or in other words it takes only the value of 0 or 1. By definition it measures the reoccurring patterns whenever the dummy variable takes the value of 1. Therefore creating a January dummy which take the value of 1 for all January months, in subsequent tests, will measure the reoccurring patterns in January. As earlier mentioned, two test statistics can be performed to measure the significance of the anomalies, the t-test in individual significance and AIC/BIC scores for relevance.

3.4.2 Momentum

One of the main pitfalls of the Fama and French models has always been the short term momentum that companies seem to have. Carhart (1997) was the first to notice and raise awareness for a one-year momentum variable as addition on the three-factor model. Fama and French refrained from the risk factor because of an expected high correlation with the addition of another variable and a slope close to zero. It might still be worthwhile to consider this factor as Fama and French provided the same reasoning for a liquidity factor as it is the main topic in this paper.

The construction of the momentum factor is in similar fashion as the previous risk factors. The portfolios are equally weighted based on the absolute lagged returns between t-12 months and t-1 months. Depending on the results, either the monthly or yearly rebalancing will be used to construct the portfolios. The MOM effect will then be calculated by subtracting the

mean return of the firms with the lowest returns from the mean return of the firms with the highest returns. Like with the other risk factors, the importance of the variable is tested with the t-test, and AIC/BIC scores.

3.4.3 Initial public offerings

A wide range of literature has shown the abnormal high returns for IPOs. It started off with a publication of the Securities and Exchange Commission in 1963, who state that an extensive list of securities had a price increase between 33% and 2900% within a very short period after the IPO. A good overview of all studies and possible explanations is provided by Ibbotson and Ritter in 1995. They document that in almost all countries the IPOs provide abnormal results. The dataset for the stock markets does not possess any firms that went public before 2009, therefore only the effect of IPOs will be tested on the ETF market. In order to keep enough observations, the test period will be July 2015 until June 2018, and the sample will be excluded of ETFs that were not on the market before January of 2015.

3.5 Descriptive statistics

In order to get a first grasp on the data we are working with, the mean abnormal return per portfolio can be seen in Appendix A. There seems to be a higher return for small stocks on both markets. Even though there seem to be a few outliers in the small-medium size portfolio for the NASDAQ, it is very reasonable to say that the small firms provide higher average returns. For the other factors, there seems to be little consistency in either NASDAQ or NYSE, especially when keeping in mind the extreme returns a few of the NASDAQ firms gained.

For the ETF markets, both the NASDAQ and NYSE exhibit the same pattern. I refrain from considering the second liquidity factor due to the low amount of observations. In the SMB portfolios combined with the first liquidity factor it seems that small ETFs tend to have a larger negative result than the larger ETFs. However, the combination with the third liquidity factor provides the complete opposite results. Concluding that the tested sample can be quite important, and that the differences are very small.

4. Results

4.1 Regressions

The regression results can be obtained from Appendix D. For the NASDAQ, it is quite remarkable that only two risk factors are consistently statistically significant, the risk factors

for investment and earnings-per-share. Combining the factors causes both to become statistically insignificant. This result can be explained by the correlation table of Appendix B. It is apparent that almost all factors have a very high correlation with the size factor, except for the only two important factors. The high correlation between the EPS and CMA factors also explains why they negate each other when regressed simultaneously on the abnormal return. Also validating the results with the Fama and French factors, kept the statistics insignificant. Drawing conclusions based on these results should be done with a side note, the R-squared is so low and the AIC is so high that it is highly unlikely that the factors provide any reasonable explanation of the abnormal return. First, the case could be made that the EPS explains more deviations than the HML for the NASDAQ, as I hypothesised at the beginning of the paper. This is mainly because of the high correlation between the HML and the SMB, therefore no results can be drawn due to the effect of multicollinearity. Also, the importance of splitting the markets due to their individual characteristics is important. The correlation between the Fama and French factors and the factors based on the NASDAQ market is very low, especially compared to the correlation between the Fama and French factors and the factors of the NYSE market.

The results of the NYSE stock market are quite the opposite. Almost all factors are statistically significant, and all liquidity factors as well as the investment factor are consistently negative. Again, the correlation between the factors is quite important. All factors interact quite heavily and collinearity is most likely of influence on the results. Interestingly is the lower interaction between the Fama and French size and book/market factors and the created other factors. Unfortunately, replacing the size and book/market factors by the Fama and French version does not provide different results.

Even though the promising results of Appendix F, where in the last table, the conservative investment portfolios clearly have on average higher returns. The main result is the fact that the Fama and French factors does not seem to resonate with the current abnormal return. It seems reasonable that investors know about the effects these factors have and act on them accordingly.

In order to choose the ‘best’ fitting regressors for each market I omit combinations with high correlation to abstain from multicollinearity. Therefore I have to choose between the combination of HML and CMA, SMB and EPS or SMB and CMA for the NASDAQ, whereas

HML and EPS cannot be combined due to their theoretical infringement. For SMB and HML both my newly created and the Fama and French versions are tested[9]. Based on the AIC, the combination of SMB and EPS, as well as the FFSMB and EPS was out of question, with the highest AIC of the lot. Although for the other four they all have the same AIC and BIC, the FFSMB and CMA combination is the only one where both factors are positive, and hence 'most important'. The NYSE has a lot of the same correlations between the factors, as well as the same results with the regressions. In order to compare both markets, the FFSMB and CMA is chosen, as well for the fact it has the lowest correlation between them.

Interestingly, for the NASDAQ, the statistical significance completely shifts when regressing on individual portfolios, as can be seen in Appendix F. SMB is 88% of the times statistically significant, as explanation, although unlikely, one could say it is coincidence as it is not 95% of the times. For the NYSE, the significance of the risk factors remain the same. Although one nuance can be made, the CMA is mainly driven by high returns for conservative investors, and negative returns for aggressive investors. Although the main conclusion has to be that once more the R-squared is very low, AIC is very high (both not given), and almost all alphas are significantly different from zero, suggesting that the model does not resonate with the abnormal returns in both markets.

Secondly, the ETF market, first annotation for this market is that I opted to document the daily return instead of a monthly return. This choice is made to have around the same total observation for the ETF market as the stock market. Also, the NASDAQ does not have that many ETFs, especially in the earlier years, which makes daily returns quite important to have a large enough dataset. Although it is not provided in the Appendix, I did test for monthly returns, and it did not change the results significantly.

One thing that stands out in the dataset is the fact that the mean of the abnormal return of the ETFs are negative, both in the entire period as well as after 2015, as can be seen in Appendix C. Even though the excess market return is in both periods negative as well, the return of the ETFs is on average even lower. Almost all risk factors are negative, suggesting that the risk factors are the other way around for the ETF market. However, SMB, and the liquidity factors 1 and 3 have a higher mean than the average return on all ETFs. Therefore, the small

[9] From this point onward, all risk variables with 'FF' in the beginning, are those obtained from Fama and French

and slower selling ETFs have a higher average returns than the larger, faster moving ETFs. except for the extreme cases, meaning the small and slow ETFs, as well as the big and fast selling ETFs.

The regressions of the ETF markets, Appendix E, are one of the highlights of the results of this paper. It seems that the ETF market has some similar patterns compared to the old stock market. Without considering LIQ2 due to the low amount of observations, the other regressions have a lot higher R-squared and statistically significant regressors. As noted in the previous paragraph, the smaller ETFs have on average higher returns than the large ETFs. Different from the previous paragraph is the lack of a reoccurring pattern for liquidity, 5 out of 8 regressors are positive, while 3 of out 8 are negative. This does not change over time.

For completion, the Fama and French risk factors are used to regress on the ETF market. A good sign is the high correlation between the Fama and French SMB and the SMB created on the size of the ETFs. The regressions provide highly significant risk factors, however, there is always a significant portion of the abnormal returns unexplained. It seems that the risk factors resonate with the ETF returns, however in order to get a complete picture of the effects, it would be necessary to collect the accounting variables of all firms inside of the ETF. By doing this, we know how much each ETF is invested in small or large firms, or high or low market-to-book ratio firms.

4.2 Confirmation tests

4.2.1 2x2 sorting

In order to confirm the prognose that the 2x2 sorting method is not necessary for the main research of this paper, I will conduct a few regression as well as looking at the summary statistics for both markets. First of all, the means of the different portfolios is somewhat like the 5x5 sorting method. As we know from the 5x5 sorting method, there is a large portion of small companies with significantly higher returns than the rest of the companies. These companies are now all inside the small firm portfolio. These firms give messy results, in multiple portfolios we see a switch in mean returns for the other portfolio than SMB. For example in the HML-SMB, we see that for the small firms, the low book-to-market firms earn higher rewards, whereas for the bigger firms we see that the high book-to-market firms tend to earn higher rewards. The same patterns occur within the NYSE portfolios. In such a big dataset it is desirable to use a 5x5 sorting method to get a larger difference in portfolio

structures to see a better overflow from small to larger and largest. Also for the regressions there are no surprising results, there are still barely any statistically significant factors for the NASDAQ, and almost all factors are significant for the NYSE, however they are unable to explain the deviations of the abnormal returns. Again, there is a very low R-squared, with a maximum of a 1.37%.

This test is not performed for the ETF market. The lack of extra information the 2x2 sorting method provided for the stock markets is the main reason for prioritizing other tests, as priorities are necessary due to a time limit.

4.2.2 January effect

The January effect exists for 20 years longer than the three-factor model does, most likely it disappeared just like the effect of the risk factors. However, as discussed previously, the January effect is probably caused by the tax structure, which is not a behavioural anomaly and more likely to still exist, therefore it is still of importance to test. In Appendix H it is quite clear from the means that January does not have higher abnormal returns, on average, than the other months. Also regressing a January dummy with various combinations of risk factors provides no evidence for a January effect within the dataset. Although not in the paper, replacing January by February provides only one statistically significant factor out of the six regressions, which suggests that the abnormal positive returns did not move over to February, and is in fact not a relevant factor in the dataset.

In the NASDAQ ETF market we see the same patterns as for the stock market. In the summary statistics it is visible that the average January excess return is lower than the mean in the entire market. In addition, both regressions with the January dummy provide insignificant results. Based on the summary statistics, the NYSE ETF market seems at first glance the same as the NASDAQ ETF market with a lower average excess return in January than the mean of the entire period. However, in the regressions the January dummy has two times a positive significant impact on the return. It is questionable though, that if all deviations are explained by an addition of risk factors, whether the January effect remains. A possible explanation for the higher return is higher density of institutional traders on the NYSE ETF market, however this needs further investigation. The January effect does not change the impact of either SMB or the liquidity factors, and should therefore not be taken into account for the main research.

4.2.3 Momentum

The momentum results are placed in Appendix I. We see the same patterns as for the other portfolios when comparing the means of the portfolios. The small-medium portfolio for the NASDAQ has a few very high returns which deviates the returns from the other portfolios. Putting that portfolio aside, no other remarkable pattern occurs. For the NASDAQ, the momentum factor is not even one time significant, whereas for the NYSE it is significant three out of three times. However, unexpectedly, two of the factors are negative, or in other words, a positive growth in the past year is associated with a decrease in the price the next month. Also, two of the three NYSE regressions do not completely explain the abnormal returns suggesting the lack of explanatory power of the factors. Also, a repeating occurrence for the research of the NYSE stock market is the low R-squared. The highest R-squared for the regressions is 0.0103, meaning that only 1% of the deviations can be explained by the factors, concluding that also the momentum does not add much to the factors in this period of time.

The NASDAQ ETF market has a mean which is significantly different from zero. However, as happened before, the effect of the momentum is not clear to see if we look at the means of the different portfolios. Also, it has no significant impact on the excess return. Interestingly, the R-squared triples. Apparently, the momentum factor has a large impact on the predictability of the other regressors. For the NYSE ETF market there is already a pattern in the means of the portfolios, however the other way as expected, the firms with a lower increase previous to the test period has a higher return, or at least, a lower negative results. Again, the momentum factor show no significant impact on the deviations of the returns in the regressions, and again the R-squared increases heavily. It seems that momentum is still important in this new market.

4.2.4 Initial public offerings

As noted in paragraph 3.4.3 this section will only be interesting for the ETF market. The results in Appendix J are based on a period of July 2015 until June 2018 on firms that went public before 2015. The average excess return decreases compared to the entire period. However, compared to the second table on the ETF market in Appendix C, the change is quite small. The regression results are quite interesting. The R-squared for the NASDAQ market increases, while the R-squared for the NYSE market decreases. Therefore it seems improbable that the initial public offerings resonate with the excess return.

5. Conclusion and discussion

The main conclusion for the NYSE and NASDAQ stock markets is that the risk variables do not seem to be of importance for the expected return of the stocks. Fama and French (1992a, 2015a) concluded in their paper as though the higher returns on, for example, smaller firms was a normative reasoning. However, in a different perspective, a well-balanced portfolio on small firms compared to a well-balanced portfolio on larger firms, and all unsystematic risk is diversified away, then the first should not gain higher returns than the latter. Whether a large loss is compensated with a large gain, or a small loss is compensated with a small gain, should probably not make a difference. Therefore, as noted in 3.4.1, anomalies caused by behavioural decisions should fade away with the resulting awareness after the publication of these papers, just like the risk factors did in the stock market.

The NYSE and NASDAQ ETF market is quite interesting. Although there is experience with the employed risk factors in a different financial market, a new market brings its uncertainties as well as flaws, and irrational decision making. Furthermore if the market is a success, then a few small products, in this case ETFs, will grow exponentially, and vice versa, resulting in noisy data. Surprisingly, the average return of the risk free rate was higher than the market as well as the ETF return. Furthermore, the ETF return was actually the lowest, being lower than the market return. Even though the gain in popularity, the market seems to be for opportunists rather for the rationalist. At first glance, the few factors I was limited to, seem to have an effect on the average returns. Combining these with the momentum factor and half of the deviations were explained by the factors. Although these were the highest numbers of correlation I found, the results are still far lower than the results from the Fama and French paper. Especially with the results from the stock market, I wonder whether the results are more linked to correlation than causation.

There are two straightforward avenues for further research. One is to go back in time and see if the large difference between the NASDAQ and NYSE has influence on the paper of Fama and French, and on all other factors as well on that matter. Second, is to further investigate the interesting new ETF market. Portfolios have been around for quite long, however it is not often that a new market comes around. Off course the cryptocurrency is very new as well, however the crypto market is very volatile and difficult to explain why certain price movements happen. With the ETF market we can also investigate whether certain behavioural decisions are actually dissolved, or that they will reoccur with a new market. It for example would be

interesting to collect the accounting variables of all firms inside the ETFs, in order to test two hypotheses. First of all, it might be interesting to see whether the average of all accounting variables will remain influential, or whether it is diversified away. Although it is a panel dataset, it focuses on the cross-sectional data. Second, with a constant rebalancing ETF, does the risk premium remain constant, or does it shift day by day.

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Appendix

A) Summary Statistics all portfolios

Table 6-19 - Summary statistics of all portfolios for the NASDAQ and NYSE stock markets (means, standard deviation, observations)

		SMB					
		1	2	3	4	5	Total
HML NASDAQ	1	0.019672	0.013628	0.014619	0.007677	.01419225	0.015463
		0.290164	0.149636	0.168402	0.15493	.18724878	0.216993
		10995	8882	5276	2992	1753	29898
	2	0.01295	0.133562	0.009533	0.025983	.01268843	0.045172
		0.202939	9.474101	0.144064	0.759418	.18773305	4.766237
		4732	7434	7759	6376	3255	29556
	3	0.014795	0.01118	0.010637	0.016684	.02473448	0.015786
		0.216992	0.174158	0.183294	0.362036	.8973083	0.46621
		4001	5018	6670	8191	6043	29923
	4	0.010504	0.021843	0.039022	0.018417	.01551664	0.020915
		0.23301	0.686803	2.010821	0.266875	.14274415	0.921691
		3107	3543	5736	7656	10313	30355
	5	0.046883	0.010976	0.007633	0.01506	.01 010304	.01905324
		1.206435	0.211057	0.167638	0.27856	.15613964	0.601614
		6736	4948	4959	5375	7754	29772
	Total	0.023171	0.043646	0.015912	0.017889	.01559216	0.023223
		0.617777	4.737964	0.886069	0.434872	.43227306	2.18826
		29571	29825	30400	30590	29118	149504

		1	2	3	4	5	Total
HML NYSE	1	0.01519	0.0108	0.010357	0.009728	.00596448	0.011728
		0.154482	0.11447	0.114735	0.103732	.10176453	0.12966
		13535	6942	4338	4084	4565	33464
	2	0.023245	0.008851	0.011424	0.007931	.00509882	0.011846
		0.996606	0.105621	0.095854	0.091489	.07680462	0.482182
		7625	8051	6651	5598	5645	33570
	3	0.01283	0.01016	0.00945	0.00654	.00474077	0.008519
		0.138773	0.114386	0.101783	0.084612	.07389379	0.10254
		4323	7876	7880	7046	6601	33726
	4	0.010401	0.010923	0.010067	0.009188	.007485	0.00937
		0.140518	0.110821	0.091079	0.084296	.07028282	0.094216
		3152	5452	8237	8321	8460	33622
	5	0.021256	0.01122	0.010302	0.01086	.00788898	0.01126
		0.236945	0.138151	0.104857	0.080668	.06989674	0.121648
		3983	5107	6770	8979	8757	33596
	Total	0.017038	0.010264	0.010274	0.008939	.00645678	0.010542
		0.503383	0.115796	0.100564	0.087218	.07689896	0.238037
		32618	33428	33876	34028	34028	167978

		1	2	3	4	5	Total
RMW NASDAQ	1	0.027125	0.013469	0.011904	0.016331	0.013082	0.015961
		0.400295	0.210682	0.165461	0.258886	0.141627	0.238335
		4414	3071	3583	5905	10172	27145
	2	0.020024	0.022293	0.01099	0.026649	0.022369	0.021027
		0.233399	0.574402	0.138201	0.745372	0.732721	0.604337
		2655	4924	6248	8327	9184	31338
	3	0.032348	0.011642	0.032679	0.018058	0.011738	0.02137
		1.029304	0.141794	1.764386	0.259479	0.132209	0.961505
		4800	6581	7443	7566	4961	31351
	4	0.014612	0.131528	0.008944	0.010066	0.014705	0.041764
		0.209422	9.453906	0.187565	0.149939	0.224077	4.730581
		7237	7466	6935	5107	3111	29856
	5	0.023691	0.011903	0.010847	0.01092	0.006818	0.015403
		0.693877	0.207165	0.194974	0.193668	0.193255	0.441154
		10428	7752	6191	3696	1690	29757
	Total	0.023057	0.0437	0.015912	0.017867	0.015592	0.023202
		0.617872	4.740425	0.886069	0.434814	0.432273	2.188661
		29534	29794	30400	30601	29118	149447

		SMB					
		1	2	3	4	5	Total
RMW NYSE	1	0.021137 0.194279 4132	0.015566 0.120586 4820	0.012498 0.102106 6202	0.010725 0.084251 8505	0.00826 0.068323 8946	0.012421 0.109832 32605
	2	0.016255 0.127533 3812	0.013533 0.101345 6276	0.012325 0.089785 7691	0.010266 0.082339 8580	0.007994 0.074548 9167	0.011345 0.091553 35526
	3	0.013753 0.112913 4962	0.011475 0.100596 7515	0.01015 0.091974 7834	0.008937 0.083771 7012	0.00566 0.073974 8178	0.00966 0.091888 35501
	4	0.011838 0.114927 7892	0.006879 0.100808 7820	0.007514 0.095506 6818	0.007664 0.090158 6385	0.003198 0.084299 5415	0.007711 0.099003 34330
	5	0.020651 0.817181 11800	0.006145 0.150293 6985	0.00844 0.128027 5331	0.003743 0.10499 3546	0.004106 0.103422 2289	0.011828 0.522912 29951
	Total	0.017015 0.50354 32598	0.010262 0.115815 33416	0.010274 0.100564 33876	0.008939 0.087218 34028	0.006477 0.076802 33995	0.010541 0.238075 167913

		1	2	3	4	5	Total
CMA NASDAQ	1	0.013124 0.364329 9317	0.146121 10.4392 6085	0.007309 0.168597 4749	0.021351 0.583522 2922	0.010182 0.173087 2164	0.044797 5.135389 25237
	2	0.011434 0.190271 5123	0.011381 0.157271 5091	0.011282 0.138399 5225	0.01499 0.290287 5068	0.013454 0.17639 4934	0.012492 0.197459 25441
	3	0.013056 0.184414 3258	0.012328 0.157872 4962	0.011621 0.152736 5265	0.011279 0.141894 6337	0.012157 0.141377 6231	0.01198 0.152932 26053
	4	0.018529 0.222135 3122	0.025469 0.988705 4396	0.009891 0.14449 4872	0.011458 0.147955 6132	0.014131 0.149766 6900	0.015174 0.436416 25422
	5	0.013687 0.28351 4062	0.010292 0.201219 4587	0.00971 0.222199 5289	0.01239 0.151401 5200	0.009509 0.148479 4483	0.011059 0.204855 23621
	Total	0.013537 0.284458 24882	0.046472 5.156113 25121	0.010015 0.168444 25400	0.013427 0.26507 25659	0.012314 0.155359 24712	0.019141 2.313177 125774

		1	2	3	4	5	Total
CMA NYSE	1	0.013835 0.186177 7778	0.008275 0.132866 5767	0.008418 0.118074 5010	0.004833 0.097146 4292	0.005614 0.093596 4153	0.008947 0.138562 27000
	2	0.015598 0.170435 4508	0.008846 0.107443 4530	0.007259 0.087734 5823	0.00795 0.084539 5979	0.005551 0.071842 6839	0.008604 0.105203 27679
	3	0.010234 0.12583 3838	0.007889 0.098555 4865	0.007839 0.09084 5510	0.008379 0.076691 6647	0.005373 0.06924 7326	0.00766 0.089888 28186
	4	0.013838 0.149779 4004	0.007147 0.109167 5276	0.009298 0.096275 6003	0.006159 0.082865 6258	0.006207 0.070945 6457	0.008128 0.100708 27998
	5	0.025322 1.148128 5747	0.008627 0.127836 6503	0.007673 0.116406 5407	0.004293 0.099603 4906	0.003411 0.086644 3326	0.010642 0.549932 25889
	Total	0.01616 0.560414 25875	0.008166 0.117264 26941	0.008105 0.102048 27753	0.006537 0.087299 28082	0.005412 0.076455 28101	0.008766 0.258891 136752

		SMB					
		1	2	3	4	5	Total
	1	0.022684	0.008125	0.006741	0.009309	0.006512	0.01278
		0.96082	0.2095	0.219502	0.16489	0.243476	0.582443
		9737	7129	5806	4028	2265	28965
	2	0.024356	0.139449	0.011236	0.010397	0.013025	0.046443
		0.408849	9.996736	0.175208	0.162024	0.1585	4.93989
		8243	6636	6119	4132	2117	27247
EPS	3	0.020681	0.030178	0.037296	0.016916	0.011147	0.024866
NASDAQ		0.208704	0.931789	1.879547	0.28391	0.135576	1.014159
		6864	6744	6556	5660	3177	29001
	4	0.02622	0.01206	0.012733	0.024119	0.015638	0.017545
		0.267395	0.141169	0.145126	0.580698	0.141223	0.33411
		2773	6130	7106	8703	7055	31767
	5	0.019561	0.012865	0.008223	0.019713	0.018373	0.016756
		0.435542	0.136512	0.136426	0.521547	0.590516	0.491193
		1688	3002	4704	7992	14494	31880
	Total	0.02284	0.043837	0.015898	0.017816	0.01561	0.023165
		0.617754	4.752627	0.887637	0.435339	0.432341	2.192818
		29305	29641	30291	30515	29108	148860

		1	2	3	4	5	Total
	1	0.019978	0.006169	0.004711	0.001018	-0.00112	0.009743
		0.868365	0.147711	0.141476	0.121342	0.125787	0.540532
		10392	6471	5097	3592	2417	27969
	2	0.016307	0.011757	0.009693	0.007402	0.003499	0.011188
		0.126414	0.11169	0.103309	0.090574	0.086271	0.109622
		8974	7559	6564	4233	3174	30504
EPS	3	0.014822	0.010607	0.010909	0.009506	0.00703	0.010511
NYSE		0.109852	0.098036	0.0854	0.082038	0.0763	0.090739
		5192	7761	7086	7562	5265	32866
	4	0.017677	0.011752	0.011916	0.011028	0.007836	0.011223
		0.166514	0.100598	0.085448	0.078176	0.067506	0.094125
		3392	5567	8024	8040	8511	33534
	5	0.016628	0.013345	0.012049	0.010889	0.007722	0.010343
		0.189942	0.105206	0.086849	0.077012	0.067714	0.087608
		1671	3337	5621	9496	13472	33597
	Total	0.01751	0.01046	0.010135	0.00908	0.006582	0.010621
		0.526022	0.114649	0.100151	0.086131	0.076712	0.243081
		29621	30695	32392	32923	32839	158470

		1	2	3	4	5	Total
	1	0.016529	0.008863	0.002945	0.009731	0.007432	0.011685
		0.416477	0.175125	0.148472	0.132648	0.132194	0.307428
		15034	10432	3916	1723	1364	32469
	2	0.022255	0.13062	0.007831	0.01521	0.010726	0.041203
		0.39475	9.305831	0.151647	0.181392	0.155611	4.488451
		7014	7723	7724	6633	4183	33277
LIQ_1	3	0.020437	0.01826	0.013164	0.019639	0.022312	0.018461
NASDAQ		0.261982	0.17391	0.194418	0.581675	0.858831	0.508587
		3972	5850	7964	8486	6628	32900
	4	0.00793	0.017022	0.030243	0.019728	0.014237	0.019487
		0.172577	0.173566	1.539367	0.471745	0.149703	0.787923
		1806	4556	9826	11833	14559	42580
	5	0.019558	0.002865	0.00776	0.015477	0.018404	0.014808
		0.270886	0.175075	0.142945	0.132292	0.206581	0.180759
		374	416	920	1763	2363	5836
	Total	0.017993	0.044408	0.015854	0.017907	0.015591	0.022263
		0.37918	4.806581	0.886835	0.435911	0.432425	2.195094
		28200	28977	30350	30438	29097	147062

		SMB					
		1	2	3	4	5	Total
	1	0.016581	0.012098	0.00886	0.011191	0.006811	0.010173
		0.130968	0.104112	0.093267	0.079338	0.065118	0.090529
		2390	3040	3979	4144	5997	19550
	2	0.017171	0.010547	0.009068	0.007014	0.006905	0.009251
		0.174144	0.103385	0.091004	0.079686	0.067315	0.099187
		2186	3837	4119	4414	4972	19528
LIQ_1	3	0.010463	0.013817	0.012507	0.008973	0.007176	0.010569
NYSE		0.120666	0.107618	0.100527	0.085389	0.077765	0.098068
		2944	4103	4158	3943	4356	19504
	4	0.010254	0.009889	0.009997	0.009453	0.0063	0.009347
		0.145938	0.109218	0.099276	0.086018	0.075263	0.108275
		4297	4137	4034	3754	3006	19228
	5	0.030361	0.01009	0.010864	0.010129	0.007086	0.015082
		1.209843	0.117613	0.100693	0.091498	0.078163	0.629152
		5163	3984	3452	3389	3458	19446
	Total	0.018185	0.011258	0.010254	0.009292	0.006879	0.010886
		0.67772	0.108759	0.096934	0.084126	0.071835	0.294984
		16980	19101	19742	19644	21789	97256

		1	2	3	4	5	Total
	1	0.02436	0.258806	0.05591	0.019875	0.034276	0.074523
		0.265242	13.21179	2.434568	0.310777	1.135253	5.802162
		4793	3831	3910	4397	3789	20720
	2	0.011151	0.014806	0.008996	0.013947	0.015068	0.013004
		0.229048	0.184191	0.152486	0.159044	0.161855	0.175223
		3083	3526	3926	4838	5107	20480
LIQ_2	3	0.028605	0.009956	0.013033	0.011868	0.01184	0.012716
NASDAQ		0.560228	0.175118	0.157124	0.133926	0.109023	0.179883
		1030	1854	3715	5976	8404	20979
	4	0.014023	0.01018	0.00964	0.010449	0.003638	0.009619
		0.189409	0.159192	0.151418	0.156043	0.1305	0.156572
		2475	4428	5878	4653	2904	20338
	5	0.007592	0.008494	0.004721	0.009755	0.015003	0.007687
		0.190314	0.145353	0.157249	0.127511	0.12456	0.16479
		8081	6046	3894	2038	440	20499
	Total	0.014215	0.058856	0.017699	0.013437	0.01567	0.023593
		0.248761	5.830438	1.051845	0.191213	0.500628	2.60663
		19462	19685	21323	21902	20644	103016

		1	2	3	4	5	Total
	1	0.030008	0.013312	0.012831	0.011612	0.011289	0.019398
		1.010995	0.130817	0.124442	0.110485	0.094353	0.637708
		7506	4779	3625	2292	1097	19299
	2	0.010354	0.01111	0.011279	0.008687	0.008058	0.010132
		0.115438	0.104579	0.094027	0.083501	0.088693	0.100324
		4778	5024	3775	2830	2993	19400
LIQ_2	3	0.011822	0.010512	0.007332	0.008981	0.004073	0.007467
NYSE		0.09649	0.088303	0.081653	0.077151	0.068499	0.079414
		2228	3274	3271	3484	7218	19475
	4	0.003994	0.007785	0.009758	0.010245	0.007458	0.00846
		0.127561	0.095217	0.080705	0.074294	0.062057	0.079165
		1115	2825	3748	4925	6756	19369
	5	0.005002	0.012238	0.009918	0.008178	0.009019	0.009291
		0.136981	0.108699	0.096675	0.083924	0.071727	0.093552
		1108	3125	5323	6090	3725	19371
	Total	0.018586	0.011252	0.010254	0.009314	0.006879	0.01094
		0.682556	0.108698	0.096934	0.084023	0.071835	0.295434
		16735	19027	19742	19621	21789	96914

		SMB					
		1	2	3	4	5	Total
	1	0.019607	0.222315	0.014414	0.01085	0.012676	0.054738
		0.476924	12.96756	0.168504	0.148641	0.145444	5.718289
		4123	3943	3969	4160	4120	20315
	2	0.014289	0.010751	0.012492	0.013893	0.011486	0.012608
		0.226697	0.180734	0.168514	0.142987	0.146123	0.176337
		4190	4119	4087	4114	3755	20265
LIQ_3	3	0.014412	0.02745	0.007885	0.011706	0.01261	0.014573
NASDAQ		0.219051	1.053439	0.147468	0.154412	0.142427	0.483674
		3820	3883	4330	4432	3933	20398
	4	0.014487	0.011316	0.013476	0.013646	0.013897	0.013358
		0.208927	0.160088	0.21671	0.177657	0.138527	0.183035
		3946	4001	4045	4049	3845	19886
	5	0.00807	0.020862	0.046704	0.017477	0.012559	0.020959
		0.221605	0.64735	2.419098	0.296356	0.140155	1.121688
		4089	3843	3952	4275	4022	20181
	Total	0.014177	0.05826	0.018716	0.013511	0.01265	0.02329
		0.291134	5.815216	1.076918	0.193193	0.142555	2.624004
		20168	19789	20383	21030	19675	101045

		1	2	3	4	5	Total
	1	0.010376	0.009359	0.009524	0.007011	0.008474	0.009035
		0.140831	0.126525	0.105276	0.094927	0.07067	0.110471
		9250	4216	3458	5086	9223	31233
	2	0.014622	0.008895	0.00912	0.00887	0.006782	0.009437
		0.15722	0.108724	0.094383	0.076688	0.064287	0.102499
		4564	7402	7391	6551	5116	31024
LIQ_3	3	0.0147	0.011191	0.010403	0.008226	0.004839	0.009806
NYSE		0.157701	0.115533	0.09156	0.077429	0.06733	0.099729
		2630	7387	9756	7974	3283	31030
	4	0.040463	0.010531	0.011261	0.008744	0.005872	0.013835
		1.3179	0.109994	0.097697	0.088713	0.074986	0.501944
		4368	7677	7605	6876	4568	31094
	5	0.012576	0.008136	0.009416	0.010577	0.006984	0.009707
		0.154743	0.121053	0.139035	0.101388	0.091154	0.124649
		9856	4357	3019	4759	9068	31059
	Total	0.016371	0.009803	0.010115	0.008635	0.007003	0.010364
		0.516639	0.114974	0.100731	0.08676	0.076544	0.24503
		30668	31039	31229	31246	31258	155440

Table 20-25 - Summary statistics of all portfolios for the NASDAQ and NYSE ETF markets (means, standard deviation, observations)

		SMB					
		1	2	3	4	5	Total
	1	-0.00048	-0.00053	-0.00051	-0.00108	-0.00034	-0.00056
		0.002217	0.002264	0.00218	0.00253	0.002454	0.002275
		26867	17221	13564	7560	2608	67820
	2	-0.00062	-0.00059	-0.00064	-0.00024	-0.00059	-0.00056
		0.002243	0.002248	0.002269	0.002152	0.002348	0.002253
		16704	19823	17212	10175	7562	71476
LIQ_1	3	-0.00084	-0.00029	-0.00056	-0.0007	-0.00024	-0.00051
NASDAQ		0.002323	0.002145	0.002416	0.002359	0.002261	0.00232
		9123	14087	19049	12514	10960	65733
	4	-0.00082	-0.00092	-0.00047	-0.00059	-0.0008	-0.00069
		0.002329	0.002418	0.002114	0.002198	0.002273	0.002254
		6785	9649	11476	23224	16957	68091
	5	-0.00066	-0.00077	-0.00069	-0.0003	-0.00056	-0.00052
		0.002754	0.002247	0.002383	0.002127	0.002196	0.002221
		1304	3648	3650	11477	25821	45900
	Total	-0.00061	-0.00057	-0.00056	-0.00056	-0.00056	-0.00057
		0.00227	0.002265	0.002276	0.002265	0.002264	0.002268
		60783	64428	64951	64950	63908	319020

		1	2	3	4	5	Total
	1	-0.00012	-0.00025	-0.00048	-0.00061	-0.00259	-0.00045
		0.002062	0.002136	0.002376	0.002353	0.002067	0.002263
		93713	71499	51650	34427	17685	268974
	2	-0.0005	-0.00032	-0.00033	-0.00035	-0.00104	-0.00043
		0.002287	0.002243	0.002225	0.002369	0.002535	0.002313
		66517	67320	71232	64703	26330	296102
LIQ_1	3	-0.00083	-0.00059	-0.0005	-0.00054	-0.00039	-0.00057
NYSE		0.002295	0.002277	0.002275	0.002269	0.002281	0.002283
		52167	61823	65224	62880	44883	286977
	4	-0.00145	-0.0008	-0.00057	-0.00048	-0.00015	-0.00051
		0.002568	0.002404	0.002223	0.002182	0.002235	0.002304
		19803	40421	47490	61317	82498	251529
	5	-0.00123	-0.00093	-0.00078	-0.00056	-0.00028	-0.00054
		0.002503	0.002396	0.002266	0.002173	0.002001	0.002174
		11727	19813	25280	37809	89479	184108
	Total	-0.00054	-0.00049	-0.00049	-0.00049	-0.00049	-0.0005
		0.00228	0.002272	0.002275	0.002274	0.002274	0.002275
		243927	260876	260876	261136	260875	1287690

		1	2	3	4	5	Total
	1	0.00033	0.00041	0.00051	0.000352	0.000643	0.000429
		0.00175	0.001912	0.001749	0.002124	0.001993	0.001876
		62	49	54	46	29	240
	2	0.000156	0.000206	0.000764	0.000602	0.000138	0.000408
		0.001713	0.001755	0.001982	0.00195	0.001854	0.001871
		36	47	59	50	45	237
LIQ_2	3	0.00069	0.000884	0.000473	0.000433	0.000112	0.000458
NASDAQ		0.001957	0.001955	0.001997	0.001906	0.001663	0.001878
		25	42	51	51	67	236
	4	0.000657	0.000526	8.63E-05	0.000195	0.000751	0.000422
		0.001992	0.002091	0.001807	0.001697	0.001854	0.001873
		24	45	49	58	59	235
	5	0.000625	0.0001	9.53E-05	0.000479	0.000722	0.000415
		0.002091	0.001622	0.001781	0.001679	0.002035	0.001864
		61	52	36	44	40	233
	Total	0.000467	0.000408	0.000419	0.000405	0.00044	0.000426
		0.001895	0.001869	0.001877	0.001864	0.001861	0.001869
		208	235	249	249	240	1181

		SMB					
		1	2	3	4	5	Total
LIQ_2 NYSE	1	0.000516 0.001865 217	0.000732 0.001886 218	0.000701 0.002013 180	0.000531 0.002017 148	0.000516 0.002022 173	0.000604 0.001951 936
	2	0.000258 0.001981 138	0.000482 0.001889 191	0.000912 0.001985 225	0.000762 0.00199 202	0.000349 0.001818 181	0.000587 0.001947 937
	3	0.000735 0.001952 113	0.000842 0.002059 157	0.000451 0.001953 167	0.000612 0.001988 244	0.00053 0.001843 249	0.000615 0.001952 930
	4	0.000741 0.002068 131	0.000543 0.002038 191	0.00065 0.001997 206	0.000501 0.001817 199	0.000596 0.001862 205	0.000597 0.001947 932
	5	0.000614 0.001991 232	0.000414 0.001886 199	0.000377 0.001713 172	0.000588 0.001903 164	0.001064 0.002172 162	0.000601 0.001948 929
	Total	0.000566 0.001966 831	0.000596 0.001949 956	0.000637 0.001947 950	0.000604 0.001942 957	0.000597 0.001943 970	0.000601 0.001948 4664

		1	2	3	4	5	Total
LIQ_3 NASDAQ	1	0.000665 0.002195 2871	0.000155 0.001931 3650	-0.00039 0.002189 5216	-0.00081 0.002342 13042	-0.00061 0.002243 38871	-0.00053 0.002265 63650
	2	-0.00017 0.002539 3915	-0.00024 0.002375 7307	-0.00055 0.002208 10958	-0.00055 0.002231 23999	-0.00075 0.002184 16165	-0.00054 0.002259 62344
	3	-2.8E-05 0.002317 4958	-0.00048 0.002207 11217	-0.00065 0.002322 21908	-0.00051 0.002184 20087	-0.00092 0.002363 4435	-0.00054 0.002268 62605
	4	-0.00075 0.002214 12260	-0.00061 0.002278 21392	-0.00061 0.002255 21127	-0.00051 0.002374 5996	0.000806 0.002077 2088	-0.00058 0.002276 62863
	5	-0.0006 0.002162 32350	-0.00068 0.002255 19561	-0.00024 0.002349 5742	0.000273 0.002416 1826	0.001008 0.002105 2349	-0.00051 0.002244 61828
	Total	-0.00049 0.002243 56354	-0.00052 0.002262 63127	-0.00056 0.002276 64951	-0.00056 0.002265 64950	-0.00056 0.002264 63908	-0.00054 0.002263 313290

		1	2	3	4	5	Total
LIQ_3 NYSE	1	0.000857 0.002217 13834	0.000389 0.002231 11747	-0.00049 0.002254 22169	-0.00072 0.002258 48253	-0.00057 0.002244 156791	-0.00047 0.002278 252794
	2	0.000386 0.002335 8085	-0.00032 0.002452 27403	-0.00043 0.002281 55576	-0.00045 0.002229 89479	-0.00071 0.002235 70946	-0.00048 0.00228 251489
	3	-0.00074 0.002324 21382	-0.00042 0.00227 54527	-0.00042 0.002256 85571	-0.00049 0.002293 79052	-0.00059 0.002268 13302	-0.00048 0.002279 253834
	4	-0.00046 0.002251 50618	-0.00059 0.002262 90510	-0.00058 0.002298 73563	-0.00031 0.002297 35485	0.001008 0.002105 4698	-0.00049 0.002284 254874
	5	-0.0006 0.002244 140355	-0.00061 0.002209 75381	-0.00056 0.002253 24518	-0.00031 0.002535 8345	0.001008 0.002105 15138	-0.0005 0.002268 263737
	Total	-0.00046 0.002286 234274	-0.00049 0.002279 259568	-0.00049 0.002274 261397	-0.00049 0.002277 260614	-0.00049 0.002274 260875	-0.00048 0.002278 1276728

B) Correlation between all factors for each market

Table 26 - Correlation between all risk variables on the NASDAQ stock market

NASDAQ stock	SMB	HML	RMW	CMA	EPS	LIQ_1	LIQ_2	LIQ_3	FFSMB	FFHML
SMB	1									
HML	0.9789	1								
RMW	0.9927	0.9771	1							
CMA	0.1221	0.1185	0.1013	1						
EPS	0.1276	0.12	0.1076	0.9996	1					
LIQ_1	0.995	0.9844	0.9896	0.1175	0.1216	1				
LIQ_2	0.9927	0.9883	0.9906	0.1198	0.1238	0.996	1			
LIQ_3	0.986	0.9903	0.9853	0.125	0.1279	0.9902	0.9911	1		
FFSMB*	-0.115	-0.1	-0.0763	-0.1248	-0.1223	-0.1252	-0.1156	-0.0992	1	
FFHML*	0.1511	0.213	0.1492	0.0092	0.0012	0.1577	0.1621	0.1797	0.2739	1

* FFHML and FFSMB are the Fama and French factor on their website.

Table 27 - Correlation between all risk variables on the NYSE stock market

NYSE stock	SMB	HML	RMW	CMA	EPS	LIQ_1	LIQ_2	LIQ_3	FFSMB	FFHML
SMB	1									
HML	0.636	1								
RMW	0.72	0.7412	1							
CMA	-0.4098	-0.324	-0.3757	1						
EPS	0.7163	0.7281	0.9114	-0.2884	1					
LIQ_1	-0.6554	-0.8175	-0.7384	0.6372	-0.7464	1				
LIQ_2	0.7938	0.8092	0.8366	-0.5585	0.8314	-0.9353	1			
LIQ_3	-0.6362	-0.6259	-0.5391	0.6137	-0.4895	0.7213	-0.7053	1		
FFSMB*	0.6771	0.1976	0.3268	-0.1209	0.4042	-0.1946	0.3201	-0.3831	1	
FFHML*	0.2824	0.4188	0.1521	0.2795	0.1874	-0.099	0.122	-0.1554	0.2729	1

* FFHML and FFSMB are the Fama and French factor on their website.

Table 28 - Correlation between all risk variables on the NASDAQ ETF market

NASDAQ ETF	y	beta	SMB	LIQ_1	LIQ_2	LIQ_3
y	1					
beta	0.4183	1				
SMB	0.1853	0.0516	1			
LIQ_1	-0.2451	-0.4705	-0.3772	1		
LIQ_2	0.0239	0.0997	0.3135	-0.467	1	
LIQ_3	0.2386	0.6148	0.283	-0.7305	0.4992	1

Table 29 Correlation between all risk variables on the NYSE ETF market

NYSE ETF	y	beta	SMB	LIQ_1	LIQ_2	LIQ_3
y	1					
beta	0.2844	1				
SMB	0.245	0.2786	1			
LIQ_1	-0.0855	-0.7114	0.4618	1		
LIQ_2	-0.1344	-0.6497	-0.0036	0.5782	1	
LIQ_3	-0.0571	-0.0172	-0.137	-0.1323	-0.4603	1

C) One-sample t-test on average monthly returns NYSE and NASDAQ

Table 30 & 31 - Summary statistics and t-values on respectively NASDAQ and NYSE stock market

NASDAQ	Obs	Mean	Std. Dev.	Min	Max	t-statistic
y	179,204	0.060503	16.6541	-1.00117	6998.998	1.5379
beta	179,204	-0.00183	0.009658	-0.03874	0.029917	-80.2491***
SMB	180,311	0.017043	0.13361	-0.12129	1.261291	54.1659***
HML	180,311	0.009896	0.13911	-0.41751	1.280478	30.2081***
CMA	149,619	0.133167	0.980853	-0.04669	8.07712	52.5153***
RMW	180,311	-0.00912	0.117265	-1.10338	0.14927	-33.0124***
EPS	180,311	0.103467	0.847512	-0.12908	7.641727	51.8403***
LIQ_1	180,311	0.009927	0.132569	-0.37964	1.229217	31.7955***
LIQ_2	180,311	0.039624	0.203834	-0.04091	1.89002	82.5448***
LIQ_3	165,943	0.013028	0.172491	-0.52231	1.54132	30.7661***

NYSE	Obs	Mean	Std. Dev.	Min	Max	t-statistic
y	172,797	0.009706	0.235255	-0.9983	86.3595	17.1497***
beta	172,797	-0.00173	0.009196	-0.03239	0.026786	-77.9786***
SMB	173,525	0.005868	0.023459	-0.04861	0.129997	104.192***
HML	173,525	0.001477	0.018404	-0.02622	0.116507	33.4319***
CMA	143,356	-0.0005	0.01795	-0.11303	0.027252	-10.4754***
RMW	173,525	0.002058	0.020584	-0.10449	0.042218	41.6561***
EPS	173,525	1.31E-05	0.026479	-0.07017	0.129394	0.2063
LIQ_1	173,525	-0.00253	0.024623	-0.20811	0.027856	-42.8041***
LIQ_2	173,525	0.006089	0.025929	-0.04223	0.210779	97.8188***
LIQ_3	159,477	-0.00252	0.015701	-0.11052	0.024648	-64.1128***

Table 32 & 33 - Summary statistics and t-values on NASDAQ and NYSE ETF market

NASDAQ ETF	Obs	Mean	Std. Dev.	Min	Max	t-statistic
y	338,148	-0.00057	0.020226	-0.4997	8.996959	-16.3118***
beta	338,148	-0.00032	0.010218	-0.06905	0.052891	-18.4572***
SMB	601,088	1.33E-05	0.003805	-0.02235	0.101394	2.716***
LIQ_1	601,088	-0.00017	0.003555	-0.10913	0.013622	-36.9566***
LIQ_2	2,304	-0.00349	0.001722	-0.00696	-0.00148	-97.4113***
LIQ_3	601,088	3.32E-05	0.00373	-0.10107	0.01887	6.8958***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

NYSE ETF	Obs	Mean	Std. Dev.	Min	Max	t-statistic
y	1,321,935	-0.00052	0.016564	-0.9521	3.899781	-36.078***
beta	1,321,935	-0.00057	0.009388	-0.07056	0.05245	-70.0255***
SMB	2,211,816	2.03E-05	0.002224	-0.01719	0.012046	13.5468***
LIQ_1	2,211,816	-0.0002	0.00298	-0.01962	0.019146	-1.00E+02***
LIQ_2	8,478	-0.00227	0.001708	-0.00527	-0.00049	-1.20E+02***
LIQ_3	2,211,816	2.04E-05	0.003063	-0.02087	0.023499	9.907***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 34 & 35 - Summary statistics and t-values on NASDAQ and NYSE ETF market, after 2015:

NASDAQ ETF	Obs	Mean	Std. Dev.	Min	Max	t-statistic
y	138,731	-0.00162	0.026805	-0.18529	8.996959	-16.3118***
beta	138,731	-0.00147	0.009081	-0.04253	0.028089	-18.4572***
day avg. ret.	166,656	0.000526	0.007307	-0.042	0.033503	34.6143***
month avg. y	166,656	-0.00152	0.00206	-0.00607	0.003273	-84.1451***
SMB	166,656	0.000188	0.005061	-0.01469	0.101394	2.716***
LIQ_1	166,656	-0.00017	0.004755	-0.10913	0.009341	-36.9566***
LIQ_2	512	-0.00248	0.000516	-0.003	-0.00197	-97.4113***
LIQ_3	166,656	-0.00018	0.00506	-0.10107	0.0132	6.8958***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

NYSE ETF	Obs	Mean	Std. Dev.	Min	Max	t-statistic
Y	502,442	-0.00163	0.015652	-0.9521	3.899781	-36.078***
beta	502,442	-0.00177	0.007575	-0.04367	0.024421	-70.0255***
day avg. ret.	613,242	0.000486	0.007728	-0.04407	0.025673	58.1109***
month avg. Y	613,242	-0.00152	0.00206	-0.00607	0.003273	-1.60E+02***
SMB	613,242	7.17E-05	0.002175	-0.01135	0.01193	13.5468***
LIQ_1	613,242	7.74E-05	0.001882	-0.00799	0.013837	-1.00E+02***
LIQ_2	1,884	-0.00168	0.001193	-0.00287	-0.00049	-1.20E+02***
LIQ_3	613,242	-2.1E-05	0.002584	-0.01026	0.013344	9.907***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

D) Paired t-test

Table 36 - Paired t-test for EPS and HML on the NASDAQ stock market

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	t-statistic
EPS	180,311	0.103467	0.001996	0.847512	0.099555	0.107379	
HML	180,311	0.009896	0.000328	0.13911	0.009254	0.010538	
diff	180,311	0.093571	0.001986	0.843235	0.089679	0.097463	47.1198***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 37 - Paired t-test for EPS and HML on the NASDAQ stock market

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	t-statistic
EPS	173,525	1.31E-05	6.36E-05	0.026479	-0.00011	0.000138	
HML	173,525	0.001477	4.42E-05	0.018404	0.001391	0.001564	
diff	173,525	-0.00146	4.47E-05	0.0186	-0.00155	-0.00138	-32.787***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

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E) Regressions

Table 38 - Values of the regressions on NASDAQ stock monthly returns and yearly rebalancing portfolios

M.	Beta	SMB	HML	RMW	CMA	EPS	LIQ1	LIQ2	LIQ3	a
1	0.19012	0.29387								0.05583
2	0.09361		0.25969							0.05809
3	0.08704			0.29881						0.05793
4	-0.02055				0.39393					0.01224
5	0.65605					0.41556				0.01871
6	0.17527						0.26419			0.05819
7	0.12217							0.18111		0.05354
8	-0.64256								0.22320	0.05940
9	0.17863	0.24261	0.05630							0.05613
10	0.30132	0.67919		-0.45180						0.05358
11	-0.05069	-0.03213			0.39450					0.01272
12	0.61898	-0.05127				0.41662				0.01940
13	0.18275	0.37193					-0.08459			0.05533
14	0.18557	0.26406						0.02111		0.05550
15	-0.65657	0.23379							0.05293	0.05738
16	0.29543	0.63600	0.11143	-0.52029						0.05383
17	-0.01309	-0.16700	0.13676		0.39453					0.01295
18	0.06515	0.44074	0.38284				-0.53680			0.05464
19	0.17412	0.21308	0.05622					0.02096		0.05579
20	-0.70641	0.25263	-0.50750						0.45729	0.05727
21	0.27866	-1.22114	-0.00776	1.37097	0.39813					0.01519
22	0.18173	1.10169	0.61347	-0.75281			-0.78480			0.05062
23	0.29413	0.57265	0.11928	-0.59720				0.08639		0.05211
24	-0.79573	1.23598	-0.70946	-1.18670					0.66403	0.05352
25	0.30937	-0.92515	0.09225	1.38775	0.39795		-0.42355			0.01478
26	0.34568	-1.06565	0.13589	1.47554	0.39835			-0.26373		0.01766
27	0.33510	-1.15180	0.22929	1.49545	0.39878				-0.34690	0.01554
28	0.56647	-0.23492		0.21496		0.41700				0.02044
29	0.05143	-0.04661			0.01165	0.40486				0.01367
30	0.61701	-0.03052				0.41661	-0.02247			0.01927
31	0.60079	-0.17124				0.41673		0.08491		0.01804
32	0.29836	-0.01745				0.41683			-0.02444	0.01698
33	0.31224	-1.15576		1.27856	0.19625	0.21323				0.01554
34	0.56319	-0.21013		0.21780		0.41699	-0.02948			0.02028
35	0.56577	-0.28218		0.15858		0.41699		0.06754		0.01908
36	0.32517	-0.36334		0.41991		0.41780			-0.04084	0.01820
37	0.30896	-1.03760		1.32379	0.24835	0.15816	-0.16112			0.01526
38	0.31552	-1.12122		1.31948	0.22261	0.18545		-0.04703		0.01591
39	0.30645	-1.13035		1.34929	0.25223	0.15428			-0.07166	0.01547

Table 39 - T-statistic of the regressions on NASDAQ stock monthly returns and yearly rebalancing portfolios

M.	Beta	SMB	HML	RMW	CMA	EPS	LIQ1	LIQ2	LIQ3	GRS	AIC	R-squared
1	0.05	1.00								1.39	1516641	0.00E+00
2	0.02		0.92							1.45	1516642	0.00E+00
3	0.02			0.89						1.44	1516642	0.00E+00
4	0.00				8.15***					0.25	1285873	4.00E-04
5	0.16					8.95***				0.46	1516562	4.00E-04
6	0.04						0.89			1.45	1516642	0.00E+00
7	0.03							0.94		1.32	1516642	0.00E+00
8	-0.13								0.90	1.37	1409674	0.00E+00
9	0.04	0.40	0.10							1.39	1516643	0.00E+00
10	0.07	0.58		-0.32						1.31	1516643	0.00E+00
11	-0.01	-0.10			8.10***					0.26	1285875	4.00E-04
12	0.15	-0.17				8.90***				0.48	1516564	4.00E-04
13	0.04	0.46					-0.10			1.36	1516643	0.00E+00
14	0.05	0.34						0.04		1.35	1516643	0.00E+00
15	-0.13	0.30							0.08	1.31	1409676	0.00E+00
16	0.07	0.51	0.19	-0.36						1.32	1516643	0.00E+00
17	0.00	-0.10	0.08		8.10***					0.27	1285877	4.00E-04
18	0.02	0.53	0.35				-0.35			1.34	1516645	0.00E+00
19	0.04	0.23	0.10					0.04		1.35	1516645	0.00E+00
20	-0.14	0.32	-0.25						0.26	1.31	1409678	0.00E+00
21	0.05	-0.41	0.00	0.42	8.05***					0.31	1285879	4.00E-04
22	0.04	0.70	0.52	-0.49			-0.49			1.22	1516647	0.00E+00
23	0.07	0.44	0.20	-0.39				0.16		1.23	1516645	0.00E+00
24	-0.16	0.69	-0.34	-0.61					0.37	1.21	1409680	0.00E+00
25	0.06	-0.23	0.05	0.42	8.04***		-0.11			0.30	1285881	4.00E-04
26	0.06	-0.32	0.06	0.43	8.05***			-0.10		0.32	1285881	4.00E-04
27	0.06	-0.38	0.10	0.44	8.03				-0.14	0.32	1285881	4.00E-04
28	0.14	-0.19		0.15		8.89***				0.50	1516566	4.00E-04
29	0.01	-0.14			0.01	0.21				0.28	1285877	4.00E-04
30	0.15	-0.04				8.90***	-0.13			0.47	1516566	4.00E-04
31	0.15	-0.22				8.90***		0.17		0.44	1516566	4.00E-04
32	0.06	-0.02				8.53***			-0.04	0.39	1409605	4.00E-04
33	0.06	-0.40		0.39	0.10	0.11				0.32	1285879	4.00E-04
34	0.14	-0.15		0.16		8.89***	-0.04			0.49	1516568	4.00E-04
35	0.14	-0.22		0.11		8.89***		0.13		0.45	1516568	4.00E-04
36	0.07	-0.20		0.22		8.52***			-0.06	0.41	1409607	4.00E-04
37	0.06	-0.24		0.38	0.11	0.06	-0.04			0.31	1285881	4.00E-04
38	0.06	-0.33		0.34	0.10	0.08		-0.02		0.30	1285881	4.00E-04
39	0.05	-0.37		0.33	0.09	0.05			-0.03	0.32	1285881	4.00E-04

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 40 - Values of the regressions on NYSE stock monthly returns and yearly rebalancing portfolios

M.	Beta	SMB	HML	RMW	CMA	EPS	LIQ1	LIQ2	LIQ3	a
1	0.3015	0.7840								0.0056
2	0.5423		0.8646							0.0094
3	0.4086			0.7834						0.0120
4	0.1747				-0.3708					0.0077
5	0.3434					0.8698				0.0103
6	0.6153						-0.6635			0.0091
7	0.5228							0.6489		0.0067
8	0.3023								-1.1230	0.0070
9	0.3182	0.5771	0.4272							0.0062
10	0.2807	0.5938		0.2985						0.0073
11	-0.0130	0.7559			0.0237					0.0035
12	0.3158	0.1036				0.8026				0.0096
13	0.3652	0.5553					-0.3348			0.0062
14	0.3427	0.5457						0.2731		0.0054
15	0.1608	0.4533							-0.7401	0.0054
16	0.3103	0.5426	0.3822	0.0883						0.0067
17	-0.0325	0.5256	0.4631		0.0611					0.0040
18	0.3526	0.5121	0.2574				-0.2155			0.0064
19	0.3249	0.5480	0.3889					0.0546		0.0061
20	0.1566	0.3947	0.1985						-0.6474	0.0057
21	-0.0173	0.5673	0.5234	-0.1180	0.0526					0.0035
22	0.3491	0.5019	0.2462	0.0300			-0.2104			0.0065
23	0.3149	0.5312	0.3671	0.0774				0.0293		0.0066
24	0.1598	0.4182	0.2321	-0.0626					-0.6459	0.0054
25	0.0679	0.5490	0.1090	-0.2347	0.3546		-0.5350			0.0030
26	0.0151	0.3936	0.2523	-0.3511	0.2417			0.5465		0.0013
27	0.0395	0.3757	0.2374	-0.0345	0.3663				-0.8519	0.0032
28	0.4377	0.2369		-1.5055		1.7765				0.0059
29	0.0526	0.1912			0.0163	0.6685				0.0069
30	0.3106	0.1106				0.8175	0.0287			0.0096
31	0.2720	0.2372				0.9635		-0.3094		0.0106
32	0.2368	-0.0852				0.6880			-0.6539	0.0088
33	0.4464	0.3306		-1.8541	0.2070	1.8384				0.0033
34	0.4552	0.2186		-1.5314		1.7491	-0.0850			0.0058
35	0.4185	0.2818		-1.4646		1.8087		-0.1126		0.0064
36	0.4995	-0.0151		-1.9949		1.9610			-0.9448	0.0036
37	0.4507	0.3241		-1.8579	0.1473	1.7890	-0.0914			0.0031
38	0.4430	0.2940		-1.8805	0.1612	1.7923		0.1111		0.0028
39	0.5326	0.0444		-1.9638	0.1639	1.8634			-0.9986	0.0024

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 41 - T-statistic of the regressions on NYSE stock monthly returns and yearly rebalancing portfolios

M	Beta	SMB	HML	RMW	CMA	EPS	LIQ1	LIQ2	LIQ3
1	4.79***	31.79***							
2	8.77***		28.01***						
3	6.53***			28.04***					
4	2.11**				-9.90***				
5	5.54***					40.39***			
6	10.00***						-28.89***		
7	8.46***							29.61***	
8	4.09***								-29.00***
9	5.06***	18.62***	11.02 ***						
10	4.46***	16.69***		7.41***					
11	-0.16	23.41***			0.58				
12	5.03***	2.82***				24.99***			
13	5.78***	17.38***					-11.26***		
14	5.43***	13.98***						7.87***	
15	2.15**	13.21***							-15.21***
16	4.92***	15.03***	8.37***	1.86*					
17	-0.39	13.26***	10.01***		1.49				
18	5.58***	15.54***	5.29***				-5.77***		
19	5.15***	14.04***	7.80***					1.22	
20	2.10**	10.72***	4.39***						-12.27***
21	-0.21	12.82***	9.64***	-2.12**	1.27				
22	5.50***	13.62***	4.74***	0.62			-5.50***		
23	4.96***	13.10***	7.09***	1.53				0.62	
24	2.14**	10.10***	4.40***	-1.24					-12.24***
25	0.81	12.39***	1.49	-4.09***	6.50***		-8.47***		
26	0.18	8.02***	3.97***	-5.62	5.11***			8.21***	
27	0.47	8.04***	4.04***	-0.61	7.61***				-12.69***
28	6.95***	6.38***		-21.95***		32.45***			
29	0.63	4.32***			0.4	18.61***			
30	4.92***	2.94***				22.32***	0.397		
31	4.31***	5.80***				24.85***		-7.40***	
32	3.17***	-1.97**				20.35***			-13.49
33	5.26***	7.40***		-21.74***	4.91***	28.42***			
34	7.19***	5.77***		-22.07***		31.32***	-2.48**		
35	6.60***	6.89***		-20.83***		32.24***		-2.63***	
36	6.65***	-0.35		-26.75***		33.62***			-19.06***
37	5.31***	7.32***		-21.77***	-2.75***	25.45***	-1.80*		
38	5.22***	6.00***		-21.73***	-3.29***	25.81***		1.82*	
39	6.27***	0.92		-22.97***	3.42***	28.83***			-16.15***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 42 - Statistics of the regressions on NYSE stock monthly returns and yearly rebalancing portfolios

M	GRS	AIC	R^2				
1	9.4 ***	-1.09E+04	6.70E-03	21	4.65***	13195.38	0.0053
2	16.21 ***	-1.07E+04	5.40E-03	22	10.11***	-11026.76	0.0075
3	20.88 ***	-1.07E+04	5.40E-03	23	9.85***	-10996.88	0.0074
4	11.41***	1.38E+04	7.00E-04	24	7.93***	282.008	0.0066
5	17.93***	-1.15E+04	1.02E-02	25	3.94***	13125.71	0.0057
6	15.71***	-1.07E+04	5.70E-03	26	1.6	13130.07	0.0057
7	11.22***	-1.07E+04	5.90E-03	27	4.33***	13036.47	0.0063
8	11.32***	4.71E+02	5.40E-03	28	9.29***	-11978.32	0.013
9	10.38 ***	-1.10E+04	7.40E-03	29	9.59***	12952.31	0.0069
10	11.42***	-1.09E+04	7.00E-03	30	15.59***	-11497.94	0.0102
11	5.02***	1.33E+04	4.50E-03	31	16.81***	-11552	0.0105
12	15.57***	-1.15E+04	1.02E-02	32	13.57***	-112.9586	0.009
13	10.37***	-1.10E+04	7.40E-03	33	4.45***	12482.65	0.0102
14	9.07***	-1.09E+04	7.00E-03	34	9.06***	-11982.49	0.013
15	8.63***	298.7917	0.0064	35	9.66***	-11983.24	0.013
16	10.34***	-10998.5	0.0074	36	5.27***	-824.7469	0.0134
17	5.37***	13197.87	5.20E-03	37	4.17***	12481.42	0.0102
18	10.61***	-11028.38	0.0075	38	3.51***	12481.32	0.0102
19	10.14***	-10996.54	0.0073	39	3.29***	12224.2	0.012
20	9.03***	281.5517	0.0066				

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 43 - Values with t-statistic of the regressions on NASDAQ ETF daily returns and yearly rebalancing portfolios

M.	Beta	SMB	LIQ1	LIQ2	LIQ3	a	AIC	R-squared
1	0 .9256844	0 .4798306				-0.000278	-1749928	0.1905
	(275.97)***	(59.19)***				(-8.89)***		
2	0.8530749		0.1082358			-0.000269	-1746615	0.1825
	(271.43)***		(13.12)***			(-8.55)***		
3	0.6014969			-0.1272386		0.002122	-8230	0.1753
	(16.32)***			(-0.70)		(3.21)***		
4	0.9140827				-0.4084779	-0.000268	-1748846	0.1879
	(270.67)***				(-49.11)***	(-8.56)***		
5	0.9618135	0.5647136	0.282277			-0.0002134	-1751001	0.1931
	(272.84)***	(66.46)***	(32.81)***			(-6.81)***		
6	0.5959852	0.9348826		-0.5408107		0.0011087	-8277	0.2052
	(16.48)***	(7.10)***		(-2.88)***		(1.67)*		
7	0.9250237	0.4974604			0.0214088	-0.0002792	-1749928	0.1905
	(273.03)***	(32.95)***			(1.38)	(-8.92)***		

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 44 - T-statistic of the regressions on NYSE ETF daily returns and yearly rebalancing portfolios

M.	Beta	SMB	LIQ1	LIQ2	LIQ3	a	AIC	R-squared
1	1.10198	0.5444672				0.000102	-7738012	0.3876
	(914.25)***	(109.12)***				(9.03)***		
2	1.117553		0.1948645			0.0001488	-7727966	0.3830
	(820.92)***		(42.55)***			(13.07)***		
3	1.311453			0.696067		0.0003352	-29680	0.0853
	(19.18)***			(4.91)***		(1.04)		
4	1.11602				-0.1357545	0.0001207	-7726989	0.3825
	(747.62)***				(-28.85)***	(10.63)***		
5	1.101636	0.5456224	-0.0026685			0.0001014	-7738010	0.3876
	(806.81)***	(100.42)***	(-0.54)			(8.93)***		
6	0.9931447	0.7949817		0.2718264		0.0010581	-29823.2	0.1108
	(13.73)***	(12.10)***		(1.89)*		(3.27)***		
7	1.057542	0.7052283			0.2555791	0.0000697	-7739947	0.3885
	(673.01)***	(114.12)***			(44.03)***	(6.16)***		

T-statistics on significance of previous regressions: 90%* 95%** 99%***

F) Regression on all portfolios

Table 45-48 - NYSE SMB-CMA portfolios yearly rebalancing, monthly returns

$$R_{it} - Rf_t = \alpha_i + \beta_i\left[R_{Mt} - R_{ft}\right] + s_i SMB_t + c_i CMA_t + \varepsilon_{it}$$

SMB-CMA portfolios	Alpha				
	1	2	3	4	5
1	0.0123103	0.1147818	0.0069248	0.0221167	0.010889
	(3.18)***	(0.84)	(2.82)***	(2.01)**	(2.91)
2	0.0108039	0.0097948	0.010304	0.0147525	0.0128887
	(4.02)***	(4.39)***	(5.35)***	(3.55)***	(5.01)***
3	0.0123882	0.0123024	0.0099647	0.010849	0.0110415
	(3.79)***	(5.43)***	(4.68)***	(6.07)***	(6.07)***
4	0.0177104	0.0267764	0.0091137	0.0107924	0.0128664
	(4.36)***	(1.76)*	(4.36)***	(5.67)***	(7.06)***
5	0.0123914	0.01001	0.0087627	0.0114145	0.007292
	(2.73)***	(3.34)***	(2.83)***	(5.40)***	(3.27)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

SMB-CMA portfolios	Beta				
	1	2	3	4	5
1	0.3362885	-8.328756	0.7515775	0.188548	0.3971087
	(0.76)	(-0.54)	(2.65)***	(0.15)	(0.93)
2	-0.4639729	0.110026	-0.0405238	0.2914107	0.3065467
	(-1.52)	(0.43)	(-0.18)	(0.61)	(1.04)
3	0.0712689	0.6973344	-0.4716183	0.0894871	-0.1830712
	(0.19)	(2.68)***	(-1.94)*	(0.44)	(-0.88)
4	0.3539444	1.385528	-0.0992081	0.047196	0.1439864
	(0.76)	(0.79)	(-0.42)	(0.22)	(0.69)
5	-0.2507025	0.0644915	-0.4831044	-0.2117586	-0.2278666
	(-0.48)	(0.19)	(-1.36)	(-0.87)	(-0.90)

T-statistics on significance of previous regressions: 90%* 95%** 99%***

SMB-CMA portfolios	S				
	1	2	3	4	5
1	0.0086372	-0.0345602	0.0113569	0.0175531	0.0114497
	(5.02)***	(-0.57)	(10.13)***	(3.60)***	(6.98)
2	0.0090612	0.0089549	0.0107052	0.0094569	0.007629
	(7.52)***	(8.90)***	(12.47)***	(5.11)***	(6.72)***
3	0.0076154	0.0101704	0.0097401	0.0109802	0.0086671
	(5.19)***	(9.86)***	(10.18)***	(13.72)***	(10.74)***
4	0.0074386	0.0077134	0.0095233	0.0112027	0.0091065
	(4.16)***	(1.14)	(10.29)***	(12.99)***	(11.16)***
5	0.0097548	0.0122076	0.0131034	0.011401	0.0100815
	(4.87)***	(9.18)***	(9.52)***	(12.01)***	(9.86)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

SMB-CMA portfolios	C				
	1	2	3	4	5
1	0.0022773	0.1140641	0.0056234	-0.0044099	-0.0011097
	(0.66)	(0.88)	(2.20)***	(-0.42)	(-0.26)
2	-0.0013582	0.0077781	0.002555	-0.0009309	0.0004636
	(-0.52)	(3.57)***	(1.37)	(-0.24)	(0.20)
3	0.0034667	0.000432	0.0027903	0.0012364	0.0002819
	(1.02)	(0.21)	(1.43)	(0.68)	(0.16)
4	0.003802	-0.0017278	0.0016247	0.0001779	0.0063325
	(0.99)	(-0.11)	(0.82)	(0.10)	(3.56)***
5	0.0024733	0.0007999	-0.001624	0.0005118	0.008585
	(0.54)	(0.26)	(-0.54)	(0.25)	(4.29)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 49-52 - NYSE SMB-CMA portfolios yearly rebalancing, monthly returns

$$R_{it} - Rf_t = \alpha_i + \beta_i\left[R_{Mt} - R_{ft}\right] + s_i SMB_t + c_i CMA_t + \varepsilon_{it}$$

SMB-CMA portfolios	Alpha				
	1	2	3	4	5
1	0.0136112	0.0084088	0.0088403	0.0049448	0.0051861
	(6.43)***	(4.88)***	(5.39)***	(3.34)***	(3.56)***
2	0.0159497	0.0084649	0.0072595	0.0076941	0.0047717
	(6.29)***	(5.39)***	(6.41)***	(7.05)***	(5.47)***
3	0.0098536	0.0080881	0.0078183	0.008026	0.0045908
	(4.90)***	(5.91)***	(6.53)***	(8.59)***	(5.65)***
4	0.0137028	0.0071143	0.0091327	0.0056537	0.0055075
	(5.80)***	(4.82)***	(7.46)***	(5.45)***	(6.23)***
5	0.0251232	0.0075935	0.0070537	0.0032667	0.0021034
	(1.65)*	(4.83)***	(4.49)***	(2.30)**	(1.40)

T-statistics on significance of previous regressions: 90%* 95%** 99%***

SMB-CMA portfolios	Beta				
	1	2	3	4	5
1	0.0846234	0.2979137	0.3759952	0.4842686	-0.3207875
	(0.32)	(1.42)	(1.86)*	(2.70)***	(-1.81)*
2	0.5305933	0.1832302	0.5488576	0.2343619	-0.0838701
	(1.70)*	(0.94)	(3.89)***	(1.78)*	(-0.79)
3	0.2229081	0.327365	0.3015447 (2.08)**	0.3554253	-0.0812121
	(0.89)	(1.95)*		(3.08)***	(-0.82)
4	0.1629943	0.3764425 (2.10)**	0.3485502 (0.19)**	0.0676277	0.1340252
	(0.57)			(0.52)	(1.22)
5	1.589342	-0.3093445	0.2137129	-0.1762152	-0.1921578
	(0.87)	(-1.60)	(1.11)	(-1.01)	(-1.04)

T-statistics on significance of previous regressions: 90%* 95%** 99%***

SMB-CMA portfolios	S				
	1	2	3	4	5
1	0.01247 (12.98)***	0.0136913	0.0116644	0.0065675	0.0044236
		(17.42)***	(15.45)***	(9.76)***	(6.78)***
2	0.0128468	0.010657	0.0088191	0.0058831	0.0035308
	(11.22)***	(14.68)***	(17.12)***	(11.85)***	(8.93)***
3	0.012582	0.012041	0.0099792	0.006012	0.0033906
	(13.92)***	(19.37)***	(18.20)***	(13.99)***	(9.13)***
4	0.0103	0.0114198	0.0097725	0.0065791	0.0039362
	(9.61)***	(17.04)***	(17.56)***	(13.86)***	(9.73)***
5	0.0149114 (2.16)**	0.0107345	0.0094595	0.00728 (11.40)***	0.0043704
		(15.18)***	(13.37)***		(6.29)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

SMB-CMA portfolios	C				
	1	2	3	4	5
1	0.5381451	0.4468926	0.440619	0.0887732	0.3357031
	(4.67)***	(4.76)***	(4.69)***	(1.10)	(4.14)***
2	0.2455045	-0.0270613	-0.0706188	-0.0321847	0.0088103
	(1.83)*	(-0.31)	(-1.18)	(-0.52)	(0.18)
3	-0.023211	-0.1686049	-0.0710932	-0.1283391	0.0056763
	(-0.32)	(-2.22)**	(-1.05)	(-2.53)**	(0.12)
4	-0.0984109	-0.2013057	-0.1320647	-0.2213725	-0.165626
	(-0.73)	(-2.46)**	(-1.92)*	(-3.92)***	(-3.47)***
5	-5.821218	-0.3615466	-0.4149392	-0.2267112	-0.464584
	(-6.68)***	(-4.28)***	(-4.96)***	(-2.86)***	(-5.93)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

G) 2x2 sorting results

Table 53-66 - 2 x 2 portfolios, mean, standard deviation and observations of risk factors for NASDAQ and NYSE stock markets

NASDAQ		SMB	
HML	1	2	Total
1	0.03332744	0.01362577	0.02566367
	3.9951069	0.31579304	3.1290631
	41625	26500	68125
2	0.01757956	0.01752	0.01754297
	0.46716603	0.76087475	0.66318299
	26313	41910	68223
Total	0.02722815	0.01601149	0.0216004
	3.1406338	0.62713634	2.2609826
	67938	68410	136348

NYSE		SMB	
HML	1	2	Total
1	0.01315816	0.00772843	0.01100688
	0.41926125	0.09275964	0.33098422
	46563	30554	77117
2	0.01192475	0.00846636	0.00980773
	0.13940977	0.07943646	0.10678677
	29969	47299	77268
Total	0.01267517	0.00817676	0.01040672
	0.33846202	0.08491501	0.24582302
	76532	77853	154385

NASDAQ		SMB	
RMW	1	2	Total
1	0.01569363	0.01485981	0.0151569
	0.202285	0.26750055	0.2462518
	24194	43710	67904
2	0.03362685	0.01799618	0.02798388
	3.9148422	0.98177734	3.1844875
	43659	24667	68326
Total	0.02723249	0.01599125	0.02159025
	3.1425885	0.62726191	2.2619498
	67853	68377	136230

NYSE		SMB	
RMW	1	2	Total
1	0.01437228	0.00968672	0.01151377
	0.1230617	0.07986755	0.09900401
	30072	47049	77121
2	0.01158517	0.00587024	0.00930537
	0.42331942	0.09198769	0.33331018
	46380	30781	77161
Total	0.01268146	0.00817734	0.01040929
	0.33862944	0.08488804	0.24589163
	76452	77830	154282

NASDAQ		SMB	
CMA	1	2	Total
1	0.03426673	0.01198131	0.02488211
	4.3049326	0.1830804	3.2775524
	35879	26100	61979
2	0.01251094	0.01136035	0.01183363
	0.20327281	0.14856226	0.17317132
	25116	35944	61060
Total	0.02530832	0.01162157	0.0184066
	3.3042876	0.16396971	2.329415
	60995	62044	123039

NYSE		SMB	
CMA	1	2	Total
1	0.01065225	0.00631413	0.00846083
	0.1417221	0.08477671	0.11650818
	33847	34552	68399
2	0.01208576	0.00623163	0.00905851
	0.49163322	0.08574588	0.34716545
	32999	35338	68337
Total	0.01135991	0.00627242	0.00875954
	0.35984304	0.08526752	0.25889063
	66846	69890	136736

NASDAQ		SMB	
EPS	1	2	Total
1	0.03384197	0.01009236	0.02603679
	3.9149965	0.17034496	3.209296
	43671	21378	65049
2	0.01504468	0.01864097	0.01743703
	0.16563506	0.74956058	0.61881772
	23536	46768	70304
Total	0.02725913	0.0159592	0.02156997
	3.1574034	0.62825349	2.2690817
	67207	68146	135353

NYSE		SMB	
EPS	1	2	Total
1	0.01285782	0.00565135	0.01025351
	0.42432741	0.1002369	0.34442284
	46124	26101	72225
2	0.01307998	0.00953242	0.01066954
	0.1147955	0.073999	0.08914739
	22842	48420	71262
Total	0.0129314	0.00817307	0.01046013
	0.35324554	0.08414491	0.25230574
	68966	74521	143487

NASDAQ		SMB	
LIQ1	1	2	Total
1	0.02959602	0.01189412	0.02333923
	3.7212605	0.18467274	2.9942119
	48107	26299	74406
2	0.01524463	0.01861356	0.01763015
	0.18797615	0.78758719	0.67047743
	17284	41927	59211
Total	0.02580269	0.01602342	0.02080931
	3.1932569	0.62796706	2.2785099
	65391	68226	133617

NYSE		SMB	
LIQ1	1	2	Total
1	0.02959602	0.01189412	0.02333923
	3.7212605	0.18467274	2.9942119
	48107	26299	74406
2	0.01524463	0.01861356	0.01763015
	0.18797615	0.78758719	0.67047743
	17284	41927	59211
Total	0.02580269	0.01602342	0.02080931
	3.1932569	0.62796706	2.2785099
	65391	68226	133617

NASDAQ		SMB	
LIQ2	1	2	Total
1	0.05640945	0.02013358	0.03491495
	5.7415147	0.90564452	3.7307084
	20136	29281	49417
2	0.00864617	0.00968152	0.00910467
	0.17226421	0.13764759	0.15787311
	26546	21099	47645
Total	0.02924858	0.01575629	0.02224541
	3.7731	0.69616979	2.6642955
	46682	50380	97062

NYSE		SMB	
LIQ2	1	2	Total
1	0.01610714	0.00864042	0.01328552
	0.53136025	0.08887476	0.42266284
	28049	17038	45087
2	0.00936927	0.0081015	0.00851341
	0.1006308	0.07485476	0.08410154
	14645	30429	45074
Total	0.0137959	0.00829494	0.01089981
	0.43471247	0.08016922	0.30475483
	42694	47467	90161

NASDAQ		SMB	
LIQ3	1	2	Total
1	0.01414766	0.01878856	0.01651102
	0.26823675	0.96553719	0.71418247
	24601	25528	50129
2	0.0449959	0.0123529	0.028553
	5.199274	0.15447402	3.6643824
	24553	24921	49474
Total	0.02955672	0.01560945	0.02249241
	3.6795378	0.69536181	2.6317997
	49154	50449	99603

NYSE		SMB	
LIQ3	1	2	Total
1	0.00600716	0.01275913	0.00978454
	0.13440834	0.07819725	0.10672777
	34311	43571	77882
2	0.01774133	0.00229949	0.01089582
	0.43413491	0.09222262	0.32977157
	43212	34411	77623
Total	0.01254789	0.00814362	0.01033926
	0.33628115	0.08483165	0.24492631
	77523	77982	155505

Table 67 - Summary statistics and t-values on variables of the NASDAQ stock market, created with 2 x 2 portfolios

Variable	Obs	Mean	Std. Dev.	Min	Max	t-statistic
SMB	180,311	-0.0187	0.261936	-2.51404	0.35069	-30.311***
HML	165,943	0.007772	0.119009	-0.35676	1.059989	26.604***
CMA	149,619	0.012611	0.112141	-0.01795	0.999163	43.4973***
RMW	165,943	-0.01255	0.10762	-0.95474	0.081496	-47.4983***
EPS	165,943	0.007623	0.103012	-0.16746	0.942911	30.1439***
LIQ1	165,943	0.006306	0.109479	-0.31576	0.974742	23.465***
LIQ2	165,943	0.028754	0.165945	-0.03235	1.496389	70.5842***
LIQ3	165,943	-0.00916	0.143728	-1.28193	0.44767	-25.9584***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 68 - Summary statistics and t-values on variables of the NYSE stock market, created with 2 x 2 portfolios

Variable	Obs	Mean	Std. Dev.	Min	Max	t-statistic
SMB	173,525	0.005137	0.017019	-0.04408	0.105729	125.7459***
HML	159,477	0.001193	0.015097	-0.0244	0.092965	31.5663***
CMA	143,356	-0.00053	0.014734	-0.09215	0.022192	-13.7074***
RMW	159,477	0.002189	0.016144	-0.07982	0.030306	54.158***
EPS	159,477	-0.00032	0.020968	-0.05695	0.106514	-6.1829***
LIQ1	159,477	-0.0018	0.020258	-0.16499	0.021216	-35.513***
LIQ2	159,477	0.004916	0.021566	-0.03425	0.17134	91.0333***
LIQ3	159,477	-0.00111	0.013913	-0.09332	0.026337	-31.8177***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 69 - Paired t-test for EPS and HML on the NASDAQ stock market, created with 2 x 2 portfolios

NASDAQ	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	t-statistic
EPS	165,943	0.007623	0.000253	0.103012	0.007127	0.008118	
HML	165,943	0.007772	0.000292	0.119009	0.0072	0.008345	
diff	165,943	-0.00015	8.79E-05	0.035823	-0.00032	2.28E-05	-1.701*

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 70 - Paired t-test for EPS and HML on the NYSE stock market, created with 2 x 2 portfolios

NYSE	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]	t-statistic
EPS	159,477	-0.00032	5.25E-05	0.020968	-0.00043	-0.00022	
HML	159,477	0.001193	3.78E-05	0.015097	0.001119	0.12674	
Diff	159,477	-0.00152	3.55E-05	0.01419	-0.00159	-0.00145	-42.721***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 71 - Various regressions for the NASDAQ and NYSE stock market mainly focussing on the difference between the 5 x 5 and 2 x 2 sorting method

M	Beta	SMB	HML	RMW	CMA	EPS	i.LIQ	Alpha
NAS	-1.206241	-0.548477			-1.052938			0.059569
	(-0.21)	(-0.39)			(-0.21)			(1.23)
NYS	0.0679198	-0.687365			-.5091877			0.010706
	(0.81)	(-13.3)***			(-10.7)***			(14.7)***
NAS	-3.014091	-1.171836	-2.459411	3.411295	-0.1119315		2.278036	0.0349473
	(-0.50)	(-0.69)	(-0.73)	(0.99)	(-0.02)		(0.72)	(0.64)
NYS	0.126694	-1.400658	0.4346512	-0.064900	0.3060584		1.406644	0.0082085
	(1.51)	(-24.4)***	(5.39)***	(-0.84)	(5.39)***		(19.97)***	(10.2)***
NAS	-2.459384	-0.6463753		7.827604	-0.4350537	6.00484	0.662822	.0561108
	(-0.42)	(-0.46)		(1.34)	(-0.08)	(1.07)	(0.20)	(1.02)
NYS	0.5265676	-1.559392		1.547653	-0.1882172	2.090999	0.8620125	0.0101062
	(6.24)***	(-27.1)***		(15.7)***	(-3.17)	(26.4)***	(12.51)***	(12.5)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

H) January effect

Table 72 & 73 - Summary statistics of excess return (return – risk free rate) for each month on, respectively, the NASDAQ and NYSE stock market

Month	Mean	Std. Dev.	Freq.
1	0.016753	0.607138	15,867
2	0.03318	0.236565	16,025
3	0.027406	0.444366	12,309
4	0.073301	6.411497	16,262
5	0.003297	0.711182	12,828
6	0.018599	1.277663	16,344
7	0.014942	0.165437	14,113
8	-0.01851	0.177788	14,184
9	0.013331	0.177135	15,557
10	0.517329	58.9136	14,114
11	0.02265	0.399087	15,740
12	0.022402	0.362788	15,861
Total	0.060503	16.6541	179,204

Month	Mean	Std. Dev.	Freq.
1	0.00356	0.108872	15,399
2	0.022425	0.097873	15,451
3	0.023742	0.117431	11,808
4	0.022513	0.11527	15,501
5	-0.01725	0.101933	12,220
6	-0.00633	0.121388	15,669
7	0.022949	0.744475	13,681
8	-0.02204	0.101071	13,741
9	0.006901	0.120896	15,147
10	0.027562	0.111766	13,613
11	0.010047	0.10935	15,233
12	0.020387	0.104355	15,334
Total	0.009706	0.235255	172,797

Table 74 - Various regressions for the NASDAQ and NYSE stock market mainly focussing on the January effect

M	Beta	SMB	HML	RMW	CMA	EPS	i.LIQ	January	Alpha
NAS	-0.047710	-0.032106			0.3944693			-0.002230	0.0129169
	(-0.01)	(-0.10)			(8.09)***			(-0.01)	(0.25)
NYS	-0. 00824	0.7582221			0.0221583			0.0038665	0.0031658
	(-0.10)	(23.5)***			(0.54)			(1.63)	(4.32)***
NAS	0.3091991	-1.23279	0.2352504	1.404417		0.1725479	-0.0214503	0.0175287	0.014258
	(0.06)	(-0.34)	(0.10)	(0.35)		(0.07)	(-0.01)	(0.10)	(0.26)
NYS	0.4404331	0.2880296		-1.878385	-0.160523	1.797103	0.1102218	-0.002252	0.0030223
	(5.18)***	(5.83)***		(-21.7)***	(-3.3)***	(25.81)***	(1.81)*	(-0.94)	(3.62)***
NAS	0.3363518	-1.181984	0.123508	1.549787	0.3987658		-0.2205985	0.0176187	0.0158557
	(0.06)	(-0.33)	(0.06)	(0.44)	(8.03)		(-0.08)	(0.10)	(0.28)
NYS	0.0198279	0.400982	0.2560515		0.2386883		0.5436712	0.002818	0.0009809
	(0.24)	(8.11)***	(4.02)***		(5.04)***		(8.16)***	(1.17)	(1.18)

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 75 & 76 - Summary statistics of excess return (return – risk free rate) for each month on, respectively, the NASDAQ and NYSE ETF market

Month	Mean	Std. Dev.	Freq.
1	-0.0006	0.012403	27,395
2	-0.00019	0.013509	26,210
3	-0.00045	0.012292	30,192
4	-0.00073	0.011729	29,027
5	-0.0015	0.013275	30,579
6	-0.00164	0.013635	30,904
7	0.000428	0.011954	26,680
8	-0.00119	0.01534	28,562
9	-0.00043	0.013821	26,592
10	0.000378	0.013471	27,411
11	-0.00031	0.013008	26,226
12	-0.00026	0.054573	28,370
Total	-0.00057	0.020226	338,148

Month	Mean	Std. Dev.	Freq.
1	-0.00064	0.016002	107,423
2	-1.4E-05	0.017071	103,235
3	-0.00026	0.014975	118,149
4	-0.00043	0.014316	112,323
5	-0.00174	0.01507	116,795
6	-0.00154	0.016807	118,675
7	0.000551	0.015579	105,728
8	-0.00121	0.018815	112,290
9	-0.00041	0.01706	104,941
10	0.000552	0.016801	107,585
11	-0.0002	0.020533	102,913
12	-0.00062	0.015007	111,878
Total	-0.00052	0.016564	1,321,935

Table 77 - Various regressions for the NASDAQ and NYSE ETF market mainly focussing on the January effect

M	Beta	SMB	LIQ1	LIQ3	January	Alpha	R-Squared
NAS	0.9618112	0.5647019	0.2822607		-0.000022	-0.0002116	0.1931
	(272.83)***	(66.45)***	(32.81)***		(-0.20)	(-6.48)	
NYS	1.101631	.5461627	-0.0030749		0.0001977	0.0000852	0.3876
	(806.81)***	(100.5)***	(-0.62)		(4.79)***	(7.20)***	
NAS	0.9250157	0.4976426		0.0216535	-0.000063	-0.0002741	0.1905
	(273.0)***	(32.96)***		(1.40)	(-0.55)	(-8.39)***	
NYS	1.057632	0.7053893		0.2553136	0.0001781	0.0000553	0.3885
	(673.02)***	(114.15)***		(43.99)***	(4.32)***	(4.69)***	

T-statistics on significance of previous regressions: 90%* 95%** 99%***

I) Momentum

Table 78 - 5 x 5 size and momentum portfolios summary statistics (mean, standard deviation and observations) for NASDAQ stock markets

			SMB			
MOM	1	2	3	4	5	Total
1	0.021691	0.010027	0.007489	0.006759	0.01691	0.013206
	0.544062	0.227964	0.213286	0.221982	0.228649	0.346978
	6699	4974	4552	4068	3029	23322
2	0.012123	0.17622	0.010054	0.011078	0.008248	0.044753
	0.176048	11.70307	0.134332	0.121944	0.123559	5.331421
	4151	4841	5069	4808	4470	23339
3	0.013365	0.011402	0.012131	0.013087	0.012553	0.012482
	0.155575	0.137615	0.112699	0.110735	0.101349	0.123357
	3843	4598	4864	4821	5077	23203
4	0.012521	0.013792	0.00805	0.011701	0.013081	0.01182
	0.144228	0.135878	0.119175	0.100812	0.101436	0.119495
	3794	4408	4735	4958	5629	23524
5	0.016021	0.015442	0.014501	0.011392	0.010919	0.013604
	0.458213	0.189666	0.188279	0.148152	0.158908	0.256636
	4696	4342	4587	5014	4606	23245
Total	0.015948	0.046765	0.010446	0.010942	0.012088	0.019175
	0.375534	5.352527	0.157456	0.144105	0.140926	2.393931
	23183	23163	23807	23669	22811	116633

Table 79 - 5 x 5 size and momentum portfolios summary statistics (mean, standard deviation and observations) for NYSE stock markets

			SMB			
MOM	1	2	3	4	5	Total
1	0.023893	0.005692	0.006793	0.0035	0.005885	0.011413
	0.957041	0.154006	0.147226	0.118035	0.101376	0.554168
	8511	5431	4416	4227	3855	26440
2	0.011052	0.007208	0.006577	0.006536	0.004971	0.007152
	0.120754	0.094659	0.084867	0.079678	0.073904	0.091303
	4858	5110	5401	5282	5907	26558
3	0.010728	0.008635	0.00883	0.009068	0.006814	0.008636
	0.111702	0.089833	0.080004	0.075685	0.067509	0.08359
	3952	4485	5722	5828	6530	26517
4	0.008934	0.008573	0.008192	0.007289	0.005883	0.007553
	0.102078	0.093687	0.083841	0.074675	0.068563	0.082728
	3459	4661	5560	6054	6878	26612
5	0.01641	0.010572	0.010067	0.005564	0.002959	0.008967
	0.167915	0.116336	0.104193	0.089982	0.076817	0.113482
	4453	5900	5466	6026	4682	26527
Total	0.015988	0.008161	0.008154	0.006559	0.005417	0.008741
	0.565787	0.113837	0.100753	0.087187	0.076176	0.261198
	25233	25587	26565	27417	27852	132654

Table 80 - Summary and t-statistic for the momentum effect in the NASDAQ and NYSE stock market

Variable	Obs	Mean	Std. Dev.	Min	Max	t-statistic
NASDAQ	149,619	0.014711	0.139478	-0.04539	1.233884	40.7968***
NYSE	143,356	0.001049	0.030607	-0.08002	0.13972	12.9791***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 81 - Various regressions for the NASDAQ and NYSE stock market mainly focussing on the momentum effect

M	Beta	SMB	HML	RMW	CMA	EPS	i.LIQ	MOM	Alpha
NAS	-0.102255	0.1205272			0.3944933			-0.160634	0.0122348
	(-0.02)	(0.08)			(8.10)***			(-0.10)	(0.25)
NYS	-0.035740	0.6760544			0.0208522			0.0933070	0.0038346
	(-0.43)	(16.7)***			(0.51)			(3.27)***	(5.42)***
NAS	0.2882242	-0.977967	0.1812333	1.434152	0.3982659		-0.2095713	-0.185181	0.0166926
	(0.05)	(-0.28)	(0.08)	(0.41)	(8.04)***		(-0.08)	(-0.10)	(0.30)
NYS	0.0264634	0.4088358	0.3112248	-0.289421	0.2557753		0.5451726	-0.094665	0.0013331
	(0.32)	(8.27)***	(4.58)***	(-4.30)***	(5.37)***		(8.18)***	(-2.46)**	(1.68)*
NAS	0.2655396	-1.052207		1.345523 (0.34)	0.2888095	0.1155219	-0.0302444	-0.119920	0.0153037
	(0.05)	(-0.29)			(0.11)	(0.04)	(-0.01)	(-0.06)	(0.29)
NYS	0.4876363	0.3182579		-1.787628	-0.125613	1.86988	0.1558015	-0.214020	0.0028703
	(5.72)***	(6.48)***		(-20.3)***	(-2.54)**	(26.45)***	(2.54)**	(-5.9)***	(3.62)***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 82 - 5 x 5 size and momentum portfolios summary statistics (mean, standard deviation and observations) for NASDAQ ETF markets

	SMB					
MOM	1	2	3	4	5	Total
1	-0.00013	-0.00041	-0.00021	-0.00058	-0.00024	-0.00032
	0.015877	0.015045	0.013569	0.01446	0.012623	0.014332
	9691	10985	11119	11155	10577	53527
2	0.000189	-0.00023	-0.00046	-0.00044	-0.00052	-0.00034
	0.015397	0.013486	0.012391	0.012029	0.011246	0.012742
	6771	9586	10898	11710	10914	49879
3	-0.00022	-8.4E-05	-0.00039	-0.00048	-0.00052	-0.00036
	0.013914	0.012849	0.012018	0.01221	0.011404	0.012399
	8074	8673	10177	9959	11826	48709
4	0.000183	-0.00025	-0.00068	-0.00011	-0.00048	-0.00031
	0.014934	0.013083	0.012044	0.012498	0.011558	0.012631
	5920	8830	9763	10061	11812	46386
5	7.43E-05	-0.00042	-0.00042	-0.0001	-0.00048	-0.00028
	0.015335	0.014543	0.013171	0.014218	0.01276	0.01393
	7163	8846	10629	12196	10575	49409
Total	-2.84E-06	-0.00029	-0.00043	-0.00034	-0.00045	-0.00032
	0.015134	0.013883	0.012677	0.013168	0.011911	0.013257
	37619	46920	52586	55081	55704	247910

Table 83 - 5 x 5 size and momentum portfolios summary statistics (mean, standard deviation and observations) for NYSE ETF markets

	SMB					
MOM	1	2	3	4	5	Total
1	-3.3E-05	-0.00026	-0.00048	-0.00046	-0.00045	-0.00035
	0.024153	0.021091	0.019089	0.019243	0.015236	0.019791
	35424	44373	44771	43600	43868	212036
2	8.13E-05	-0.00026	-0.00047	-0.00025	-0.00047	-0.00031
	0.015337	0.01435	0.013455	0.01299	0.012237	0.013499
	26643	36160	42451	45801	49540	200595
3	0.000122	-0.00015	-0.00031	-0.00034	-0.0005	-0.00028
	0.015288	0.013662	0.013179	0.012417	0.011728	0.013021
	25277	35604	40326	46013	52956	200176
4	2.16E-05	-0.00013	-0.00036	-0.00033	-0.00044	-0.00028
	0.017111	0.014273	0.013376	0.013018	0.012255	0.01374
	25859	34670	41523	43061	50958	196071
5	0.000128	-0.00021	-0.00027	-0.0004	-0.00043	-0.00026
	0.025294	0.020812	0.019247	0.018138	0.015514	0.019668
	29420	39017	42081	41361	42225	194104
Total	5.89E-05	-0.0002	-0.00038	-0.00036	-0.00046	-0.0003
	0.020379	0.017448	0.015995	0.015361	0.013351	0.016274
	142623	189824	211152	219836	239547	1002982

Table 84 - Summary and t-statistic for the momentum effect in the NASDAQ and NYSE ETF market

ETF Variable	Obs	Mean	Std. Dev.	Min	Max	t
NASDAQ	159,060	0.005219	0.043791	-0.2982	0.347189	47.5271***
NYSE	805,961	0.005481	0.052168	-1.05015	4.08074	94.3247***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 85 - Various regressions for the NASDAQ and NYSE ETF market mainly focussing on the momentum effect

M	Beta	SMB	LIQ_1	LIQ_3	Momentum	Alpha	R-Squared
NAS	0.9749882	0.293457	0.3866534		-0.000487	-0.0001657	0.5840
	(438.09)***	(48.74)***	(63.69***		(-0.99)	(-7.66)***	
NYS	1.144571	0.3733789	-0.0236717		-0.000227	0.0001371	0.5577
	(817.14)***	(67.44)***	(-4.82)***		(-1.02)	(11.76)***	
NAS	0.9451583	0.3677804		0.1376985	-0.000450	-0.0002421	0.5733
	(421.89)***	(38.16)***		(13.92)***	(-0.90)	(-11.1)***	
NYS	1.114485	0.4910533		0.1960366	-0.0002298	.0001264	0.5584
	(735.74)***	(78.33)***		(35.02)***	(-1.03)	(10.91)***	

T-statistics on significance of previous regressions: 90%* 95%** 99%***

J) Initial Public Offerings (public before 2015, results after from July 2015 – June 2018)

Table 86 - Correlation between all factors on the NASDAQ ETF market, created with the data between July 2015 and June 2018 of companies that went public before 2015

ETF	y	beta	SMB	LIQ1	LIQ2	LIQ3
y	1					
beta	0.1813	1				
SMB	0.0021	-0.5501	1			
LIQ1	-0.1947	-0.9928	0.4459	1		
LIQ2	0.1299	0.0441	0.81	-0.1637	1	
LIQ3	0.2133	0.9314	-0.2086	-0.9684	0.4046	1

Table 87 - Correlation between all factors on the NYSE ETF market, created with the data between July 2015 and June 2018 of companies that went public before 2015

ETF	y	beta	SMB	LIQ1	LIQ2	LIQ3
y	1					
beta	-0.1316	1				
SMB	0.1016	-0.9341	1			
LIQ1	0.1129	-0.9693	0.9932	1		
LIQ2	0.1373	-0.7377	0.4479	0.549	1	
LIQ3	-0.1195	0.5226	-0.1836	-0.2969	-0.9611	1

Table 88 - Summary and t-statistic for the initial public offering effect in the NASDAQ ETF market

ETF	Obs	Mean	Std.	Dev.	Min	Max	t-statistic
y	117,907	-0.00142	0.01239	-0.18529	0.182806	-39.3209	-41.1057***
beta	117,907	-0.00114	0.009812	-0.04253	0.042312	-39.8963	-42.5037***
SMB	122,931	7.05E-05	0.004976	-0.02235	0.101394	4.9658	5.2577***
LIQ1	122,931	-0.00019	0.004551	-0.10913	0.012067	-14.3518	-15.1954***
LIQ2	471	-0.00284	0.000658	-0.00356	-0.00197	-93.7132	-99.2333***
LIQ3	122,931	-0.00011	0.004963	-0.10107	0.01887	-8.0203	-8.4918***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 89 - Summary and t-statistic for the initial public offering effect in the NYSE ETF market

ETF	Obs	Mean	Std.	Dev.	Min	Max	t-statistic
y	465,620	-0.00142	0.016883	-0.9521	3.899781	-57.2983	-62.7410***
beta	465,620	-0.00149	0.008304	-0.04367	0.029558	-1.20E+02	-1.3e+02***
SMB	485,460	-9.29E-06	0.002451	-0.01719	0.01193	-2.6398	-2.8624***
LIQ1	485,460	1.24E-05	0.002012	-0.01149	0.013837	4.3018	4.6647***
LIQ2	1,860	-0.00182	0.000994	-0.00287	-0.00049	-78.8194	-85.4709***
LIQ3	485,460	-5.69E-06	0.00278	-0.01026	0.016183	-1.4255	-1.5458

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 90 - Various regressions for the NASDAQ ETF market mainly focussing on the initial public offerings effect

	Beta	SMB	LIQ1	LIQ3	a	R-squared
1	0.8430627	0.2001179			-0.0004734	0.4023
	(263.6)***	(32.39)***			(-16.84)***	
2	.8100678		0.1161113		-0.0004726	0.3988
	(274.12)***		(18.61)***		(-16.73)***	
3	.8308608			-0.1362207	-0.0004868	0.3994
	(252.3)***			(-21.36)***	(-17.28)***	
4	.9337063	0.3996578	0.3482659		-0.0003179	0.4129
	(250.4)***	(53.13)***	(46.13)***		(-11.33)***	
5	.827756	0.4823529		0.3178019	-0.0004776	0.4044
	(252.3)***	(31.68)***		(20.27)***	(-17.02)***	

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 91 - Various regressions for the NASDAQ ETF market mainly focussing on the initial public offerings effect

	Beta	SMB	LIQ1	LIQ3	a	R-squared
1	1.119554	0.5000923			0.0002538	0.2881
	(430.98)***	(57.98)***			(11.95)***	
2	1.094602		0.5592036		0.0001981	0.2876
	(433.3)***		(54.56)***		(9.34)***	
3	1.077957			0.0166666	0.0001868	0.2830
	(326.6)***			(1.72)*	(8.68)***	
4	1.114815	0.340364	0.3177625		0.0002375	0.2891
	(428.3)***	(31.68)***	(24.89)***		(11.19)***	
5	1.029146	0.7554091		0.4997834	0.000121	0.2909
	(307.1)***	(72.01)***		(42.58)***	(5.65)***	

T-statistics on significance of previous regressions: 90%* 95%** 99%***

K) Fama and French factors and ETF

Table 92 – Summary statistics and t-values on the NASDAQ ETF market

NASDAQ ETF	Obs	Mean	Std. Dev.	Min	Max	t-statistic
Y	338,148	-0.00057	0.020226	-0.4997	8.996959	-16.3118***
Beta	338,148	-0.00032	0.010218	-0.06905	0.052891	-18.4572***
SMB	601,088	1.33E-05	0.003805	-0.02235	0.101394	2.716***
FFSMB	601,344	0.003742	0.43629	-1.8	2.54	6.6511***
FFHML	601,344	-0.0043	0.459851	-1.58	2.47	-7.2436***
FFRMW	601,344	0.005854	0.30276	-1.59	1.28	14.9928***
FFCMA	601,344	0.001158	0.282113	-1.21	1.72	3.1829***
LIQ1	601,088	-0.00017	0.003555	-0.10913	0.013622	-36.9566***
LIQ2	2,304	-0.00349	0.001722	-0.00696	-0.00148	-97.4113***
LIQ3	601,088	3.32E-05	0.00373	-0.10107	0.01887	6.8958***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 93 - Summary statistics and t-values on the NYSE ETF market

NYSE ETF	Obs	Mean	Std. Dev.	Min	Max	t-statistic
Y	1,321,935	-0.00052	0.016564	-0.9521	3.899781	-36.078***
Beta	1,321,935	-0.00057	0.009388	-0.07056	0.05245	-70.0255***
SMB	2,211,816	2.03E-05	0.002224	-0.01719	0.012046	13.5468***
FFSMB	2,212,758	0.003742	0.43629	-1.8	2.54	12.7584***
FFHML	2,212,758	-0.0043	0.459851	-1.58	2.47	-13.895***
FFRMW	2,212,758	0.005854	0.30276	-1.59	1.28	28.76***
FFCMA	2,212,758	0.001158	0.282113	-1.21	1.72	6.1056***
LIQ1	2,211,816	-0.0002	0.00298	-0.01962	0.019146	-1.00E+02***
LIQ2	8,478	-0.00227	0.001708	-0.00527	-0.00049	-1.20E+02***
LIQ3	2,211,816	2.04E-05	0.003063	-0.02087	0.023499	9.907***

T-statistics on significance of previous regressions: 90%* 95%** 99%***

Table 94 - Correlation between all factors on the NASDAQ ETF market, including the Fama and French variables

NASD	y	beta	SMB	FFSMB	FFHML	FFRMW	FFCMA	LIQ1	LIQ2	LIQ3
Y	1									
Beta	0.4183	1								
SMB	0.1853	0.0516	1							
FFSMB	0.1365	-0.0181	0.7812	1						
FFHML	-0.1911	-0.6693	0.2973	0.167	1					
FFRMW	0.1513	0.4935	-0.4297	-0.2148	-0.7655	1				
FFCMA	-0.2053	-0.7109	0.2375	0.2364	0.9137	-0.4913	1			
LIQ1	-0.2451	-0.4705	-0.3772	0.0216	-0.0231	0.0683	-0.0005	1		
LIQ2	0.0239	0.0997	0.3135	-0.1244	-0.0067	-0.2293	-0.1227	-0.467	1	
LIQ3	0.2386	0.6148	0.283	-0.0379	-0.503	0.1147	-0.5655	-0.7305	0.4992	1

Table 95 - Correlation between all factors on the NASDAQ ETF market, including the Fama and French variables

NYSE	y	beta	SMB	FFSMB	FFHML	FFRMW	FFCMA	LIQ1	LIQ2	LIQ3
Y	1									
Beta	0.2844	1								
SMB	0.245	0.2786	1							
FFSMB	0.1594	0.1118	0.7786	1						
FFHML	-0.0734	0.1078	0.0096	0.1856	1					
FFRMW	0.0867	0.005	0.1608	-0.1532	-0.713	1				
FFCMA	-0.0638	0.0097	0.1425	0.2864	0.8961	-0.3815	1			
LIQ1	-0.0855	-0.7114	0.4618	0.4446	-0.0806	0.118	0.1032	1		
LIQ2	-0.1344	-0.6497	-0.0036	0.0421	-0.2563	0.3967	-0.0166	0.5782	1	
LIQ3	-0.0571	-0.0172	-0.137	-0.4394	0.0724	-0.1263	-0.0593	-0.1323	-0.4603	1

Table 96 - Various regressions for the NASDAQ ETF market mainly focussing on the effect of the Fama and French regressors

M	Beta	SMB	FFSMB	FFHML	FFRMW	FFCMA	LIQ3	Alpha	R-squared
NAS	0.944858	0.3919441		0.0027314	-0.000499	0.002177		-0.000233	0.1980
	(256)***	(47.7)***		(29.9)***	(-4.3)***	(15.3)***		(-7.5)***	
NYS	1.09341	0.556032		-0.0003114	-0.0008133	-0.001368		0.0000956	0.3886
	(827)***	(111)***		(-9.6)***	(-19.7)***	(-27.5)***		(8.47)***	
NAS	0.863477		0.001822	0.003330	0.0000489	0.0021391		-0.000245	0.1939
	(244)***		(23.1)***	(36.5)***	(0.40)	(15.0)***		(-7.8)***	
NYS	1.057491		0.0022762	0.0001725	0.0001308	-0.001556		0.0000823	0.3860
	(787)***		(81.0)***	(5.28)***	(3.03)***	(-31.2)***		(7.27)***	
NAS	0.974052	0.4049861		0.0027347	-0.0005901	0.0022451	0.0231601	-0.000200	0.2060
	(245)***	(46.6)***		(28.6)***	(-4.84)***	(15.09)***	(8.62)***	(-6.1)***	
NYS	1.143908	0.5686019		-0.0003768	-0.0008883	-0.0015084	-0.0694315	0.0001531	0.4043
	(830)***	(111)***		(-11.3)***	(-21.0)***	(-29.7)***	(-68.0)***	(13.3)***	
NAS	0.889282		0.0018916	0.00336	-0.0000125	0.0022033	0.0266061	-0.000213	0.2020
	(233)***		(22.9)***	(35.3)***	(-0.10)	(14.8)***	(9.89)***	(-6.5)***	
NYS	1.106904		0.0023883	0.000111	0.0001031	-0.0016904	-0.0686975	0.0001389	0.4018
	(792)***		(83.3)***	(3.33)***	(2.34)**	(-33.2)***	(-67.2)***	(12.0)***	

T-statistics on significance of previous regressions: 90%* 95%** 99%***