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Empirical evidence of the high volume premium in Finnish capital markets

Bachelor's Thesis
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Abstract

This paper presents the first empirical evidence of the existence of the high volume premium in the Finnish capital markets. I examine the daily returns from the Finnish markets from 3.1.2000 to 31.12.2019 and find weak supporting evidence for the return anomaly. I find some correlation between the high volume premium with capital asset pricing models, but the models fail to adequately explain the phenomenon.

Keywords The high volume premium, trading volume, mispricing

Table of Contents

1 Introduction

Researchers have widely acknowledged that the high volume premium is pervasive in many markets. Based on prior research and theory (Gervais, Kaniel and Mingelgrin, 2001) significant positive shocks to the trading volume of a particular stock means that the stock in question is likely to receive excess market-adjusted returns.

This paper aims to examine if the high volume premium exists in the Finnish stock market because this has yet to be examined. In most European and US markets, the high volume premium seems to prevail as a pervasive anomaly and has not been adequately explained (Kaniel, Ozoguz and Starks, 2012). My research makes progress toward finding more about this return anomaly, which remains a considerable challenge from an asset-pricing standpoint (Wang, 2021).

In this paper, I find that the high volume return premium is – depending on the timeframe – primarily non-existent in the Finnish capital markets. However, on those timeframes where the high volume premium seems to exist, the premium loads on the traditional capital asset pricing model factors lose some of the statistical significance where it existed. These mainly are the market-beta, size-effect and momentum factors (Fama and French, 2015). In the analysis of stock-specific characters, I find mixed evidence on the determinants that would be predicted, but the results align with previous research (Kaniel, Ozoguz and Starks, 2012).

Contradictory to previous results, my findings from the Finnish data show that the relationship between firm size and the magnitude of the high volume premium is inverse (Kaniel, Ozoguz and Starks, 2012). As the market size of a stock increases the more excess results it should expect from a volume shock.

The current paradigm for explaining the premium is centred around two theories. One is based on Merton's (1987) investor recognition hypothesis. The theory implies that in a market with incomplete information, some investors will not be aware of some stocks, thus not holding them in their portfolios. This leads to circumstances where the investors might be less than optimally diversified, taking on more idiosyncratic risk.

Tied to Merton’s (1987) investor recognition hypothesis is the market microstructure theory that suggests that the arrival of information to the market is tied to price and trading volume changes (Cochrane, 2013). Thus, the trading volume should indicate how investors trade on the need to share risk and speculate on price changes. Han et al., (2022) suggest that mispricing and expected returns are linked to the trading volume of a stock.

There also exists a risk and mispricing based explanation for the phenomenon. Lo and Wang (2010) hypothesize an equilibrium model of asset markets in which the trading process is determined endogenously by two motives, liquidity needs and risk-sharing. This results in the traditional risk pricing methods being suitable for the high volume premium. At least some of the high volume premium can be explained by its co-movement with factors such as the Fama - French five-factor model (Fama and French, 2015) and the Pástor and Stambaugh (2003) liquidity factor.

Even though there is no clear consensus of the reasons behind the high volume premium many empirical studies point to the anomaly's existence. In this paper, I will examine whether the high volume premium effect (Kaniel, Ozoguz and Starks, 2012) is present in the Finnish market through empirical tests on stock market data. For this research I hypothesise that I will find the high volume premium from the Finnish market as is consistent with the literature discussed i.e., I expect that positive shocks to trading volume result in outsized excess returns for Finnish stocks.

My paper proceeds as follows. In section 2, I present the data and research methodology, and in section 3, the findings that result from the data. In section 4 I briefly explore the data for potential error factors. Section 5 discusses the potential factors behind my results. Finally, in section 6 I present my concluding comments on the research.

2 The high volume premium in the Finnish market

2.1 Methodology and data

For determining if the high volume premium i.e., that outsized returns follow an extreme shock to trading volume, exists in the Finnish market I closely follow the method of Gervais, Kaniel and Mingelgrin (2001), further modified by Kaniel, Ozoguz and Starks (2012). The modifications arise from the reason that the original study was done in the US market with lots of available data.

Following Kaniel et al., (2012), I begin by defining a 70-day trading interval as my base period, which consists of three sub-periods. The first 49 days are classified as the reference period where the typical volume distribution is measured for all stocks individually. Followed by the reference period is a one-day formation period during which the volume for the particular day is observed, and after the day, the portfolios are constructed for the testing period i.e., the stocks are individually identified as extreme high (low) or normal volume and sorted into three portfolios. The testing period then constitutes the following 20 days after the formation day, during which the portfolio performance is measured.

Because sufficient data exists only from the start of the millennium, I overlap the reference periods to make the most out of the data. However, the testing periods are not overlapped to produce robust results. For my analysis subsequent testing periods are time to start one day after the previous testing period ends.

Kaniel et al., (2012) define a stock as in the extreme high or low volume portfolio if the formation day volume is in the top or bottom 20th percentile. I also use the 10th percentile classification as Kaniel et al., (2012) because although the number of active stocks in Finland during the research time frame is fairly limited the 20th percentile definition of extreme high or low volume could mask the effect behind random noise and lessen the significant differences between the high and low volume portfolios. In Finland, there does exist somewhat sufficient data for using the 10th percentile definition, which could strengthen the effect and significance. Most of the analysis is done using the 10th percentile cut-off point to capture most of the effect.

I employ return and volume data for all Finnish stocks that are traded, and sufficient data exists. The equity data is for volumes, and the return is downloaded from Refinitiv Datastream. Table 1 describes the research data. Also, data on individual market values are downloaded because there seems to be a size-correlated effect intertwined with the trading volume effects, as highlighted by previous studies (Cooper, 1999). Criteria for a stock to be included in the data set are that the stock must be traded on the main exchange of Helsinki and that trading data for the previous year exists. Companies operating in the financial sector are excluded from the sample on the basis that they have a noticeably different structure from other firms as well do very small firms. I define a very small firm as the bottom 5th percentile by market value, and these stocks are also removed from the sample. Observations on the formation date, very close to a capital event, are also omitted when data is available from Datastream International; this is not the case for all stocks and timeframes. Data for regressions and risk factors are downloaded from the researchers' own sites.

Table 1

	Start date	Number of intervals	Average number of stocks
Finland	Jan-2000	249	102
Finland 2000-2010	Jan-2000	125	89
Finland 2010-2020	Jan-2010	124	113

2.2 Return on zero-investment portfolio

If a high volume premium exists, it should be able to form portfolios to get robust results if there is a positive excess return associated with high-volume shocks (Kaniel et al., 2012). To test this conjecture, I form a zero-investment portfolio that goes long and short the low and high stocks that received high and low volume shocks for one euro in total in both legs of the strategy, respectively, both at the 10th and 20th percentile definitions. This is a modified version of Gervais', Kaniel's, and Mingelgrin's (2001) method. Some of the modification needs arise from the differences between the US and the Finnish market structural differences. In Finland, it is not meaningful to form all the reference portfolios.

Portfolios are formed at the end of the formation period and then held for the 20 day testing period without rebalancing. The following equation then determines the net return for the portfolios over research interval t, where R_t^h denotes the return of the high-volume shock portfolio and R_t^l the return of the low-volume shock portfolio.

$$R_t = R_t^h - R_t^l \ (1)$$

Table 2

20th-day returns for the average cumulative returns for the portfolios alongside different timeframes. T-statistic if the returns are statistically different from zero. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Portfolio and timeframe		Average return for zero-investment portfolios held for 20 days	t-Statistic
10th-percentile	2000 - 2020	0,91	1,51
	2000 - 2010	1,63	1,51
	2010 - 2020	0,24	0,4
20th-percentile	2000 - 2020	0,29	0,69
	2000 - 2010	0,09	0,13
	2010 - 2020	0,49	1,11

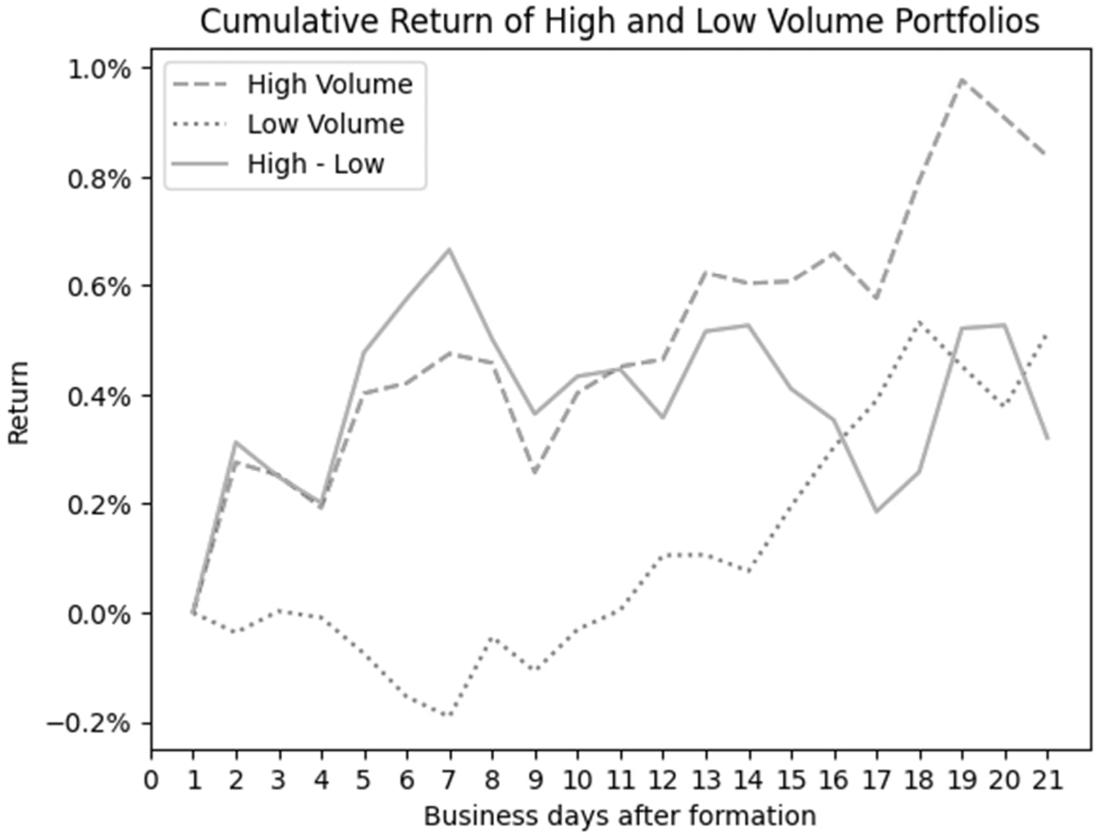
In Finnish capital markets, the high volume premium is not a significant phenomenon which is consistent with conjectures derived from Merton's (1987) investor recognition theory. The relatively low number of traded stocks means that it is not that likely for a stock to be hidden from the potential investor pool. The power of the high volume premium effect seems to correlate with the number of traded securities in a country (Kaniel et al., 2012). My results are consistent with prior research; even in the absence of statistically significant results, the returns are still positive. Countries with a similar capital market structure to Finland, Sweden and Norway also lack evidence of the existence of the high volume premium (Kaniel et al., 2012).

Figure 1 plots the average performance of the 20th-percentile-defined zero-investment portfolio. In line with (Wang, 2021), most of the return spread occurs in the first seven trading days after the formation; thereafter, the spread seems to stagnate. Chordia and

Swaminathan (2000) indicate that this might be caused by the different speed of adjustment to related news between single stocks and the whole market. Like Wang (2021), this plot confirms that the differential speed of adjustment hypothesis does not hold when measuring shocks to the trading volume of shocks.

Fig 1

This exhibits the cumulative post formation average returns between the top and bottom decile portfolios summarized in table 2. Sample data spans from Jan-2000 to Dec-2019.



2.3 Size effect on the high volume premium

Figure 2 shows the cumulative returns for the portfolios of the stocks that received high and low shocks to their trading volume and the spread between those two portfolios. Based on this figure, the high volume premium has existed in Finland for some time frames. It is reasonable to check whether the premium exists on some time frame or in some companies in Finland. Merton (1987) conjectures that the market value of a particular stock influences its visibility. Therefore, it is reasonable to divide the stock market by market value. I created 2x2 sorted portfolios based on market value and shocks to the trading volume. Table 3 examines if the size of the company has effect on the strength of the high volume premium.

Fig 2

This figure exhibits the performance of the strategies and the performance between the top and bottom deciles of the volume-sorted portfolios. This sample spans from Jan-2000 to Dec-2019 for the 10th decile portfolios. One period is a 20-day trading period.

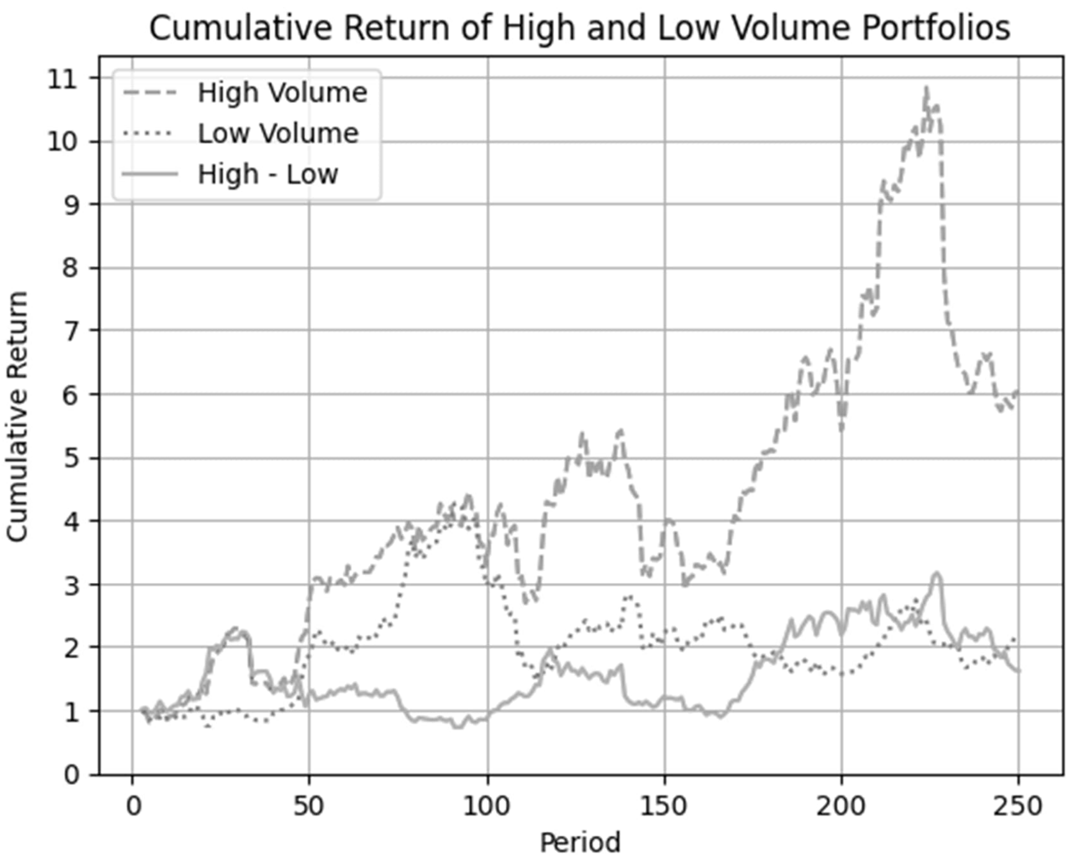


Table 3
20th-day returns for the average cumulative returns for the portfolios alongside different timeframes. T-statistic if the returns are statistically different from zero. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	Low market cap		Large market cap	
	Average return for zero-investment portfolios held for 20 days	t-Statistic	Average return for zero-investment portfolios held for 20 days	t-Statistic
2000 - 2020	-0,97	1,10	0,93	1,55
2000 - 2010	-2,80	-1,96*	1,62	1,74*
2010 - 2020	0,86	0,85	0,22	0,30

In Finland stocks that have a lower market value get lower returns. However, the time period when this happens contains the financial crisis (2007) and the dot-com bubble (2001). Thus, it is reasonable that some patterns reversed in the financial markets and after that period they reverted to their original form. Overall, the results might also be caused by the limited sample availability of the Finnish stock market and therefore show conflicting results.

The result is contrary to the findings of Kaniel et al., (2012). They note that the high volume premium should decrease as the size of the firm increases. In my sample data this is not the case. These results are against the theory implied in Merton's (1987) investor recognition hypothesis that states that stock with a smaller market cap are likelier to receive larger outsized returns from added visibility – positive volume shocks.

3 Testing risk-based explanations of the high volume premium

Considering that there is some conflicting evidence about the high volume premium in Finland it would be helpful to know about the loadings of different risk pricing factors on the premium. In this section, I first conduct a univariate portfolio analysis of how different factors are related to the performance, and then I conduct some cross-sectional analysis to figure out if the firm-level fundamentals affect the performance of the premium. Infact the high volume premium is correlated with some traditional risk pricing model factors. Table 4 has multiple regression statistics that report the time-series averages of the slopes and intercepts of the top and bottom decile portfolios and risk factors. The regression is done by the following time-series model:

$$y_t = \alpha_t + \bar{\beta}_t \boldsymbol{X}_t + \epsilon_t \ (2)$$

where y_t is the excess return of the zero investment portfolio for the period t. In $\boldsymbol{X}_t$ I include the market beta (β^{MKT}), the size (SMB), the book-to-market ratio (BM), momentum (WML), the robust minus weak (RMW), and the conservative minus aggressive (CMA) (Fama and French, 2015). Finally the Pástor and Stambaugh (2003) liquidity factor is added (Agg Liq).

While column 1 indicates that the slope estimate with market beta (β^{MKT}) is negative, it is also statistically insignificant. However, it is worthwhile to note that the sign is non-positive. Subsequently, since higher volume should predict higher returns (Wang, 2021), the negative sign implies lower market beta stocks should perform better in the following period, which is called beta anomaly in empirical asset pricing literature (Bali *et al.*, 2017). Columns 3, 4, 6 and 7 also imply a negative slope with value (HML), momentum (WML), conservativeness (CMA) and aggregate liquidity (Agg Liq) factors, though all are statistically insignificant. Only columns 2 and 5 indicate that the premium loads positively the size effect (SMB) and the robustness of operating profits (RMW) factors. The positive loading on the size effect is backed by existing literature (Fama and French, 2015). The final column includes all factors in the regression analysis. Differing from the univariate analyses, the robustness of the operating profitability factor turns statistically significant.

The intercepts are mostly statistically insignificant, but all are positive. Notably, the momentum factor univariate intercept is significant, in line with my later analysis in table 5. None of the univariate regression models has an exceptionally high explaining factor based on the R^2 statistic. When all the factors are included the regression the R^2 statistic does rise while still remaining relatively low.

Table 4

This table reports the slopes and intercepts of the model 2. Numbers in parenthesis are t-statistics that test if the returns are statistically different from zero. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0,603	0,564	0,641	0,727	0,620	0,665	0,476	0,526
	(1,519)	(1,416)	(1,632)	(1.827)*	(1,567)	(1,684)*	(1,150)	(1,247)
β^{MKT}	-0,228							0,017
	(-0,736)							(0,037)
SMB		0,770						1,286
		(1,161)						(1,364)
HML			-0,165					0,044
			(-0,207)					(0,038)
WML				-0,613				-1,205
				(-1,214)				(-1,967)**
RMW					0,639			1,179
					(0,521)			(0,685)
CMA						-0,671		-0,961
						(-0,593)		(-0,652)
Agg. Liq							-0,072	-0,6213
							(-1,262)	(-1,044)
R^2	0,002	0,005	0,000	0,006	0,001	0,001	0,006	0,030

3.1 Firm-specific determinants of the high volume return premium

Dissecting the sample data cross-sectionally between large and small market cap stocks and during different time periods reveals some statistical significance with the 3 factor capital asset pricing model (Fama and French, 1993) and the momentum factor (Fama and French, 2015) following the methods of Kaniel, Ozoguz and Starks (2012) and Bali *et al.* (2017).

$$y_t = \alpha_t + \bar{\beta}_t \boldsymbol{X}_t' + \epsilon_t \ (3)$$

Table 5 shows the results from the regressions based on model 3 estimated for each of the parameters. For the following analyses in $\boldsymbol{X'}$ are included the market beta (β^{MKT}), size factor (SMB), value factor (HML), and momentum factor (WML).

Table 5

Slopes and intercepts of multiple cross-sectionally dissected regressions for varying periods. Included are the three-factor model factors with the momentum factor. (Fama and French, 2015). *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

		Intercept	β^{MKT}	SMB	HML	WML	R^2
All stocks	2000-2020	0,6559	0,0826	1,400	-0,6076	-1,0608	0,020
		(1,636)	(0,197)	(1,495)	(-0,719)	(-1,888)*	
	2000-2010	0,705	0,030	1,230	-0,119	-0,554	0,016
		(1,182)	(0,056)	(1,029)	(-0,109)	(-0,786)	
	2010-2020	0,764	-0,064	-0,242	-2,663	-2,883	0,062
		(1,397)	(-0,093)	(-0,133)	(-1,725)*	(-2,686)***	
Large market cap	2000-2020	1,054	0,634	3,042	-0,059	-2,241	0,038
		(1,740)*	(1,000)	(2,150)**	(-0,046)	(-2,641***)	
	2000-2010	1,601	1,038	3,762	0,864	-2,200	0,055
		(1,681)*	(1,176)	(1,970)*	(0,496)	(-1,953)*	
	2010-2020	0,621	0,012	-0,840	-3,437	-3,518	0,050
		(0,814)	(0,013)	(-0,330)	(-1,597)	(-2,352)**	
Small market cap	2000-2020	-0,544	1,470	3,993	-4,221	-1,278	0,035
		(-0,681)	(1,756)*	(2,137)**	(-2,502)**	(-1,141)	
	2000-2010	-2,239	1,802	6,109	-6,916	1,663	0,091
		(-1,792)*	(1,556)	(2,439)**	(-3,025)***	(-1,125)	
	2010-2020	1,286	0,071	0,125	0,769	-1,426	0,009
		(1,303)	(0,057)	(0,038)	(0,276)	(-0,737)	

Results show that many of the factors turn out to be statistically significant. At least some of the prevailing high volume premium can be attributed to the common risk factors during some time periods. For all stocks included in the sample, the loading on the momentum factor turned statistically significant even at the 1% level during 2010-2020. The sign of the slope being negative implies that stocks that perform better based on the momentum effect are less likely to receive benefits from the high volume premium. Also, during 2010-2020, for all stocks, the slope of the value effect is negative and statistically significant. This insinuates that the stocks in Finland that benefit from the high volume premium are likelier to be growth stocks than value stocks.

For large market cap stocks, the loading against the momentum factor is persistently negative and statistically significant for all time frames. Notably, when adjusting for these common risk factors, the high volume premium does produce statistically significant alpha at the 10 % level, as shown in column intercept. So, for large stocks, the high volume premium seems to have existed in the Finnish markets. Also, stocks with large market caps show statistically significant positive loading against the size factor (SMB) during 2000 – 2010, implying that the stocks that receive positive shocks to their trading volume are more likely to behave like small stocks. However, this slope turns negative during 2010 – 2020, although the statistical significance also disappears during the 2010 – 2020 time frame. When the large stocks received positive shocks to their trading volumes, they were likelier to correlate with the momentum effect (WML) negatively. So, when the momentum existed as a strong anomaly, the high volume premium was weaker for large stocks.

The regression for small market cap stocks reveals that when controlling for risk-based factors, the high volume premium produces negative alpha during 2000 – 2010. This is in contradiction with Merton's (1987) investor recognition conjecture. Smaller stocks should benefit more from excess visibility produced by the volume shocks on the basis that they are probably less known, and thus investors are less than ideally diversified. When the smaller stocks are affected by a positive shock to their trading volume, the smaller stocks behave in a way that reflects the behaviour of small stocks. This is consistent with existing literature (Fama and French, 1993). The sizeable positive slope indicates this with a statistically significant size effect (SMB) on the 5 % level. The loading against the value factor is also especially important, being -6,9 during 2000 – 2010. This effect is also statistically significant on the 1 % level. Thus, growth stocks were likelier to receive excess returns from the high volume premium in the decade following the year 2000. The explaining power is the highest of all the regressions during 2000 – 2010 for small stocks, the R^2 being 0,091 for the regression in question.

Overall, the results of regressions from the dissected data samples reveal some contradicting results. For small market cap stocks, the effect of the high volume premium varies between decades. During 2000 – 2010 the effect was negative, but this was reversed from 2010 through 2020. For the larger stocks, the high volume premium is positive for the whole testing period but loses statistical significance during 2010 – 2020. This can be partly caused by the financial crisis of 2007.

4 Robustness of results

Fig 3

Histogram plots of the zero-investment portfolio return and residual of the regression for all stocks during 2000 – 2020.

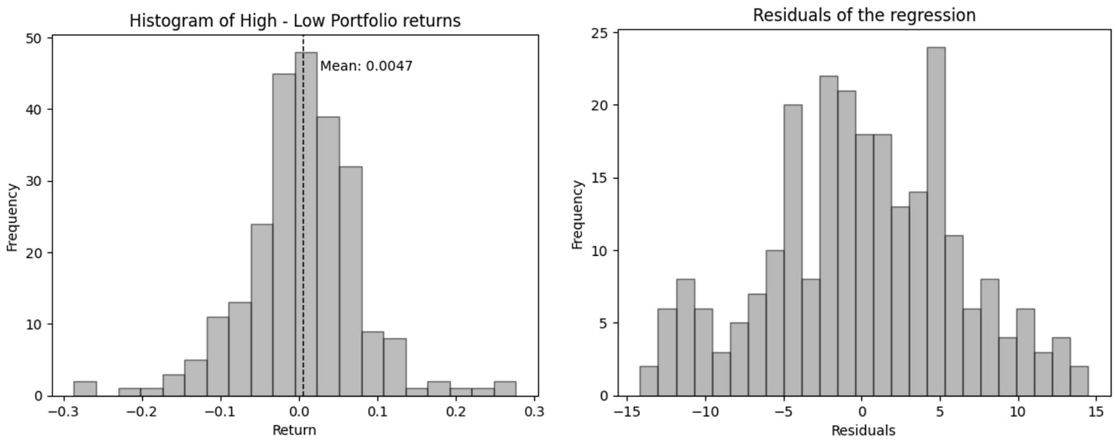


Table 6

Tests for normality (D'Agostino and Pearson, 1973) of the distributions for the zero-investment returns and the regression residuals in table 5 for all stocks in 2000 – 2020. *, **, and *** represent significance at the 10%, 5%, and 1% levels, respectively.

	Normality of the returns	Normality of the residuals
t-statistic	1,453	1,622

Figure 3 shows the returns and the residuals plotted in histograms. Visually the distributions look heteroscedasticly normally distributed. D'Agostino's and Pearson's (1973) normality test results are presented in table 6. The t-statistics of both tests reveal that the null hypothesis of no normality cannot be rejected at any statistically significant level. This can be an attributing factor of errors to the regressions in section 3, and some statistical significance could be lost to these errors and discrepancies.

By some measures, the Finnish capital markets resemble the likes found mainly in developing markets. Distinctive features of the developing markets are defined as a low number of trading stocks which is also a characteristic of the capital markets in Finland. It has also been found that the number of stocks trading tends to affect the outcome of tests determining the existence of the high volume premium and cause low power (Kaniel, Ozoguz and Starks, 2012).

5 Discussion

When considering the high volume premium in Finland from Merton’s (1987) investor recognition hypothesis perspective, the premium seems to be inverted in Finland for some segments of the market. Merton's (1987) conjecture states that bigger market cap stocks should receive smaller excess returns because these stocks are likelier to be already recognised by the wider investor pool and, therefore, should receive less returns from the increased investor attention. Except this, my results are generally in line with Merton’s (1987) theory and previous studies (Kaniel, Ozoguz and Starks, 2012).

My results do not reveal a statistically significant effect of the existence of the high volume premium in the Finnish markets. Still, the results do not directly contradict the hypothesis that Finland has a high volume premium. The effect is remarkably pervasive across many markets in Europe (Kaniel, Ozoguz and Starks, 2012). Factors that might affect the strength of the high volume premium could be related to the investor pool of Finland. In Sweden where the high volume premium has also been found to be statistically non-significant (Kaniel, Ozoguz and Starks, 2012) the reasons have been explained by the presence of foreign investors and Swedish investors’ tendency to hold stocks internationally operating firms (Dahlquist, 2001).

Besides Merton’s (1987) theory, another explaining theory is that investors tend to get overconfident and overly excited, the causal effect being that the price of stocks reaches irrational prices that are decoupled from fundamentals (Statman, Thorley and Vorkink, 2006). This effect is further exacerbated by high trading volumes, which further fuel future mispricing (Gervais, Kaniel and Mingelgrin, 2001). Other explanations exist for the effect of return anomalies following volume shocks to trading volumes, which could be used to explain the high volume premium. Han *et al.* (2022) theorise that trading volume is an attributing factor to investor disagreement and causes mispricing of stocks. Trading volume is an amplifier of mispricing i.e., under (over) priced stocks experience larger negative (positive) return following large influxes of trading activity.

Potential determinants for the high volume premium are theorised to be connected to a stock's liquidity (Kaniel, Ozoguz and Starks, 2012). These theories are derived from former research about a liquidity premium for stocks based on their trading volume (Acharya and Pedersen, 2005). Therefore, it would be reasonable to assume that shocks to trading volume affect this liquidity premium, causing the high volume premium. This was considered by Gervais, Kaniel and Mingelgrin (2001) and proven not to be the case for US markets. If the liquidity premium is a component in the high volume premium in Finland, it would mean that all stocks hold a time-varying liquidity pricing factor in their price. However, it would appear that the high volume premium is not produced by the varying liquidity (Gervais, Kaniel and Mingelgrin, 2001).

Liquidity and trading volumes of stocks contribute to an individual investor's decision-making process. Han and Huang (2018) connect the effects of liquidity shocks to asset prices. They find that contrary to my results and previous literature about the high volume premium when a stock experiences a negative shock to its liquidity, and it is likely to undergo a reversal of the lower returns to higher price appreciation in the longer time frame. Han and Huang (2018) explain this phenomenon by connecting the firm fundamentals and information uncertainty to the trading volume shocks and show that a negative shock is subsequently followed by degradation of the fundamentals for the individual firms. Recent literature by Wang (2021) shows that also the high volume premium, both positive and negative shocks, is connected to economic fundamentals for individual firms and on the macroeconomic level. Cochrane (2013) attributes a large part of trading volume shocks to the arrival of new information to the market. Therefore, the following heightened trading volume can be interpreted as a part of the normal tâtonnement process of markets finding a new equilibrium.

6 Concluding remarks

The prevalent explanation for the high volume premium is that it is a phenomenon, caused by the underlying mechanisms described in Merton's (1987) investor recognition theory and market signals inefficiency. In this paper, I examine if the high volume premium is also a phenomenon in the Finnish markets. While I do not find statistically significant evidence about the existence of the premium, the evidence is not damming that the premium does not exist.

Examining the characteristics of the high volume premium, I find evidence generally consistent with Merton's (1987) investor recognition hypothesis. Contrary to expectations, the premium seems to increase when the firm size grows. My results are more generally in line with existing research and results from similar markets – Sweden and Norway.

Overall, the results in this paper make some progress towards further understanding the relationship between changes to trading volume and stock returns. The evidence gathered in this paper is nevertheless limited because the statistical insignificance raises questions with risk factors. Identifying the sources of this premium and extending the research into the derivatives market remains a challenge for future research.

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