Determinants of Trading Activity on Single Stock Futures Market-Evidences from Eurex Exchange[Δ]

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Abstract

This paper investigates to what extent underlying specific properties together with contract design determine level of trading activity on Eurex derivative exchange. Therefore the study looks beyond systematic reasons extensively examined in prior research. It is found that trading activity is higher for single stock futures on stock characterized by low institutional ownership, and high volume on spot market. The mispricing between spot and futures market also attracts investors to single stock futures market. Moreover the factors, such as a size of contract, tick size and age of contract on particular stock significantly contribute to increase open interest and traded volume. Furthermore, evidences are found that single stock futures become more efficiently priced around ex-dividend date for underlying stock. Our findings have important implications for investors who have interest in that segment of derivative market. They should also be taken into consideration by market regulators.

JEL classification: G1; G11; G14; G21

Keywords: Single stock futures; Futures market efficiency; Listing selection, Short sale

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1. Introduction

The futures contract on single stock (SSF) is the derivative product which has a number of desirable features. It offers an investor the possibility to hedge against a change in the value of underlying stock. In the case of short hedge it gives an opportunity to postpone the sale of underlying, and in this way secure the right to dividend and vote. Moreover, due to the fact that futures prices on financial instruments tend to be higher than spot prices, short position in futures contract is a better alternative than the true sale of underlying. This derivative product offers undisputable benefits to a speculator who can easily leverage his position in a given stock and takes short position instead of using short sale. Also, there are evidences that market efficiency has been improved for stocks being a underlying for single stock futures contracts. (see Ang and Cheng (2005a)). On the other hand, many opponents of that instrument put forward the hypothesis that the introduction of single stock futures contributes to the excess volatility on spot market. Despite the fact that in the existing literature there are mixed evidences for the above premise many local market authorities have decided to tighten regulations for the new segment of the market. The so called Shad-Johnson accord repealed in 2000 was a good example of such type of regulation for US market. In this context, it is worth mentioning the controversy surrounding the introduction of SSF on Hong Kong Futures Exchange in March 1995.

However, in most cases potential risks related to the introduction or reintroduction of singles stock futures were outweighed by the benefits for market participants. Therefore, the launches of a new product, extensively covered by financial press, were highly anticipated. Despite high expectations, the introductions of singles stock futures on exchanges of developed countries do not attract much of investor's attention. Back to November 2002 singles stock futures contract were supposed to be traded on three US based exchanges, namely Nasdaq Liffe, OneChicago, and Island Futures Exchange. Currently, trading takes place only on the floor of Chicago exchange. On the other hand, Hong Kong Futures Exchanges, Euronext.liffe and recently Eurex were much more successful in the introduction of SSF product. Therefore, not surprisingly, most of previous studies

were focused on the reasons why SSF market did not attract projected attention of investors. In the article by Gibson (2002), the lack of education together with the novelty of the product that has been blamed for minor trading activity. The fact that at the time of introduction there were differences between tax treatment of SSF and other futures contract seems to contribute to the situation in which many investors avoid investing in single stock futures market (see Simmons 2002, Jones and Brooks 2005). The high level of initial and maintance margin was pointed out by studies of Dutt and Wein (2003) and Parntnoy (2002) as a factor reducing activity on that segment of derivative market. Finally, the fact that in the first years after introduction, open interest and volume traded was nowhere near their underlying stock becomes a self-fulfilling prophecy. Potential investors stay away from the market which is unable to meet their expectations in terms of liquidity. Instead of pointing out the reasons behind introduction's failure the study by Ang and Cheng (2005b) has pointed out three factors facilitating launch of singles stock futures market. According to the reported results the contracts on stock characterized by high capitalization, volume and volatility are those which used to attract attention of market participants. All three factors are commonly taken into account by US and European exchanges in a selection process of a stock to be the underlying for a futures contract.

Nonetheless, an analysis of trading activity observed on SSF markets after 2005 reveals that both trading volume and open interest differ considerably for various stocks. It suggests that the key to understanding SSF market can lie in the other properties of underlying and specification of futures contract. It can also depend on a market. Therefore, our study focuses on the question to what extent properties of underlying instrument for single stock futures contract determine its popularity among investors. Moreover we examine whether a specification of the contract influences the level of volume and open interest. In order to find answers to those questions, we identify factors affecting trading globally and locally.

The investigation into trading patterns is warranted the attention on at least two grounds. First, acquiring the knowledge on what type of characteristics of underlying attracts attention of investors

in single stock futures is in vital interest of stock exchanges. Secondly, the results reported here can be of interest to market regulators as they provide direct evidence on the level of development of single stock futures market.

The remainder of the paper is organized as follows. The next section contains description of institutional background and the data set. The formulation of research hypothesis is presented in the third section. The discussion of empirical results follows in the subsequent section. Section five investigates the robustness of results. The last section concludes the paper with the discussion of implications for market regulators and investors.

2. Institutional Background and Preliminary Data Analysis

In October 2005 the Eurex exchange launched a singles stock futures market as its new segment. It was a response to Undertakings for Collective Investments in Transferable Securities III (UCITS III) act issued by European Union. This new regulation gave an authority to mutual fund mangers to take short position in derivatives products. First candidates for underlying have come from indices like DAX 30, SMI and Dow Jones STOXX 600. So far, the exchange has chosen companies based on the level of capitalization and turnover. Since the initial introduction of SSFs Eurex exchange has been continuously expanding its product range. In 2008 the number of underlying for singles stock futures has exceeded 500. The Eurex together with Euronxet.liffe are the most liquid markets for single stock futures in Europe. The average open interest and notional value traded for the period 2006-07 has reached the value of 1.95 millions of contracts and USD 217 billions, respectively. For the last two years the Eurex exchange has been among top five markets in terms of the number of single stock futures contracts traded.

In an attempt to create a broad sample, the authors compiled information on 420 companies stock which become underlying for singles stock futures traded on Eurex exchange. The majority of companies are registered in Western European countries like France, Germany, Switzerland, Spain, Italy, and the Netherlands. The remaining 23% of examined firms come from other 11 countries

including developed and emerging economies. For each of the company variables such as a market-to-book ratio, market capitalization, volume, turnover and beta were obtained from the Thomson Financial DataStream. The same source was used to get daily stock prices. As descriptors of past volatility and return patterns we employed benchmarks provided by Thomson Financial DataStream. A return index measures previous performance of stock. It shows a theoretical growth in value of a share holding over a specified period, assuming that dividends are re-invested to purchase additional units of equity at the closing price applicable on the ex-dividend date. In turn volatility index measures the degree of fluctuation in the share price during the previous 12 months. This volatility measure is calculated as a standard deviation of the price. This standard deviation is then divided by the mean price, and the result is adjusted to give a figure in the scale from 1 to 20. The higher value of index the more variation of stock price is observed. Volatility rating of 10 indicates a standard deviation of 25%.

In addition, the data on institutional ownership were obtained from the Osiris database compiled by the Bureau van Dijk Electronic Publishing. The share of intuitional ownership is defined by summing the stock direct holdings of all reporting institutions for each stock in each quarter. We extracted manually quarterly holding starting from the third quarter of 2005 and ending in the first quarter of 2008. The study by Gompers and Metrick (2001), pointed out the fact that large companies in terms of capitalization have also high percentage of institutional ownership. As a result, level of institutional ownership needs to be adjusted to avoid multicolinearity problem. To address concerns, we examined the correlation between institutional ownership and the size of the company for examined sample. The small sizes of correlation coefficient allowed us to proceed with constructed variables. Finally, for all companies we gathered data on dividend yield, ex-dividend dates, and dividend payment date.

The data on single stock futures market were sourced from Thomson Financial DataStream. We collected variables describing contract specification and market activity. Those include contract size, age, and allowed tick size. In turn, activity was measured by open interest and the number of

contracts traded. Previous studies on futures market used to exclude all data within the delivery month to avoid the possibility of noise during the last trading month. We have followed this practice. Thus, our continuous futures prices series is constructed in the following way. Prices for the nearby futures contract are selected until the contract reaches the first day of the delivery month. On that day there is a change of contract on the next one nearest to delivery, and its prices are recorded. For companies included in the sample the mispricing was computed as the difference between the market futures price and the theoretical price of a contract normalized by spot price, where theoretical price is given by the cost-of-carry formula (see Cornell and French (1983)). In order to achieve consistency in a dataset, we translated variables to euro denominated ones.

Table 1 reports descriptive statistics on company level for the variables introduced above. The means of monthly mispricing per company exceed 12.23% with standard deviation equal to 15.29%. The distribution of mispricing has positive skewness. The size of mispricing seems to be surprisingly high. Its size can be attributed to the fact that futures on stock of some companies are hardly ever traded. It applies especially to contracts on stocks from emerging markets. On the other hand, the average daily mispricing across the whole market is slightly above 3%, which is much closer to the previously reported values for index futures.

[Table 1 about here]

The size of contract available on Eurex are 1,10,50,100, 500, and 1000 shares. The Row 2 of Table 1 indicates the more than half of futures contracts included in the sample have the size of 100 shares or more. The tick size ranges from 0.0005 to 0.2 on average, its value is 0.02. At least half of single stock futures contracts were introduced 20 months or more before the begin January 2008. Just less than 10% of contracts were traded for a shorter period than 1.41 year. Both market capitalization and beta reveal that Eurex exchange is biased towards stock of well established companies as underlying of single stock futures. Average market capitalization of a firm is around 1.15 billions euro, and beta is close to 1. For the examined sample the average institutional

ownership is on the level of 56.65%, and at least 50% companies have a value of *Inst_ownership* variable above 61.67%.

In this study impact, the impact of volatility is measured by the *Volatility_index*. It ranks the companies based on the level of volatility during last 12 months. The index can take a value from 1 to 20. Around 40% of companies included in the sample have annual volatility in the range of 12.5-25%. The mean value of volatility index is 5.88. It suggests that companies on which singles stock futures are available are characterised by relatively low level of volatility. Also we include control variables: the logarithm of the number of stocks from particular country, *Log_NS_EUR*, the total capitalization of a country's stock market as a percentage of its total GDP, *MVGDP*.

3. Hypothesis development

In the effort to find determinants of trading on SSF market, we need to look beyond standard criteria of underlying selection. According to the previous studies, the exchanges made a choice based on the level of turnover, market capitalization and volatility. Large dispersion in the popularity of single stock futures on different underlying indicates that there are other missing factors. Below, we have listed variables which may affect trading level. In each case we briefly discuss reasons of including particular parameter in the regression.

3.1 Contract specification

In the analysis we consider four variables which characterized the contract. The variable *Size_lot* measures the size of contract. The previous studies by Karagozoglu and Martell (1999), Huang and Stoll (1999), and Bollen et al. (2003) have pointed out that smaller contract size can increase popularity of product among investors. Investors with less capital can obtain better accessibility to the futures market. Moreover, even larger investor may prefer smaller contract. The application of large size contracts to hedging or speculation can result in compromising a degree of precision in

matching positions. On the other hand reducing the contract size increases a trading cost, as both brokerage commissions and exchange fees are mostly quoted per contract independently of a size.

The next variables *Tick_size* quantify the smallest allowed change of contract price. A larger tick size reduces the number of possible prices at which trade could take place, thereby improving the way the market operates. At the same time larger tick size means higher revenue for market maker at the expense of investors (see Sappi (1997), Brown et al. (1991), Bollen et al. (2003)). Above quoted studies on changes in contract specification, do not leave us with clear indication what type of specification receives more acceptances from market participants. The fact that Eurex offer products characterised by different contract size and tick value to the investors, makes it ideal case to test them. Therefore, it justified the inclusion of variables *Size_lot* and *Tick_size* in our analysis.

Finally, the variable *Age* indicates the number of years since futures contracts on a particular stock have been offered to investors. We put forward a hypothesis that financial products which are longer available on the market may receive more investors' attention.

3.2 Characteristics of underlying

In this study we consider seven variables which characterized the properties of underlying. The three factors like turnover, market capitalization and volatility were previously analyzed. The stock exchanges tend to select underlying for single stock futures based on three above criteria. Therefore, it is not clear if variables such as *Ln_volume, Ln_Market_Value and Volatility_index* still have any explanatory power. Based on previous studies all three are expected to have positive impact on trading activity.

Of course, investors would like to trade single stock futures only if it offers any advantage in comparison to instruments already available on the market. The limitation in the right to use short sale can be one of such reasons. To verify this hypothesis, we consider *Inst_ownership* variable.

The positive relationship between percentage of direct institutional ownership and accessibility of short sale instrument was documented by Nagel (2005). Thus, we can put forward the hypothesis that futures contract on underlying stock with high institutional ownership is less popular among investors. Since taking short position in futures contract is a substitution of shorting a stock on spot market. On the other hand one can argue that institutional ownership is a factor facilitating trading, because an institutional investor is believed to be better prepared to trade on spot and futures market (Falkenstein (1996), Dennis and Weston (2001)). Thus, our study can shed the light on which of the above presented hypotheses is confirmed by trading patterns observed on Eurex exchange.

The number of studies have examined the performance of stock portfolios construct based on the level market-to-book ratio (see Fama and French (1992), Lakonishok et al (1994), LaPorta et al. (1997)). The risk-return profile for such portfolios is dissimilar to each other. Therefore, one can expect that a variable such as natural logarithm of market-to-book ratio, ***Ln_M/B,*** may affect the level of activity on futures market. There is no clear indication about a direction. The beta is one of key characteristics of stock and it is also used for calculating optimal hedge ratio in terms of market risk. Thus, we put forward a hypothesis that high beta stocks as more sensitive to change of macro conditions are better candidates for being an underlying. Finally, we address the question to what extent performance of stock influences status of futures contracts among investors. ***Ln_Return*** index is a proxy of stock performance during the preceding year.

3.3 Mispricing between Spot and Futures market

Prior research on stock index futures has shown that mispricing tends to become smaller and less volatile for well a established contracts (see: e.g. Kempf (1998); Miller et al. (1994); Puttonen (1993); Chung (1991), MacKinlay and Ramaswamy (1988)). Thus, mispricing is often used as the benchmark for efficiency of particular futures market. Consequently, we can expect that its magnitude can be negatively correlated with trading activity. On the other hand it seems reasonable

that some level of mispricing actually facilitates trading. The existence of mispricing gives an arbitrageur a chance of making profit, so the reason to engage in trading.

3.4 Trading activity around ex-dividend date

In addition to global analysis of factors affecting trading in SSF segment of the market, we would like to get better understanding of the reasons behind local spikes of trading activity. It turned out that we observed high investor's activity around ex-dividend dates. The two hypotheses are put forward in an effort to explain this phenomenon.

1. The fact that in a short run dividend level will not influence theoretical price given by cost-of-carry formula may have an impact on trading. In other words, the less uncertainty about fair price of derivative product the more active the market is.
2. The activity of investors can be affected by some factor external to the market, such as taxation. The different taxation levies were blamed for low market activity on US market (see Simmons (2002)).

In the next section we present the results of empirical analysis which will help us verify the above discussed hypotheses.

4. Empirical results

In order to detect factors facilitating trading on EUREX exchange we use the logit regression on company level. The two proxy of trading activity were used: average daily open interest and traded volume. Tabel II presents the results of our logit model where definition of dependent variable use open interest as proxy of market activity. If the average daily open interest for futures contact on the stock of particular company exceeds the average open interest per contract for Eurex market the dependent variable is 1, otherwise 0. We find strong evidence that high level of institutional ownership has negative impact on the popularity of single stock futures among investors. It is consistent with the hypothesis that investors trade more often a SSF on stock characterised by

limited access to short sale. The results indicate that market participants prefer smaller size futures contracts with larger tick value. So, the contracts which can be easily used for hedging and have limited number of possible prices receive more market acceptance.

Also, we found evidence that the period of time since introduction of SSF is positively correlated with the level of open interest. From three variables previously used by exchange in the process of selecting stock for underlying of futures contract, only the level of volume on spot market has statistically significant positive impact on dependent variable.

Thus, the level of activity on spot market stands out of other two factors previously used for selection. We also find evidence that the magnitude of mispricing attracts attention of market participants to particular single stock futures. None of other considered variables have statistically significant explanatory power. The proposed specification (2)-(6) manage to have a correct classification rate of 69-81%. Based on that rate, the logistic regression model fits well to data. Further, confirmation of the right selection of the model comes from Wald test and the fact that Hosmer and Lemeshow test do not reject our approach. It is worth highlighting that the model's specification (1) based on three factors primarily used by exchanges leads to correct classification rate 50% only. Thus, there is a need of considering explanatory variables different than traded volume on spot market, volatility, market capitalization of underlying.

The results of logit regression for traded volume have mostly confirmed those reported for open interest (see Tabel III). The major difference is that the volume observed on spot stock market is no longer statistically significant. Both Wald test and Hosmer and Lemeshow test suggest that the specification (2)-(6) fits quite well to the data. Moreover correct classification rate is in the range of 72-80%.

Overall, our results indicate that five variables have statistically significant explanatory power of trading activity. Those variables are the size of the contract, the value of tick, the age of contract, the level of institutional ownership, the volume on spot market, and mispricing between futures and spot markets.

In addition to the overall analysis of parameters affecting trading on SSF segment of Eurex market, we have examined the behaviour of single stock market around the dates such as dividend announcements, ex-dividend dates, and dividend payments. There are evidences that open interest volume traded, and mispricing significantly change around ex-dividend date. The Figure I presents behaviour of mispricing and both indicators of investors' trading activity. The efficiency benchmark sharply decreased from almost 5% to slightly above 1%. Around ten trading days after an ex-dividend date the mispricing starts to rise. Starting from two weeks before ex-dividend date the open interest steadily increases and then after the event date it gradually decreases. The traded volume is characterized by a few high peaks before and after ex-dividend date. In order to obtain a further insight into the dynamics of three magnitudes we test whether the activity is indeed higher around the event day. The results are reported in Table IV. All panels present the average level of open interest, volume traded, and mispricing for selected days relative to event. In addition, each of reported means is tested whether it is higher than the minimum of global average and median for examined variable. The first part of the table exhibits the results for the whole sample which consists of 990 ex-dividend dates spread out across companies. In the middle panel results obtained for companies with dividend yield lower than the reported median. The sample consists of companies with institutional ownership higher than the median was used to obtain estimates from the last panel of Tabel IV. Independently of the sample selection, we observed statistically significant change of open interest around ex-dividend date. The traded volume changes only within a week before or after the event date. The three panels clearly indicate that the Eurex single stock future market becomes more efficient around ex-dividend date.

The most probable explanation of high activity combined with increased efficiency is the difference in taxation of income coming from investment in SSF and cash dividend. From empirical studies by Elton and Gruber (1970), Dubofsky (1992), and Frank and Jagannathan (1998) we know that on ex-dividend date stock is expected to drop by the amount smaller than actual dividend size. The futures price is affected by the level of spot price. So, an investor who takes a short position on

the stock before ex-dividend is able to benefit from a drop of futures price. Moreover, an incentive to trade increases if investor operates in tax environment where cash dividend is taxed with higher levy than the income from derivative investment. The Table V provides information on individual tax levies for countries whose residents generate more than 85% of volume on SSF segment of Eurex exchange. The particular active investors come from Germany, Spain and Switzerland. The analysis of Table V reveals that trading single stock futures instead of waiting for cash dividend can bring substantial tax savings to the wealth investors. Those savings range from 5 to 33% depending on the country. A word of caution, however, is required as exact benefits from trading vary from individual to individual as they belong to different tax brackets.

We believe that our analysis would be incomplete without analysis of futures and spot price behaviour around ex-dividend date. Such scrutiny can reveal trading strategy generating profit from event driven price movement. The Table VI reports percentage change of both prices. In an intersection of a row and a column the change is reported between the day represented by the row and the day defined by the column. For example, in the panel *spot market* in the intersection of row "-2" and "1" is -0.0163. Thus, it means that on the average, the spot price between two days before ex-dividend date and 1 day after, decreases by1.63%. In addition, we test if percentage changes are different than zero. The strategy of opening short position in single stock futures contact in one of three days preceding ex-dividend date and closing it on the day when stock is traded without the right to dividend is optimal in terms of maximising profit. The first column in the panel *futures market* confirms our choice as all reported changes are statistically different than zero and they are in the range of 0.7 -1.0 percent. The level of risk measured by standard deviation of returns is comparable to the one observed on spot market.

5. Robustness checks

In order to examine sensitivity of results to the assumptions, we have performed the number of robustness checks. First, we defined dependent variable for logit regression based on the size of median. Thus dependent variable was a dummy indicating if futures contract on the stock of a

particular company attract the above median trading activity. This robustness check was designed to address concerns that the results may be driven by specific value of mean. Secondly, we run logit regression on country sub-samples and the number of other specifications. In all examined cases obtained results are very similar to those reported in Table II and III. Thirdly, we checked if the results are sensible to the change of mispricing definition. Instead of using continuous approach for handling dividend, we considered discrete version of cost-of-carry model. Finally, we also examine if the effect of an increase of trading combined with improvement of market efficiency around ex-dividend depends on sample composition. As a robustness check the analysis reported by Figure I and Table V was repeated separately for samples consisting of SSF for companies registered in one country only. On country basis our results were confirmed. Overall, we can conclude that the results presented in this paper are robust to the sample and model selection.

6. Conclusions

This study investigates whether the properties of an underlying and specification of contract have determined the level of trading observed on single stock futures segment of Eurex derivative exchange. The value added of this paper is twofold. Firstly, it provides a detailed examination of determinants of the trading activity since the commencement of the market. The analysis has focused not only on factors effecting overall trading, but also on reasons behind of extraordinary levels of market participation. Secondly, we stretch the limits of earlier research by overcoming the common bias toward systematic factors by introducing a new, extensive set of explanatory variables.

Our empirical findings indicate that there is a positive relationship between the level of trading on futures market and the following variables: trading volume on spot market, the mispricing between spot and futures and a tick size. For direct institutional ownership and a size of contract negative correlation with open interest and trading volume is observed. Following the study by Nagel (2005) a percentage of institutional ownership is used as proxy of short sale accessibility. In other words, we show that stocks characterized by the restriction in short sale and

high trading volume on spot market are good candidates for underlying for futures contract. Furthermore, we find evidence that market participants present on Eurex exchange prefer smaller contracts with higher tick size. Our study has also proven that single stock market increases its efficiency measured by the level of mispricing and during the time where stock is traded ex-dividend. Around that date trading activity measured by open interest and traded volume substantially increases. The fact that trading of SSF instead of a stock allows to avoid income tax on a cash dividend significantly contributes to the increase of trading activity and as a result the reduction of mispricing.

The implications of this study for market regulators are tangible and important. The derivatives exchanges tend to select the stock for underlying of futures contract based exclusively on the size of market capitalization, share turnover and volatility. However, it turns out, that those factors are not sufficient to achieve the ultimate aim namely the attention of investors. The key variable previously overlooked is company's ownership structure.

An interesting extension of this study would be an analysis of factors determining trading on option segment of Eurex exchange and its compression to the factors here reported. Such analysis can shed the light on broader reasons behind trading derivatives product on single stock.

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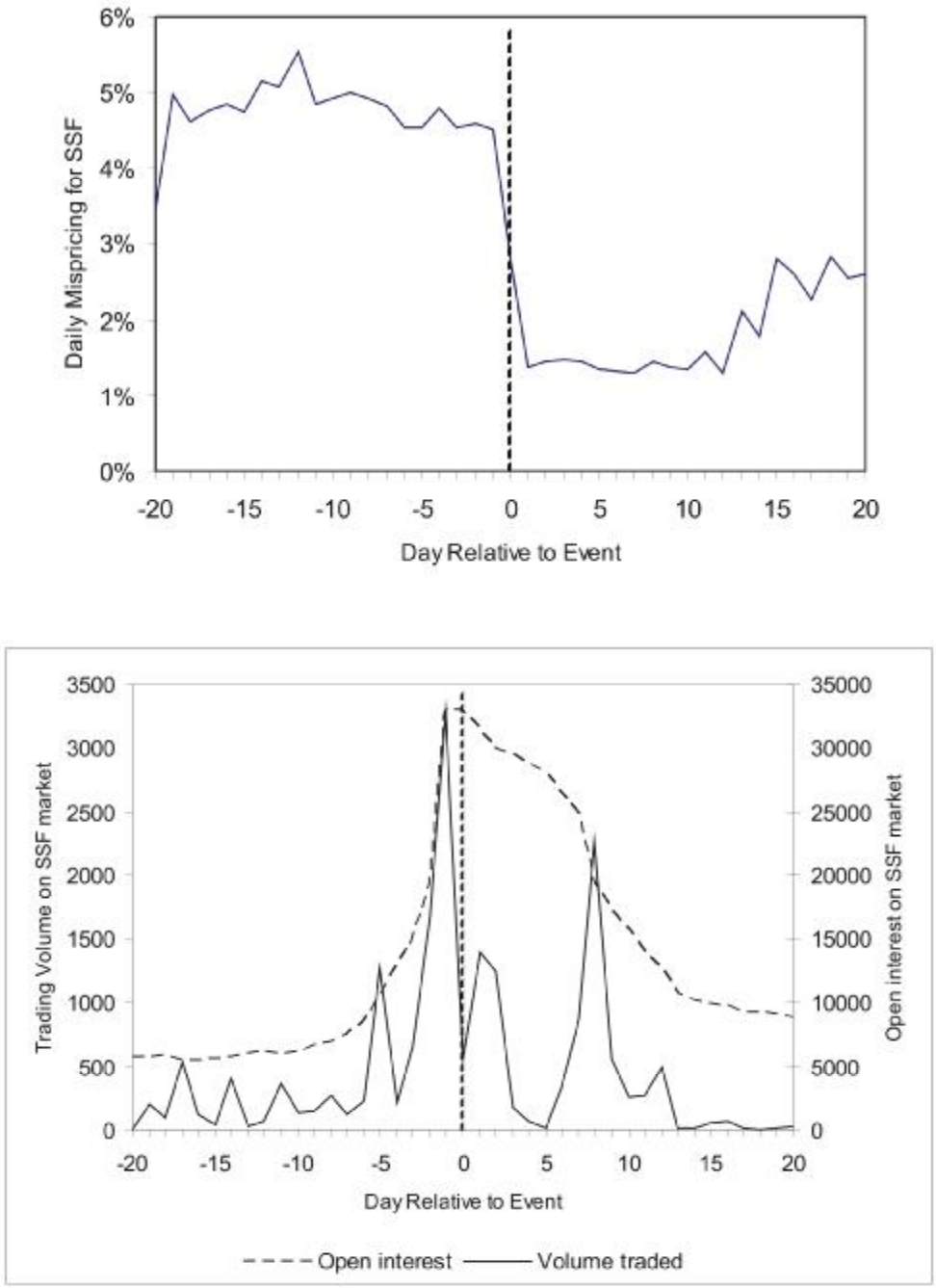
Figure I: Trading patterns and Market Efficiency around Ex-dividend Date.



Note: The first panel plots the average mispricing abnormal volatility around 990 ex-dividend dates for 420 companies. The sharp decrease of mispricing indicates improvement in market efficiency. The subsequent panel depicts the average level of open interest and traded volume around ex-dividend dates. The left hand scale corresponds to traded volume and right hand one for open interest only. Both magnitudes tend to increase revealing high market activity around the event date.

Table I: Descriptive statistics

	Mean	Standard deviation	10th Percentile	Median	90th Percentile
Mispricing	*12.2338*	*15.2988*	*-3.9708*	*11.5868*	*31.4813*
Size_lot	*139.3741*	*190.3674*	*50*	*100*	*500*
Tick_size	*0.0177*	*0.0342*	*0.01*	*0.01*	*0.1*
Age	*1.6111*	*0.3410*	*1.4109*	*1.5671*	*2.1863*
Ln_Market_Value	*7.0565*	*1.6208*	*5.0378*	*6.9848*	*9.1549*
Beta	*0.9775*	*0.5707*	*0.3418*	*0.8747*	*1.7219*
Inst_ownership	*56.6497*	*28.6728*	*11.7653*	*61.6731*	*91.9364*
Ln_M/B	*0.9635*	*0.6048*	*0.2599*	*0.9130*	*1.7552*
Ln_volume	*9.2438*	*2.3691*	*5.6480*	*9.7196*	*11.9618*
Volatility_index	*5.8811*	*3.0336*	*3.00*	*5.00*	*10.0*
Ln_Return index	*7.1116*	*1.6112*	*5.0708*	*7.0659*	*9.1549*
Log_NS_EUR	*3.6781*	*0.6777*	*2.4849*	*3.7135*	*4.3820*
MVGDP	*1.1506*	*0.7265*	*0.5100*	*1.0800*	*3.0700*

Descriptive statistics for a set of variables that are likely to influence the level of market activity are reported above. The data set consists of 420 companies from in 17 countries. ***Mispricing*** is defined as the difference between the market futures price and the theoretical price of a contract normalized by spot price, where theoretical price is given by the cost-of-carry formula. ***Size_lot*** denotes the size of single stock futures for a given company. ***Tick_size*** measures the smallest amount by which a price of contract can change. ***Age*** denotes the number of years since introduction SFF on a stock of a given company. ***Ln_Market_Value and Ln_M/B*** are the natural logarithms of market capitalization and market-to-book value for a given company-month, respectively. ***Beta*** is stock beta calculated from 5 years period. ***Inst_ownership*** measures percentage of institutional holding in a given company on quarterly basis. ***Ln_volume*** is the natural logarithms of volume observed on spot market for a given company. ***Volatility_index*** is a variable that takes a value from 1 to 20 measuring riskiness of stock during last 12 months. ***Ln_Return index*** is the natural logarithms of total return index and market-to-book value for a given company-month. ***Ln_NS_EUR*** is natural logarithms of a number of stocks from a given country for which single stocks are available. ***MVGDP*** is the total capitalization of a country's stock market as a percentage of its total GDP.

Table II Results of logit regression for open interest as dependable variable

	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-6.0174***	-2.7081***	-5.1496**	-5.1803***	-5.1589***	-7.3143***
Mispricing		0.0302**	0.0352**	0.0380***	0.0380***	0.0404***
Size_lot		-0.0051**	-0.0097**	-0.0098**	-0.0098**	-0.0114***
Tick_size		12.0698***	7.4966**	6.6879**	6.7001***	
Age						1.9615**
Ln_Market_Value	0.1501*		0.0495		0.0584	0.0125
Beta				0.3434	0.3436	0.2911
Inst_ownership			-0.0159***	-0.0159***	-0.0159***	-0.0154***
Ln_M/B			-0.0707	-0.0458	-0.0452	0.0664
Ln_volume	0.1951***		0.2938***	0.2770***	0.2765***	0.2738***
Volatility_index	0.0011			0.0235	0.0238	0.0119
Ln_Return index				-0.0616		
Ln_NS_EUR	0.3061	0.1261	0.3871	0.3506	0.3508	0.1299
MVGDP	0.4155	0.2641	0.2313	0.2403	-0.0141	-0.0832
Pseudo R^2	0.0799	0.1669	0.2466	0.2601	0.2518	0.2937
Percentage classified correctly (%)	50.9	69.35	75.21	77.6	77.5	80.4
Chi-squared for Wald test	16.02*	25.68***	38.35***	39.47***	39.42***	45.01***
Hosmer and Lemeshow Test	15.,90**	11.39	6.33	12.10	9.86	9.45

This table reports the results of the logistic estimation of the above average open interest per contract. The sample consists of 420 companies on which stock are underlying for singles stock futures in the period between October 2005 and January 2008. If open interest for futures contact on the stock of particular company exceeds the average open interest per contract for Eurex market the dependent variable is 1, otherwise 0. *Mispricing* is defined as the difference between the market futures price and the theoretical price of a contract normalized by spot price, where theoretical price is given by the cost-of-carry formula. *Size_lot* denotes the size of single stock futures for a given company. *Tick_size* measures the smallest amount by which a price of contract can change. *Age* denotes the number of years since introduction of SFF on a stock of given company. *Ln_Market_Value and Ln_M/B* are the natural logarithms of market capitalization and market-to-book value for a given company-month, respectively. *Beta* is stock beta calculated from 5 years period. *Inst_ownership* measures percentage of institutional holding in a given company on quarterly basis. *Ln_volume* is the natural logarithms of volume observed on spot market for a given company. *Volatility_index* is a variable that takes a value from 1 to 20 measuring riskiness of stock during last 12 months. *Ln_Return index* is the natural logarithms of total return index and market-to-book value for a given company-month. *Ln_NS_EUR* is natural logarithms of a number of stocks from a given country for which single stocks are available. *MVGDP* is the total capitalization of a country's stock market as a percentage of its total GDP. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table III Results of logit regression for volume traded as dependable variable

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Intercept	*-4.5122****	*-4.5002****	*-4.48027*	*-3.7344***	*-3.7105***	*-6.2541****
Mispricing		*0.0333***	*0.0385***	*0.0336*	*0.0339***	*0.0294***
Size_lot		*-0.0118***	*-0.0183***	*-0.0184***	*-0.0187***	*-0.0248***
Tick_size		*9.8292***	*7.7805*	*8.5114***	*8.5256***	
Age						*2.5693****
Ln_Market_Value	*0.0528*		*0.0333*		*-0.0176*	*-0.0694*
Beta				*-0.1920*	*-0.1929*	*-0.3474*
Inst_ownership			*-0.0137***	*-0.0143***	*-0.0144***	*-0.0125***
Ln_M/B			*-0.1661*	*-0.2212*	*-0.2206*	*-0.1305*
Ln_volume	*0.0815*		*0.0498*	*0.0661*	*0.0665*	*0.0542*
Volatility_index	*0.0761*			*0.0783*	*0.0787*	*0.0308*
Ln_Return index				*-0.0146*		
Ln_NS_EUR	*0.4532*	*0.3903*	*0.5466*	*0.5468*	*0.546753*	*0.1855*
MVGDP	*0.2455*	*0.2832*	*0.1580*	*0.1439*	*0.139954*	*0.1014*
Pseudo R^2	*0.0869*	*0.1588*	*0.1880*	*0.1971*	*0.2172*	*0.2714*
Percentage classified correctly (%)	*46.10*	*71.6*	*73.10*	*74.20*	*74.70*	*79.50*
Chi-squared for Wald test	*6.46*	*20.57****	*25.06****	*26.01****	*26.10****	*37.90****
Hosmer and Lemeshow Test	*14.35***	*9.94*	*7.78*	*5.75*	*5.76*	*9.15*

This table reports the results of the logistic estimation of the above average traded volume per contract. The sample consists of 420 companies on which stocks are underlying for singles stock futures in the period between October 2005 and January 2008. If traded volume for futures contract on the stock of a particular company exceeds the average traded volume per contract for Eurex market the dependent variable is 1, otherwise 0. ***Mispricing*** is defined as the difference between the market futures price and the theoretical price of a contract normalized by spot price, where theoretical price is given by the cost-of-carry formula. ***Size_lot*** denotes the size of single stock futures for given company. ***Tick_size*** measures the smallest amount by which a price of contract can change. ***Age*** denotes the number of years since the introduction SFF on a stock of a given company. ***Ln_Market_Value and Ln_M/B*** are the natural logarithms of market capitalization and market-to-book value for a given company-month, respectively**.** ***Beta*** is stock beta calculated from 5 years period. ***Inst_ownership*** measures percentage of institutional holding in a given company on quarterly basis. ***Ln_volume*** is the natural logarithms of volume observed on spot market for a given company. ***Volatility_index*** is a variable that takes a value from 1 to 20 measuring riskiness of stock during last 12 months. ***Ln_Return index*** is the natural logarithms of total return index and market-to-book value for a given company-month. ***Ln_NS_EUR*** is the natural logarithms of a number of stocks from a given country for which single stocks are available. ***MVGDP*** is the total capitalization of a country's stock market as a percentage of its total GDP. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table IV : Daily levels of open interest, traded volume and mispricing around Ex-dividend date.

Day Relative to Event	*-10*	*-5*	*-2*	*-1*	*0*	*1*	*2*	*5*	*10*
Panel A: Full sample N=990									
Open interest	*6121.88*	*10622.23**	*19324.13****	*32987.75****	*33028.79****	*31319.93****	*29920.22****	*28003.71****	*15643.78****
Volume traded	*129.56*	*1273.87***	*1669.55****	*3282.03****	*546.28**	*1399.80***	*1251.57***	*8.66*	*258.30*
Daily Mispricing(%)	*4.9376**	*4.5542**	*4.5899**	*4.5235**	*2.8031*	*1.3683*	*1.4602*	*1.3658*	*1.3637*
Panel B: Low dividend yield <2.26%, N=445									
Open interest	*9243.16*	*16362.25***	*28591.78****	*39863.62****	*40728.82****	*38546.40****	*36188.26****	*33844.22****	*21486.98****
Volume traded	*52.18**	*2742.29***	*2005.87***	*5094.51****	*344.27*	*1785.44***	*180.26*	*12.05*	*572.96*
Daily Mispricing(%)	*5.6843*	*5.3567*	*5.2450*	*5.3043*	*7.1357**	*3.5239*	*3.5192*	*3.3470*	*3.3433*
Panel C: Institutional ownership>62.44%, N=451									
Open interest	*2832.97****	*4480.36****	*10824.47****	*23767.69****	*23923.61****	*23101.74****	*22392.27****	*21020.56****	*7827.86****
Volume traded	*9.91*	*16.02*	*1049.15****	*604.19***	*227.9*	*168.43*	*52.89*	*10.23*	*455.67**
Daily Mispricing(%)	*16.1679***	*15.2822***	*15.4058***	*15.1453***	*8.3009**	*3.9653*	*3.9658*	*3.816*	*3.7749*

This table reports arithmetic mean of open interest, traded volume and mispricing calculated around ex-dividend dates for 406 companies. The arithmetic means are calculated cross day around event date. Panel A of the table reports means for full sample of 990 events, whereas Panel B reports the results for companies with dividend yield lower than median equal to 2.26%. Panel C of the table reports means for sample of companies with institutional ownership higher than median. The null hypotheses that examined means are lower than corresponding minimum of median and mean for the whole sample are tested. ***, **, * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Table V: Summary of individual tax levies for countries whose residents generate more than 85% of volume on recorded on SSF segment of Eurex exchange.

Country	*Type*	*Net personal tax (%)*				*Withholding tax(%)*
		2005	*2006*	*2007*	*2008*	*2005-2008*
Finland	*PIN*	*16.0*	*19.6*	*19.6*	*19.6*	*N/A*
France	*PIN*	*32.3*	*32.7*	*32.7*	*32.7*	*N/A*
Germany	*PIN*	*22.2*	*22.2*	*23.7*	*26.4*	*N/A*
Italy	*PIN*	*17.6*	*17.8*	*18.0*	*22.3*	*N/A*
Netherlands	*CL*	*25.0*	*25.0*	*22.0*	*25.0*	*15*
Spain	*PI*	*23.0*	*23.0*	*18.0*	*18.0*	*N/A*
Switzerland	*CL*	*40.4*	*40.4*	*40.4*	*25.7*	*35*

Source: OECD Tax Database and KPMG Derivatives: International tax handbook 2008.

The column *Type* describes a dividend treatment: CL: Classical system (dividend income is taxed at the shareholder level in the same way as other types of capital income (e.g. interest income), PI: Partial imputation (dividend tax credit at shareholder level for the part of underlying corporate profits tax), PIN: Partial inclusion (a part of received dividends is included as taxable income at the shareholder level). The *Net personal tax* column shows the net top statutory rate to be paid at the shareholder level, taking into account of all types of reliefs and gross-up provisions at the shareholder level. The *Withholding tax* column shows the tax levy imposed on income received from vanilla derivatives.

Table VI: Mean of holding returns on spot and futures market around ex-dividend date.

Market	*Opening position (Day Relative to Event)*	*Closing position (Day Relative to Event)*			
		0	***1***	***2***	***3***
Spot Market	***-3***	*-0.0226**** *(0.0001)*	*-0.0142**** *(0.0001)*	*-0.0145**** *(0.0001)*	*-0.0158**** *(0.0001)*
	-2	*-0.0246**** *(0.0001)*	*-0.0163**** *(0.0001)*	*-0.0166**** *(0.0001)*	*-0.0178**** *(0.0001)*
	-1	*-0.0250**** *(0.0001)*	*-0.0163**** *(0.0001)*	*-0.0166**** *(0.0001)*	*-0.0178**** *(0.0001)*
Futures Market	***-3***	*-0.0069*** *(0.0397)*	*0.0014 (0.8535)*	*0.0025 (0.8747)*	*0.0011 (0.6614)*
	-2	*-0.0089**** *(0.0088)*	*-0.0007 (0.3124)*	*0.0004 (0.5039)*	*-0.0009 (0.2959)*
	-1	*-0.0095**** *(0.0056)*	*-0.0011 (0.2323)*	*-0.0005 (0.3685)*	*-0.0014 (0.2491)*

The table reports arithmetic mean of holding return if investors apply strategy buy before ex-dividend date and sell on or after that date. The ex-dividend date is denoted by day 0. In the brackets p-value for t-test with null hypothesis mean equal to zero are reported. ***, **, * denote rejection of null on statistical significance at the 1%, 5%, and 10% level, respectively.