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 derivatives 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 the underlying stock. In the case of a short hedge it gives an opportunity to postpone the sale of the underlying security, and in this way secure the right to dividend and vote. Moreover, due to the fact that theoretical futures prices on financial instruments tend to be higher than spot prices[1], a short position in futures contract seems to be 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 take a short position instead of using a short sale. Also, there is evidence that market efficiency has been improved for the underlying stocks. (see Ang and Cheng (2005a)). On the other hand, many opponents of the SSF instrument put forward the hypothesis that the introduction of single stock futures contributes to the excess volatility on the spot market. Despite the fact that in the existing literature there is mixed evidence 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 the 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 single stock futures were outweighed by the benefits for market participants. Therefore, the launches of a new product, extensively covered by the financial press, were highly anticipated. Despite high expectations, the introductions of single stock futures on exchanges of developed countries do not attract much investor attention. In November 2002 single stock futures contract were supposed to be traded on three US based exchanges: Nasdaq Liffe, OneChicago, and Island Futures Exchange.

[1]The theoretical future price given by cost-of-carry model is $F_0 = S_0 e^{(r-q)\times T}$ and as far $r>q$ we expect that futures price should be higher than the observed spot price.

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 the 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 on SSF's 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 the introduction's failure, the study by Ang and Cheng (2005b) has pointed out three factors facilitating the launch of single stock futures market. Their results suggest that the contracts on stock which are characterized by high capitalization, volume and volatility use to attract the attention of market participants. All three factors are 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 the specification of a futures contract. It can also depend on a market itself. Consequently, our study focuses on the question to what extent properties of the 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 the underlying security attracts the attention of investors in single stock futures is of vital interest to 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 hypotheses to be tested 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 single stock futures market as a new segment. It was a response to Undertakings for Collective Investments in Transferable Securities III (UCITS III) act of the European Union. This new regulation gave an authority to mutual fund managers to take short position in derivatives products. First candidates for underlying securities 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, the Eurex exchange has been continuously expanding its product range. In 2008 the number of underlying securities 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 1.95 millions of contracts and USD 217 billions, respectively. The Eurex exchange has also been among the top five markets in terms of the number of single stock futures contracts traded in this period.

In an attempt to create a broad sample, we compiled information on 420 company's stock which becomes the underlying for single stock futures traded on the 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 stock prices, a market-to-book ratio, market capitalization, volume, turnover and beta were obtained from the Thomson Financial DataStream. We also employed Thomson Financial DataStream's descriptors of past volatility and return patterns as benchmarks. A return index shows a theoretical growth in value of a share held 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 the 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 divided by the mean price, and adjusted to give a figure in the scale from 1 to 20[2].

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

2 Thompson DataStream defines the volatility index(rating) in the following way. Volatility index measures the degree of fluctuation in the share price during the previous 12 months, based on the last 52 weekly values. Volatility is calculated on a standard deviation of the price, and is a measure of its dispersion around the 12 month average. This standard deviation is then divided by the mean price, and the result multiplied by 40 to give a figure in the scale from 1 to 20. This corresponds to a standard deviation range of 0 – 50%, so a volatility rating of 10 indicates a standard deviation of 25%. The higher the value, the higher the volatility of the stock.

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. We have followed the convention of previous studies on futures market by excluding all data within the delivery month to avoid the possibility of noise during the last trading month. 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 to 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 the spot price, where the 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 the 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 is surprisingly high. Its size can be attributed to the fact that stock futures of some companies are rarely 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 contracts available on Eurex are 1,10,50,100, 500, and 1000 shares. Row 2 of Table 1 indicates that 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, the mean 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 the Eurex exchange is biased towards stock of well established

companies as the underlying security 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 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 the volatility index is 5.88. It suggests that companies on which singles stock futures are available are characterised by relatively a 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. Hypotheses development

In the effort to find determinants of trading on the SSF market, we need to look beyond standard criteria of underlying security 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 security indicates that there are missing factors. Below, we have listed variables which may affect trading level. In each case we briefly discuss the reasons for including a particular parameter in the regression.

3.1 Contract specification

In the analysis we consider four variables which characterize 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 a smaller contract size can increase the popularity of a product among investors. Investors with less capital can obtain better accessibility to

the futures market. Moreover, even larger investors may prefer smaller contracts. 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 a clear indication of what type of specification receives more acceptances from market participants. The fact that Eurex offer products characterised by different contract sizes and tick values to the investors, makes it an ideal market to test these characteristics.

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 have been available on the market longer may receive more investors' attention.

3.2 Characteristics of underlying security

In this study we consider seven variables which characterized the properties of underlying securities. Turnover, market capitalization and volatility have been previously analyzed. The stock exchanges tend to select underlying securities for single stock futures based on these three criteria. Therefore, it is not clear if variables such as *Ln_volume, Ln_Market_Value and Volatility_index* 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 an 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 suggest the hypothesis that futures contract on an underlying stock with high institutional ownership is less popular among investors. Since taking a short position in a futures contract is a substitution for shorting a stock on the 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.

A 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 depends on the level of the ratio. 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.

Beta is one of the key characteristics of a stock and it is also used for calculating the optimal hedge ratio in terms of market risk. Thus, we put forward a hypothesis that high beta stocks as more sensitive to a change of macroeconomic conditions are better candidates for an underlying security. 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 possibility of making profit, so encourages 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. The analysis has detected 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 the cost-of-carry formula may have an impact on trading. In other words, the less uncertainty about the fair price of a derivative product the more active the market is.
2. The activity of investors can be affected by some factors external to the market, such as taxation. The different taxation levies were once blamed for low market activity in the US market (see Simmons (2002)).

In the next section we present the empirical results which will help us provide the evidence regarding discussed hypotheses.

4. Empirical results

In order to detect factors facilitating trading on EUREX exchange we use the logit regression on company level. We used two proxies of trading activity: average daily open interest and traded volume. Tabel II presents the results of our logit model the dependent variable is open interest used as a proxy of market activity. If the average daily open interest for futures contract on the stock of particular company exceeds the average open interest per contract for the Eurex market the

dependent variable is 1, otherwise 0. We find strong evidence that a high level of institutional ownership has a negative impact on the popularity of single stock futures among investors. It is consistent with the hypothesis that investors trade a SSF on stock characterised by limited access to short sale more often. The results indicate that market participants prefer smaller size futures contracts with larger tick values. So, the contracts which can be easily used for hedging and have limited number of possible prices, receive more market acceptance.

We also found evidence that the period of time since the introduction of the SSF is positively correlated with the level of open interest. From the three variables previously used by an exchange in the process of selecting underlying stocks of futures contract, only the level of volume on the spot market has statistically significant positive impact on the dependent variable. Thus, the level of activity on the spot market stands out from the other two factors previously used for selection. We also find evidence that the magnitude of mispricing attracts the attention of market participants to particular single stock futures. None of the 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 the data. Further, confirmation of the correct 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 other than traded volume on the spot market, volatility and market capitalization of underlying security.

The results of logit regression for traded volume have primarily confirmed those reported for open interest (see Tabel III). The major difference is that the volume observed on the spot stock market is no longer statistically significant. Both the Wald and Hosmer and Lemeshow tests suggest that the specification (2)-(6) fits data well. Moreover correct the 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 the mispricing between futures and spot markets.

In addition to the overall analysis of parameters affecting trading on the SSF segment of the Eurex market, we have examined the behaviour of single stock market around dates such as dividend announcements, ex-dividend dates, and dividend payments. There is evidence that open interest volume traded, and mispricing significantly change around the ex-dividend date. Figure I presents the 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 the 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 the ex-dividend date. In order to obtain a further insight into the dynamics of the market 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 the event. In addition, each of reported means is tested to determine whether it is higher than the minimum of global arithmetic average and the median for the examined variable. The first part of the table shows the results for the whole sample which consists of 990 ex-dividend dates spread out across companies. The middle panel provides results for companies with dividend yield lower than the reported median. The last panel reports results of companies with institutional ownership higher than the median. Independent of the sample selection, we observed a statistically significant change of open interest around the ex-dividend date. The traded volume changes only within a week before or after the event date. The three panels provide clear evidence 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 dividends. Empirical studies by Elton and Gruber (1970), Dubofsky (1992), and Frank and Jagannathan (1998) has shown that on ex-dividend date, stock is expected to drop by an amount smaller than the 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 an investor operates in a tax environment where the cash dividend is taxed higher levy than the income from a derivative investment. The Table V provides information on individual tax levies for countries whose residents generate more than 85% of volume on the SSF segment of the Eurex exchange. The particularly active investors come from Germany, Spain and Switzerland. The analysis of Table V reveals that trading single stock futures instead of waiting for a cash dividend can bring substantial tax savings to the investors. Those savings range from 5 to 33% depending on the country[3].

We believe that our analysis would be incomplete without analysis of futures and spot price behaviour around ex-dividend date. Such scrutiny can reveal a trading strategy which generates profit from an event driven price movement. Table VI demonstrates the percentage change of both prices using matrix. In an intersection of a row and a column the change between the day represented by the row and the day defined by the column is reported. 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 the percentage changes are different than zero. The strategy of opening a short position in a single stock futures contract 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

[3] A word of caution, however, is required as exact benefits from trading vary from individual to individual as they belong to different tax brackets.

they are in the range of 0.7 -1.0 percent. The level of risk measured by the standard deviation of returns is comparable to the one observed on spot market.

5. Robustness checks

In order to examine the sensitivity of results to the assumptions, we have performed a number of robustness checks. First, we defined the dependent variable for logit regression on the size of median. Thus, the dependent variable was a dummy variable indicating if a futures contract on the stock of a particular company was above the median trading activity. This robustness check was designed to address concerns that the results may be driven by a specific value of the mean. Secondly, we run a logit regression on country sub-samples and a number of other specifications. In all examined cases the results are very similar to those reported in Table II and III. Thirdly, we checked if the results are sensitive to the change of mispricing definition. Instead of using a continuous approach for handling dividends, we considered a 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 the 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. 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 security and the specification of a contract have determined the level of trading observed on the single stock futures (SSF) segment of the Eurex derivative exchange. The contribution 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 extraordinary levels of market participation. Secondly, we expand the limits of earlier research by diminishing 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 the spot market, mispricing between the spot and futures markets and tick size. Using either open interest or trading volume, we find negative correlation between both direct institutional ownership and the size of the contract. 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 the spot market are good candidates for underlying securities for futures contracts. Furthermore, we find evidence that market participants present on Eurex exchange prefer smaller contracts with higher tick sizes. Our study has also provided evidence that SSF 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 is substantially higher. The fact that trading of SSF instead of a stock allows the investor to avoid or reduce 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 contracts based exclusively on the size of market capitalization, share turnover and volatility. However, this study provides evidence that those factors are not sufficient to achieve the ultimate aim namely the attention of investors. The key variable previously overlooked is the company's ownership structure. An interesting extension of this study would be an analysis of factors determining trading on option segment of the Eurex exchange combined with the comparison to the factors reported here. Such analysis would shed the light on the broader reasons behind trading derivative products on a single

stock.

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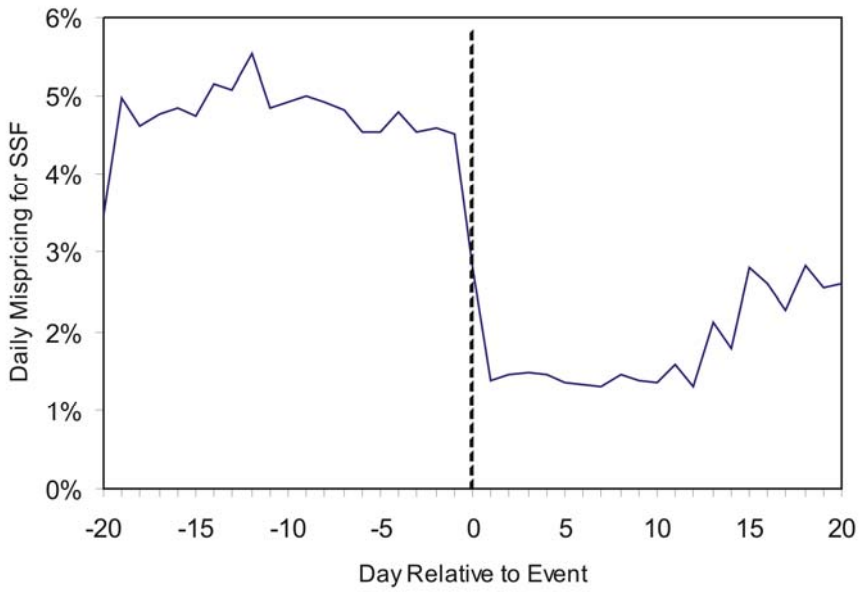
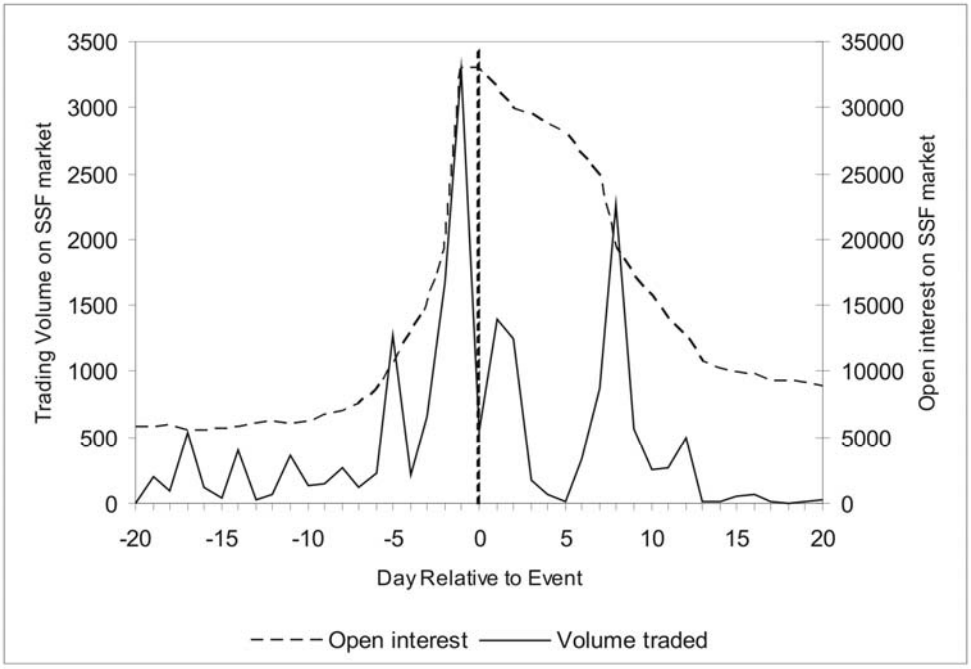
Figure I: Trading patterns and Market Efficiency around Ex-dividend Date.





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 contract 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 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: 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****	*-0.0142****	*-0.0145****	*-0.0158****
		(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*
	-2	*-0.0246****	*-0.0163****	*-0.0166****	*-0.0178****
		(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*
	-1	*-0.0250****	*-0.0163****	*-0.0166****	*-0.0178****
		(0.0001)	*(0.0001)*	*(0.0001)*	*(0.0001)*
Futures Market	***-3***	*-0.0069***	*0.0014*	*0.0025*	*0.0011*
		(0.0397)	*(0.8535)*	*(0.8747)*	*(0.6614)*
	-2	*-0.0089****	*-0.0007*	*0.0004*	*-0.0009*
		(0.0088)	*(0.3124)*	*(0.5039)*	*(0.2959)*
	-1	*-0.0095****	*-0.0011*	*-0.0005*	*-0.0014*
		(0.0056)	*(0.2323)*	*(0.3685)*	*(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.