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ANALYSING CFD RETAIL INVESTORS' PERFORMANCE IN A POST MIFID II ENVIRONMENT

In this scientific article, the performance of retail investors trading contracts for differences offered by EU regulated investment firms has been analysed. The aim of the study is to identify common patterns of behaviour and the determinants of holding period returns and risk aversion in general and in a post-MiFID II environment. More than 80% of clients in this sample are losing money and a panel econometric examination reveals that low equity and high used margin-to-equity ratios are among the biggest contributors for negative holding period returns. Used margin-to-equity ratios are affected by equity size and by the holding period returns. Regulatory changes due to MiFID II implementation and due to the introduction of a restriction on the sale of contracts for differences are affecting holding period returns and used margin-to-equity ratios, perhaps not as intended and expected.
JEL: F31; G11; G15; G41

1. Introduction

Trading complex financial instruments like leveraged Contracts for difference (CFDs) has dramatically grown in popularity over the last decade. Hundreds of investment firms have been active in offering "low commission" or "commission-free" over the counter (OTC) trading of CFDs via ever-improving electronic platforms. Investment firms try to match the growing demand for CFD trading by retail investors, but at the same time, they are in the business of creating their own demand with all the advertisements of potential big returns, independent income, aggressive and indirect marketing, etc.

In spite of the fact that the chance of an asset price (representing a stochastic process) going up or down is around 50%, on average above 70% of retail investors' accounts for trading CFDs are losing money (see Appendix Table 2). It is well known that odds for winning on the financial markets, especially in leveraged CFDs trading, are against the retail investor, however, this is not preventing vast of the new and existing clients to pursue their casino alike experience, emotions and of course, outcome and to devote different shares of their monthly income and accumulated wealth to this pursuit. Trading forex, derivatives and excessive trading of financial instruments are compared to gambling and addictions (Lopez-Gonzalez, Griffiths, 2018; Grall-Bronnec et al., 2017). It is not proven that derivatives trading

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promotes higher quality for the market of the underlying market and for the overall quality of markets (Phylaktis, Manalis, 2013).

CFDs trading based on currency pairs has been very common. Client performance is determined not only by the pure price differential times quantity but also by slippage and by swap charges (rollover charges) that are one of the main revenue pillars of the investment firm with the latter representing financing costs incurred by retail investors and associated with margin trading. The bid-ask spreads also account for individual traders' performance, since spreads can sometimes represent 1-3% of the CFD price (Brown et al., 2010).

Opening a trading account for trading CFDs is relatively easy, e.g. investment firms usually require questionnaire filling, copy of a personal document for identification, proof of address, bank account/credit card possession and depositing money into the trading account. It is a very widespread practice for retail brokers to request a minimum of 100-200 EURO/USD initial deposit in order for the client to be allowed to open an account and to start investing/trading. Before the 2018 ESMA measures and newer legislation, it was possible for clients using services of EU investment firms to use 400 to 1 leverage which means that with just 100 EUR in their margin account, they could open a 400 times higher notional value, e.g. it was possible for a client with just 100 EUR in her account to open a position of 40 000 EUR. In this particular example, just a 0.25% price change of the underling asset in the opposite direction will lead to equity being wiped out, while a one percent change per day or even more being the normal for many underlying assets.

Regulators like European Securities and Markets Authority (ESMA) and EU member countries' authorities are aware of the CFD trading practices and the business model of regulated investment firms offering this kind of financial instruments' trading via an electronic platform. Through various regulatory measures, incl. regulations, directives, national laws implementing directives, ordinances, guidelines and recommendations, EU legislation set a common legal framework, that led to a standardised method of conducting business and have raised the standards for financial services providers aiming higher transparency and better-informed choice for clients. Although retail investors still don't manage to become profitable on average and to take advantage of higher regulatory and legislative standards in the field.

The aim of this scientific study is to analyse individual investors' performance in trading OTC CFDs and to test individual investors' profitability determinants and accounting for risk-taking determinants, using real trading data of retail investors, clients of licensed in the EU investment firms.

In this article following hypotheses have been tested:

1. The size of the equity variable has a positive impact on traders' performance (HPR);
2. The used-margin-to-equity ratio (UMER) negatively impacts the HPR;
3. Traders' performance is deteriorating with the advance of time;
4. When the UMER is considered as a responsive variable, then the equity size is negatively affecting the dependent variable;

5. The HPR negatively impacts the UMER;
6. A positive impact on HPR is caused by the 3rd of January, 2018 entry into force of the European Union's (EU's) Second Directive on Markets in Financial Instruments (MiFID II-Directive 2014/65/EU of the European Parliament and of the Council ofthe 15th of May 2014 on Markets in Financial Instruments and Amending Directive 2002/92/EC and Directive 2011/61/EU (MiFID II) aiming to strengthen investor protection, increasing transparency and set common rules for all investment firms offering services in the EU;
7. The 1st of August 2018 ESMA's measures on restricting marketing, distribution and sales of CFDs led to improved performance of traders, i.e. to higher HPRs;
8. The UMER has decreased as a result of the implemented MiFID II-Directive;
9. The UMER has decreased as a result of the implemented August 2018 ESMA's measures.

After a brief introduction on the characteristics of CFD trading descriptive and econometric investigation follows, with summarising and analysing presented results.

2. CFDs Trading Peculiarities

CFDs are complex derivative financial instruments allowing investors to take advantage of underlying asset's price changes. Investment firms offer CFDs on a wide range of underlying assets, including single stocks, currency pairs, equity indices, cryptocurrencies, commodities, etc. Usually CFDs are traded by retail investors, while professional traders, due to various regulatory limitations and helped by wider access to financial instruments and venues, prefer to make transactions with the underlying asset, e.g. trading equities, ETFs, exchange-traded derivatives, for example.[2] Bauer et al. (2009) signal that options trading is leading to much larger loss compared to the price dynamics in the underlying and is representing a gambling pattern of investors behaviour.

CFDs offer no direct arbitrage opportunity with the underlying asset, however, CFDs are traded at a price close to the underlying asset (Brown et al., 2010). CFD trading involves leverage, or said in other words, CFD trading usually is done on margin. If an individual retail investor uses a leverage of 20 to 1 and the underlying asset's price goes in the opposite direction of the opened position by 5%, then a 100% loss on initial investment is achieved. The leverage of "200 to 1" and "400 to 1" was not something unusual prior to August' 2018 ESMA's measures on limiting leverage and promoting additional measures for improving the soundness of retail investor's financial status and behaviour. CFDs are traded over the counter (OTC) and as not being a standardised product slight differences apply for the CFDs manufactured by different providers (investment firms). According to the ESMA Annual Statistical Report on EU Derivatives Markets (2018) CFDs account for 19% of the amount outstanding for currency derivatives, while in terms of the number of total derivatives

[2] In the text the term retail investor can be used interchangeably with the terms: trader; individual investor; investor; client; consumer.

contracts, CFDs comprise 57% of total volume. CFDs are held and traded mainly by retail investors due to their ease of access.

When offering CFDs and acting as counterparty, the investment firms stick to one of the three common business models: 1) Dealing on own account and not hedging the exposure, thus taking the whole risk, respectively bearing the clients' profits and benefiting from clients' losses; 2) Hedging all client orders to a third party, e.g. transmitting received trades to a liquidity provider; 3) Dealing on own account and hedging part of the received exposure when a specific threshold is met or based on a discretionary decision.[3]

On the 3rd of January 2018, the EU's Second Directive on Markets in Financial Instruments (MiFID II) took into effect. The aim of the new regulatory framework is to improve transparency, increase investor protection and to help restoring competition in the sector. Rules for: algorithmic and high-frequency trading; provision of services from third (non-EU) countries; data reporting; and transparency requirements have been introduced with MiFID II. Furthermore, on the 2nd of July 2018, ESMA banned the marketing, distribution or sale of binary options to retail investors. In addition to these measures on the 1st of August 2018, for a period of 3 months initially restrictions on the marketing, distribution or sale of CFDs to retail investors entered into force. The restrictions are comprised by: limiting the leverage on different classes of instruments (from 30:1 for major currency pairs to 2:1 for cryptocurrencies); a margin close out rule; a negative balance protection; banning the use of incentives by CFD providers, such as bonuses; and a standardised risk warning. After several prolongations of the three-month period, the 1st of August, 2018 measures has been implemented permanently by country authorities of EU members.

Margin trading of CFDs is known to be a risky endeavour with odds for reducing initial capital invested exceeding by much odds for increasing it. Thanks to the standardised warnings, investment firms regulated in EU must inform potential and existing clients about the percentage of clients losing money using their services and each quarter to recalculate the indicator based on the latest data. A small sample of EU regulated investment firms, presented in Table 2 in the Appendix, reveals that 72% of CFD providers' retail investor accounts are losing money. Similar negative outcome from trading forex CFDs is revealed in the summarized and analysed results by Ivantchev (2020). In todays' informative world, traders have at their disposal abundant information on the matter of trading on the financial markets. A vast literature (books, scientific and non-scientific articles) has been written on the topic of Fundamental analysis, technical analysis, automation of trading, trading behaviour and numerous courses, coaching services, trading systems can be bought and accessed. Despite this fact, traders are still prone to failure in trading financial instruments, CFDs in particular. Financing costs are among the main contributors to CFD trading losses, especially for open positions (trades) held overnight, from a week to one year (Lee, Choy, 2014). Akerlof (1978)'s information asymmetry through the adverse selection can also be blamed for the prevailing share of retail investors losing money, furthermore, Levin (2001) claims that better buyer's information is increasing the quantity of services demanded.

[3] See Questions and Answers Relating to the provision of CFDs and other speculative products to retail investors under MiFID, 31 March 2017, ESMA35-36-794.

Decisions made under stress are known to be irrational, as suggested by Kahneman and Tversky (1979), thus investors experiencing losses are prone to wrong trades/investments.

Investors, even professional ones, usually are experiencing behaviour that can be depicted by the disposition effect, characterised by the behaviour of keeping losses long and cutting gains short (Kahneman, Tversky, 1979; Weber, Camerer, 1998; Oehler et al., 2003; Lucchesi et al., 2015; Beev, Hristozov, 2020). Feng and Seasholes (2005), however, find that experience helps traders to overcome the reluctance to realise losses but reduces the propensity to realise gains significantly. Hartzmark (1991) analyses the performance of 2229 large traders trading on the Chicago Board of Trade (CBT) for the period from July 1977 to December 1981. Speculative traders prevail in comparison to hedging purposes traders. The performance of traders, however, can be defined as pure luck and random, which is not a subject to sophisticated persistently profitable trading strategy (see ibid.).

From other perspective, Doering et al. (2015) summarise that social trading networks can lead to higher returns for retail traders, also helping in restoring the transparency of returns and trading and eventually lead to higher liquidity on the financial markets. Retail investors can copy profitable patterns using social trading networks and achieve hedge funds alike returns (see ibid.).

3. Data

In this scientific paper, an unbalanced panel from January 2015 until May 2019 for 3038 active retail investors has been analysed. A larger data set has been filtered down to selected active clients who have realised closed and open daily profit or loss on average of above 20 currency units. The data set comprises retail investors' CFD trading historical data from various EU based and MIFID complying regulated investment firms. The analysed data comes from a history reports like the ones derived from the common Meta trader 4 and 5 trading platforms. Only the history reports variable, that is employed in the analysis, has been scrutinised descriptively and econometrically.

This scientific research has been accomplished through an anonymous dataset of retail investors trading data provided after a written consent by a liquidity provider investment firm licensed in the EU. No individual retail investor has been identified, neither can be identified by the provided dataset, nor has been identified by the liquidity provider itself. Following Recital 26 of the General Data Protection Regulation (GDPR) Regulation (EU) 2016/679 that came into effect on THE 25TH OF MAY 2018, no natural person can be or has been identified directly or indirectly through using this set of anonymous trading historical data, thus principles of data protection are not applicable to anonymous information.

Retail investors' performance, in terms of profitability and risk aversion analysis, involves real trading data scrutinisation. One of the reasons this topic is not commonly covered is due to the lack of easily accessible trading data of retail investors. The main limitation of this paper's dataset is the missing individual investors' trades who impact the variables used in the research, like closed and floating profit or loss, equity, balance and used margin. For example, the closed and floating profit or loss are leading to a change in equity and balance

variables, but it is not clear what part of the profit or loss is due to swaps (rollover charges), or to change in prices, or due other fees and commission charges, the size of the spread and the slippage of execution, etc.

Dependent variables have been selected among all history report variables, due to their ability to suit this research objective, namely, to allow the analysis of retail investors' profitability and risk aversion and their determinants.

3.1. Dependent variables

HPR is the total holding period return (HPR), calculated as the change in equity adjusted for deposits, withdrawals and other adjustments, compared to beginning equity, all of them derived from the history report. The variable is calculated for each period and for each retail investor on a cumulative basis.

MARGINRATIO is the variable for the UMER, calculated as the quotient of the used margin and the equity variable, found in the history report.

3.2. Explanatory variables

Each of the dependent HPR and MARGINRATIO variables can serve as an explanatory variable if the other is selected as dependent variables.

LOGEQUITY is the natural logarithm of the trader's equity variable.

D01012018 is a dummy variable for the 3rd of January' 2018 entry into force of the EU's Second Directive on Markets in Financial Instruments (MiFID II-Directive 2014/65/EU of the European Parliament and of the Council ofthe 15th of May 2014 on Markets in Financial Instruments and Amending Directive 2002/92/EC and Directive 2011/61/EU (MiFID II).

D01082018 is a dummy variable for the 1st of August 2018 ESMA's measures on restricting marketing, distribution and sales of CFDs. These measures have been implemented temporarily, for three months initially. Upon expiry, they have been rolled over several times. On the 31st of July 2019 ESMA ceased the renewal of the temporary restriction on the selected financial instrument, since most national competent authorities (NCAs) have taken permanent national product intervention measures related to CFDs that are at least as stringent as ESMA's measures.

4. Descriptive Analysis

The dataset is comprised by daily trading data for 3038 active retail investors of MIFID II compliant EU investment firms. The average length of the trading history of individual retail investors is 336 calendar days, with a median value of 224 days, from the beginning of 2015 until the end of May 2019 respectively. The sample is unbalanced and is comprised by more than 1 mln. observations per variable.

The retail investors' equity possesses the following base (account) currency distribution: 1629 retail investors' account are in EUR (53.6% from total), 1062 in USD (34.9%), 269 in PLN (8.8%), 69 in GBP (2.3%) and 10 in CHF (0.3%). The average retail investor's account size (equity) for the period whole period under investigation stood at 3227 EUR, while the median value came at 1 276 EUR. Retail investors with accounts in CHF base currency are having the largest mean and median values of their equity, equal to the amount of 6601 and 4371 EUR, respectively. Retail investors with a base currency of their trading account of Polish zloty are having the lowest mean and median values, 1458 and 247 EUR, respectively.[4]

The average length of each client's history is 338 calendar days, and with 224 calendar days for the median value. Retail clients experienced a daily change in equity, due to closed Profit or Loss or the change of Floating Profit or Loss on average of 72.5% of the days in review, and with a median value of 77.3%.

Summarised statistical data for variables presented in Table 5 in the Appendix suggests that variables are not following normal distribution since the third and fourth central moment are having different values than zero and the Jarque-Bera statistic and the p-value for accepting the null hypothesis of kurtosis and skewness having zero values is suggesting the non-rejection of the null hypothesis.

The distribution of the HPR variable, suggests that data is heavily skewed to the right (see figure 4). The UMER variable is also right-tailed yet having fewer outliers in comparison to the HPR dependent variable (see Figure 3). The distribution of the equity and the natural logarithm of the equity is not even, as can be seen from Table 5 and Figure 1 and Figure 2 in the Appendix. The natural logarithm of the equity is skewed to the left, while the equity variable is skewed to the right.

Since this paper is targeting retail investors' performance and common patterns of retail investors trading CFDs it is important to stress on profitability. In Table 1 a total HPR distribution has been presented. The variable has been calculated as the net change of equity during the whole period for each retail investor, adjusted for deposits, withdrawals, account adjustments. The distribution of this variable suggests considerable skewness and non-normality. Retail investors are prone to losing money when trading CFDs using electronic trading platforms. Summary statistics for the total HPR variable reveals that above 47% of retail investors are losing between 90 to 100% of their equity, around 60% of retail clients are losing at least half of their equity, while 84.4% of retail clients are losing money, i.e. they are experiencing negative total HPR on their equity. About 12% of retail investors realise an HPR between 0 and 50%, while only 2.8% gain more than 90%.

Considering the other variable for depicting retail investors' behaviour and performance led to the analysis of the risk-taking variable, approximated by the UMER (see Table 2 below and Figure 3 in the Appendix). The distribution of UMER of sample's retail clients reveals that 318 or 10.5% of all retail clients in the sample are not holding overnight trading positions, thus their overnight UMER is zero (as can be seen in Table 2). This, however, is not indicative

[4] For the purpose of these calculations all accounts have been converted into single currency of EUR using average exchange rates values for the period of Jan-2015-May 2019.

for the degree of intraday risk aversion, i.e. for the UMER, respectively. In the range 0-0.2 are falling 562 clients (or 18.5% of total), while 17% of retail investors fall in the 0.2-0.4 range, 20.7% in the 0.4-0.6 respectively, and 18.5% are in the 0.6-0.8 range. In the last quantiles, from 0 to 1 and in the above "1" values are falling close to 14.9% of all retail investors. The distribution of the UMER is following a much equal path compared to the total HPRs' distribution of retail investors.

Table 1

Distribution of total HPRs of retail investors

Total HPR ranges	number of clients	% total
above 90%	84	2.8
75 -90%	18	0.6
50 -75%	19	0.6
25 -50%	68	2.2
0 -25%	286	9.4
-25 -0%	456	15.0
-50 – -25%	285	9.4
-75 – -50%	242	8.0
-90 – -75%	140	4.6
-100 – -90%	1440	47.4

Source: Own calculations.

Table 2

Distribution of UMER of clients

UMER ranges	number of clients	% of total
equal to 0	318	10.5
from 0 to 0.2	562	18.5
from 0.2 to 0.4	516	17.0
from 0.4 to 0.6	628	20.7
from 0.6 to 0.8	563	18.5
from 0.8 to 1	294	9.7
above 1	157	5.2
Total	3038	100.0

Source: Own calculations.

After the descriptive analysis of variables, an econometric investigation of individual investors' behaviour has been carried out using selected responsive (dependent) and explanatory variables outlined in the next sections.

5. Methodology and (Panel) Econometric Investigation

Several models for identifying the determinants of the traders' profitability and UMER have been revealed hereinafter. The ordinary least squares (OLS) approach for panel data has been employed for the purpose of dependent variable determinants identification. Bond (2002) suggests that lagged values of the dependent and explanatory variables can be used as instrument variables (also see Das, 2005; Miguel et al., 2004). Results of Judson and Owen

(1999) prove that the bias of a panel ordinary lest squares model with fixed effects and lagged dependent variables decreases with increasing the number of periods, hence improving dramatically the quality of the regression. The higher the number of periods, the lower the bias in the dynamic panel regression with fixed effects (Nickell, 1981a). Nickell (1980b) suggest adding a dependent lagged value as an explanatory variable in order to reduce the bias.

A Hausman test has been performed on Ordinary least squares (OLS) panel data models for the selection of Fixed, Random effects introduction. The low p-value for the Correlated Random Effects – Hausman Test suggests that the null hypothesis can be rejected, inferring thus the acceptance of the alternative hypothesis of Fixed effects.

Appling a panel econometric investigation through the fixed-effects models, as suggested from the Hausman test output, yields to satisfactory result in revealing the determinants for the HPR dynamics as a dependent variable. The same procedure applies when identifying the factors for the UMER.

A redundant fixed effects test is also carried out in order to check the joint significance of variables. The p-value of the Cross-section F-value and the Cross-section Chi-square value are equal to zero, suggesting the rejection of the null hypothesis and accepting the alternative.

The presence of multicollinearity has been checked through the application of correlation analysis. Low cross-correlation coefficient values are associated with the absence of multicollinearity (see Dormann et al., 2013). As can be seen from Table.5 in the Appendix, the variables are experiencing low cross-correlation, thus multicollinearity is not an issue in the panel econometric investigation.

Verifying the statements made in the hypotheses is done through individual variables' p-values for coefficient t-statistics and for overall model F-statistics and p-value for accepting the null of the F-test.

Since the performed Hausmann test suggest the use of a Fixed effects panel regression models, following general panel regression model has been applied:

$$Y_{it} = a_i + \gamma_1 Y_{it-n} + \beta_n X_{j,it-n} + \zeta_j D_{j,i} + u_{it} \quad (1)$$

where:

$\mathbf{Y_{it}}$ is the dependent (responsive) variable for the $\mathbf{i^{th}}$ retail investors in the $\mathbf{t^{th}}$ period. First, the HPR variable is used as a dependent variable, then the UMER is employed as a dependent variable in order to test the performance and the risk-taking behaviour.

$\mathbf{Y_{it-n}}$ is the n-lagged dependent (responsive) variable for the $\mathbf{i^{th}}$ retail investors (if the value of **n** is larger than zero, a dynamic panel regression has been introduced);

$\mathbf{X_{j,it-n}}$ is $\mathbf{j^{th}}$ explanatory(predictor) variable for the $\mathbf{i^{th}}$ retail investors in the $\mathbf{t^{th}}$ period for lag-**n**. UMER by retail investors; Natural logarithm of the equity of retail investors; dummy variables.

$\mathbf{D_{n,i}}$ is $\mathbf{n^{th}}$ dummy variable for $\mathbf{i^{th}}$ retail investors accepting zero values before a specific date marking a structural break and taking a value of one for each period after. In this

scientific paper, dummy variables have been applied for the introduction of the second Markets in financial markets directive and the restrictions on the sale of CFDs;

t is a period index accepting values from 1 to T;

i is an individual retail investor index accepting values from 1 to N;

j is an index corresponding to the j^{th} dependent variable;

n is the index denoting the number of lags and can take values higher or equal to zero. When using the lagged-dependent variable on the right-hand side of the equation, then **n** can take values higher or equal to "one" for the lagged-dependent variable.

$\boldsymbol{\beta_n}$ is coefficient representing the relationship between the n^{th} explanatory(predictor) variable and the dependent variable, taking values from 1 to N depending from the number of explanatory variables involved in the panel regression;

$\boldsymbol{\zeta_j}$ is the coefficient describing the relationship between the j^{th} dummy variable and the dependent variable;

$\boldsymbol{a_i}$ is the i^{th} individual retail investor's unobserved time-invariant individual effect;

$\boldsymbol{u_{it}}$ is the error term.

Augmenting the general representation of the Fixed effect panel regression equation presented in eq. (1) by replacing the formal variable notations with the specific ones for this study, leads to the following two group models, separated by the responsive variable. In the first group (Group A) the HPR variable is analysed as a dependent, followed by the second group of models (Group B) where the MARGINRATIO determinants have been analysed Since the Hausmann test suggests the use of Fixed effects models two general groups of models have been constructed and analysed taking the data set and the goal of this study into consideration. In Group A, the models with HPR as a dependent variable have been presented by eq. (2.1), (2.2) and (2.3), respectively, while in Group B models with MARGINRATIO as a dependent variable have been considered (as can be seen from eq. (3.1), (3.2) and (3.3).

In eq. (2.0) and (3.0) a Fixed effects model has been applied, while in eq. (2.2) and (3.2) a lagged dependent variable Fixed effects model is introduced, while in eq. (2.3) and (3.3) first-order autoregressive term is replacing the first lag of the dependent variable in the Fixed effects models.

Following models have been introduced: models without lagged dependent variables and without AR term; models with lagged-dependent variable: models with first-order autoregressive term AR(1); respectively.[5] Adding a lagged dependent variable or first-order autoregressive term AR(1) aims to improve overall model explanatory power, stability and significance, justified by higher F-stat and higher Adj R^2. The Durbin-Watson stat is not a good serial correlation predictor when lagged-depend variables are added or autoregressive terms (Baltagi, Wu, 1999; Zaman, 1996).

[5] Presented in the appendix models are having either lagged dependent variable, or aurotregressive term(s), or none, thus reducing the abovementioned to models as they appear in the Results section and in the appendix.

Group A models

$$HPR_{it} = \beta_1 LOGEQUITY_{it} + \beta_2 MARGINRATIO_{it} + \zeta_n Dummy_n + individual\_fixed\_effects_i + error\_term_{it} \quad (2.1)$$

$$HPR_{it} = \gamma_1 HPR_{it-1} + \beta_1 LOGEQUITY_{it} + \beta_2 MARGINRATIO_{it} + \zeta_n Dummy_n + individual\_fixed\_effects_i + error\_term_{it} \quad (2.2)$$

$$HPR_{it} = \beta_1 LOGEQUITY_{it} + \beta_2 MARGINRATIO_{it} + \zeta_n Dummy_n + individual\_fixed\_effects_i + autoregressive\_term(n) + error\_term_{it} \quad (2.3)$$

Group B models

$$MARGINRATIO_{it} = \beta_1 LOGEQUITY_{it} + \beta_2 HPR_{it} + \zeta_n Dummy_n + individualfixedeffects_i + error\_term_{it} \quad (3.1)$$

$$MARGINRATIO_{it} = \gamma_1 MARGINRATIO_{it-1} + \beta_1 LOGEQUITY_{it} + \beta_2 HPR_{it} + \zeta_n Dummy_n + individualfixedeffects_i + error\_term_{it} \quad (3.2)$$

$$MARGINRATIO_{it} = \beta_1 LOGEQUITY_{it} + \beta_2 HPR_{it} + \zeta_n Dummy_n + individualfixedeffects_i + autoregressive\_term(n) + error\_term_{it} \quad (3.3)$$

Where (for A and B models):

HPR is the total HPR, calculated as the change in equity adjusted for deposits, withdrawals and other adjustments, compared to beginning equity, all of them derived from the history report;

MARGINRATIO is the variable for the UMER, calculated as the quotient of the used-margin and the equity variable, found in the history report;

LOGEQUITY is the natural logarithm of the trader's equity variable;

Dummy is either one: ***D01012018*** – a dummy variable for the 3rd of January' 2018, entry into force of the EU's Second Directive on Markets in Financial Instruments (MiFID II-Directive 2014/65/EU of the European Parliament and of the Council of the 15th of May 2014 on Markets in Financial Instruments and Amending Directive 2002/92/EC and Directive 2011/61/EU (MiFID II); ***D01082018*** – a dummy variable for the 1st of August 2018 ESMA's measures on restricting marketing, distribution and sales of CFDs.

These measures have been implemented temporarily, for three months initially. Upon expiry, they have been rolled-over several times. On 31st of July 2019, ESMA ceased the renewal of the temporary restriction on the selected financial instrument, since most NCAs have taken permanent national product intervention measures related to CFDs that are at least as stringent as ESMA's measures*;* ***autoregressive_term(n)*** – autoregressive term of order n; ***error_term –*** the error term.

6. Results of the Econometric Investigation

Following the common representation in eq. (1) and the more specific form of the two general groups of econometric models, through eq. (2.1) to eq. (3.3) respectively, two groups of models have been outlined. In Group A models, the HPR determinants have been analysed, while in Group B models, an econometric investigation of the MARGINRATIO and its explanatory variables has been carried out. Results have been commented helped by a brief representation of analysed models, while in the Appendix models have been outlined in detail.

6.1. Group A models with HPR as a dependent variable

By constructing group-A fixed-effect models, the following list of equations has been created and analysed. All model results in group A (with HPR being investigated as a dependent variable) are presented and commented hereinafter but can be seen in detail in Table.6 at the Appendix.

HPR of retail investors is in positive association with the equity variable, which supports the hypothesis that larger equity is giving better chances for retail investors. The average investor is having a small trading account in monetary terms, which is reducing the chances for a positive daily and cumulative returns. The larger account size is in favour of realised higher returns for retail investors, or vice versa- smaller retail investor accounts are prone to losses and failure.

In models A and B, one percent increase of the natural logarithm of the equity variable leads to a 0.14 and 0.13 percent increase in the dependent variable. In models D and F a one percent increase of the natural logarithm of the equity leads to around 0.17% increase in the retail investors' performance, i.e. leads to a 0.17% surge in the HPR, while in model C the relationship is justified by a much lower coefficient (one percent increase in the explanatory variable leads to a 0.04% percent increase in the dependent variable respectively). Results are supporting the first and third hypotheses laid out in the introduction section.

The findings of this scientific work suggest that individual investors worsen their performance over time, i.e. real trading experience approximated by the deterioration of adjusted equity over time leads to lower returns on investments for the retail investor, since there is a negative association between current and past values of the dependent variable. The results support the disposition effect characterised by the behaviour of keeping losses long and cutting gains short (Kahneman, Tversky, 1979; Weber, Camerer, 1998; Oehler et al., 2003). Feng and Seasholes (2005), however find that experience helps traders to overcome the reluctance to realise losses but reduces the propensity to realise gains significantly.

The UMER is in a negative association with the dependent variable, hence a higher used margin leads to lower performance in terms of overall profitability of retail investors. As can be expected, the higher the leverage used, the lower the HPR, hence the second hypothesis is also confirmed. In models A and B, a one percentage point increase in the margin ratio is leading to around 0.1 percentage points decrease in the HPR, while in models C, D and E, there is a weaker but yet statistically significant negative relationship, which leads between

0.021 and 0.028 percentage points reduction in HPR. Adding lags of the MARGINRATIO variable in model E is leading to smaller but positive interdependencies between the dependent variable and the first and second lags of the MARGINRATIO variable, while maintaining a negative relationship with the zero lag of the variable.

Dummy variables for the implementation of the Second Markets in Financial Instruments Directive and for the restriction on sales of CFDs are leading to lower HPRs, which is quite on the contrary from what one can expect and from what was hypothesised at the beginning of this research.

The effective introduction of the MiFID II from 1st of January 2018 that transposes numerous changes on investment firms offering CFDs to retail investors is harming their overall investment/trading performance. One of the potential answers may find grounds in higher costs for retail investors associated with trading, e.g. higher swaps, larger spreads, slippage, other fee and commissions that result in a reduction of equity and lower HPR, respectively. The introduction of the 1st of January 2018 MiFID II led to 0.12 percentage points decline in the HPR according to the results of model B and between 0.02 to 0.06 percentage points in models C, D, E, F.

The second dummy variable, responsible for the restrictions on the sale of CFDs that came into effect on 1st of August 2018, is also maintaining a negative relationship with the dependent variable. Restrictions on marketing, dramatically reducing the leverage for non-professional investors, led to poorer performance for retail investors, in terms of HPR, instead of restoring sustainability and soundness of trading results and overall profitability. The 1st of August 2018 sales on CFDs restriction is having a very similar negative impact on the dependent variable as the relationship between the 1st of January 2018 MIFID II dummy and HPR.

*Model A: HPR = -1.371 + 0.143*LOGEQUITY_ 0.112*MARGINRATIO; Adj R^2 0.64, F-stat 199.5* (2.1)

Note: all coefficients are statistically significant at 1% level.

*Model B: HPR = -1.165 + 0.131*LOGEQUITY_ 0.095*MARGINRATIO -0.123*D01082018 -0.14*D01012018; Adj R^2 0.65, F-stat 212.04* (2.2)

Note: all coefficients are statistically significant at 1% level.

*Model C: HPR = -0.033 +0.969*HPR_{t-1} + 0.04*LOGEQUITY_ 0.028*MARGINRATIO - 0.002*D01082018 -0.002*D01012018; Adj R^2 0.98, F-stat 5064.04* (2.3)

Note: all coefficients are statistically significant at 1% level.

*Model D: HPR = -1.721 + 0.17*LOGEQUITY_ 0.021*MARGINRATIO -0.005*D01082018 +0.984*AR(1) ; Adj R^2 0.98, F-stat 5571.07* (2.4)

Note: all coefficients are statistically significant at 1% level.

*Model E: HPR = -0.024 + 0.167*LOGEQUITY_ 0.023*MARGINRATIO – 0.004*D01082018 – 0.004*D01012018 + 0.977*HPR_{t-1} – 0.006*HPR_{t-2} – 0.167*$LOGEQUITY_{t-1}$ + 0.002*$LOGEQUITY_{t-2}$ + 0.015*$MARGINRATIO_{t-1}$ + 0.003*$MARGINRATIO_{t-2}$; Adj R^2 0.98, F-stat 6290.02* (2.5)

Note: all coefficients but ***$LOGEQUITY_{t-2}$*** *are statistically significant at 1% level.*

*Model F: HPR = -1.658 + 0.168*LOGEQUITY_ 0.021*MARGINRATIO + 0.979AR(1) - 0.006AR(2) -0.006*D01082018 – 0.006*D01012018 ; Adj R^2 0.98, F-stat 6293.16* (2.6)

Note: all coefficients are statistically significant at 1% level.

6.2. Group B models with UMER as a dependent variable

In this subsection, the results of Group-B models (with MARGINRATIO as a responsive variable) have been reviewed and analysed. Detailed results for the group-B models, where the MARGINRATIO is set as a dependent variable, can be found in Table 7 in the Appendix.

As can be seen in models G, H, I, J, K, a strong negative association between the natural logarithm of the equity and the UMER exists. It can be reasonably expected that higher equity is diminishing the need for using a higher margin, i.e. retail investors can maintain larger exposure with smaller UMER due to abundance in the capital. Small retail investors are maintaining higher UMER in order to support larger exposure compared to their limited equity. Results are validating the fourth hypothesis stated at the beginning of the research. In Models G, H and I 1% increase in the natural logarithm of the equity leads to around 0.073% smaller MARGINRATIO, while this relationship is decreasing to around 0.02% in models J and K.

HPRs are supporting the need for a lower used margin compared to the equity justifying a negative association between the HPR variable and the dependent variable in group B models, supporting the fifth hypothesis of this paper. One percentage point increase in the HPR is leading to around 0.077 percentage points decrease in the UMER in modes G, H and I, whilst this negative relationship is around 0.02 percentage points in models J and K.

The 1st of August 2018, the introduction of restrictions on the sale of CFDs led to an increase in the UMER, invalidating the ninth hypothesis of this paper. The introduction of this regulatory change led to 0.072 and 0.077 percentage points increase of the dependent variable, as per the results of Models H and I and to 0.01 and 0.013 percentage points increase according to models J and K. The biggest change in the post- 1st of August 2018 CFD trading world is the decrease of leverage, with a maximum of 30 to 1 leverage for CFDs on major FX pairs and 2 to 1 for the more volatile instruments like Cryptocurrencies. Retail investors cannot support huge exposures for their account compared to the period prior the regulatory change, sometimes got used to a 400 to 1 leverage. Retail investors need to keep a larger used margin to support just a fraction of the exposure before the regulatory change took effect. It can be summarised that retail investors are using a larger portion of their equity as a margin for securing a fraction of targeted profit and loss change due to swings in the CFD prices compared to the pre-change period. Planned swings in Profit or Loss and equity can be achieved with a higher margin, used in the post-changes period.

On the contrary, the MiFIDII changes that came into effect on 1st of January 2018 are having a small negative effect on the UMER, leading to a 0.011 and 0.014 percentage points decrease of the dependent variable (see models I and K). Retail investors are using lower margin thanks to the 1st of January 2018 measures, even though the association is very small, judging by the size of the coefficients, thus the eighth hypothesis is confirmed.

Adding a first lag of the dependent variable improves the overall model performance, by increasing the Adjusted R^2 and the model F-stat (see models J and K). The first lag of the dependent variable is maintaining a strong positive association with the dependent variable, inferring that a one percentage point change of the UMER in the previous period is leading to around 0.85 percentage points change in the dependent variable, signalling the presence

of inertia, e.g. higher past values of the dependent variables will result in larger current values of the current value of the dependent variable and vice versa. Retail investors are prone to increase the MARGINRATIO, ceteris paribus, the variable in the next period is growing in comparison to the previous, or inertia dynamics is revealed.

*Model G: MARGINRATIO = 0.959 – 0.085*HPR – 0.074*LOGEQUITY; Adj R^2 0.477, F-stat 103.043* (2.1)
Note: all coefficients are statistically significant at 1% level.

*Model H: MARGINRATIO= 0.928 – 0.073*LOGEQUITY_ 0.074*HPR + 0.072*D01082018; Adj R^2 0.48, F-stat 104.217* (2.2)
Note: all coefficients are statistically significant at 1% level.

*Model I: MARGINRATIO= 0.935 – 0.073*LOGEQUITY_ 0.073*HPR + 0.077*D01082018 – 0.014*D01012018; Adj R^2 0.48, F-stat 104.070* (2.2)
Note: all coefficients are statistically significant at 1% level.

*Model J: MARGINRATIO= 0.242 – 0.022*LOGEQUITY_ 0.02*HPR + 0.8* $MARGINRATIO_{t-1}$ + 0.001*D01082018; Adj R^2 0.778, F-stat 402.696* (2.2)
Note: all coefficients are statistically significant at 1% level.

*Model K: MARGINRATIO= 0.097 – 0.007*LOGEQUITY_ 0.019*HPR + 0.894* $MARGINRATIO_{t-1}$ + 0.013*D01082018– 0.011*D01012018; Adj R^2 0.789, F-stat 402.607* (2.5)
Note: all coefficients are statistically significant at 1% level.

7. Conclusions

In this paper, the retail investors' CFD trading performance has been targeted. Identifying profitability and risk aversion determinants in a post-MiFID II world through scrutinising a large panel of retail investors daily history reports has been performed.

Properties of analysed data justify the conclusion that trading CFDs is against the odds, since only 15.7% of clients of EU investment firms in this sample manage to make money, and 84.3% are losing funds on their investments, with bulky 60% losing more than 50% of their investments. The analysis of the UMER reveals that more than 60% of retail investors holding a position overnight tend to use more than 40% of their equity as margin, thus being exposed to a big change of their equity due to a small change in the price of the underlying asset.

Econometric investigation' results suggest that retail investors are losing money over time due to small equity and high used margin. ESMA CFDs sale restrictions and the implementation of MiFID II are deteriorating retail investors' performance, quite on the contrary to what can be expected, since these measures were meant to strengthen investors' financial health. On the other hand, risk-taking behaviour, approximated by UMER, is stimulated by daily losses and small equity of retail investors. Growing equity and larger HPRs reduce the MARGINRATIO variable. The dummy for restricting the sale of CFDs is increasing the margin ratio, most probably due to the higher larger margin requirements by

different classes of instruments, while the MiFID II implementation is helping retail investors to reduce the UMER.

Retail investors' performance and risk aversion behaviour may be supported by the following initiatives: 1. Breaking down of HPRs in the standardised risk warning EU investment firm put on their website and official documents. Retail investors, regulators, analysts need to know what part of client losses are determined by swaps, slippage and open-close price differential. After this information is easily accessible and publicly available competition will be in favour of investment firms with narrowest spreads, lowest swaps, smallest slippage, etc.; 2. Imposing even higher margin requirements for novice and small equity retail investors is recommendable. Clients need to provide real proofs of trading experience and performance.; 3. Stressing on the education of retail investors through revealing most common patterns for failure.

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APPENDIX

Table 3

Share of losing retail investor accounts

Provider (investment firm)	Share of losing retail investor accounts with this provider as of 15th of December 2019 (%)
FXPRO	77
Plus500	76
Admiral	76
Xtb	75
Etoro	75
IG Markets	75
Saxobank	72
Avatrade	71
FXCM	70
Xm	69
Leagacy fx	68
Deltastock	61
AVERAGE	72

Source: websites of abovementioned firms; Own calculations.

Table 4

Correlation matrix

Probability Correlation t-Statistic	HPR	MARGINRATIO
HPR	1	

MARGINRATIO	-0.23703	1
	-127.993	-----
	0	-----
LOGEQUITY	0.252992	-0.26698
	137.1804	-145.331
	0	0

Note: Included observations: 275200 after adjustments

Source: Own calculations

Table 5

Descriptive statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	CV	Jarque-Bera Prob.	Observations
HPR	-0.4	-0.5	139.0	-1.0	0.7	60.1	10 262	-1.5273	0	993436
MARGINRATIO	0.5	0.4	17.8	0.0	0.4	3.4	61.4	0.90541	0	303775
LOGEQUITY	5.3	6.0	13.1	-4.6	3.4	-0.7	2.7	0.63628	0	983502
EQUITY	3363	340	507468	-62290	11958	12.8	241	3.55548	0	1020637

Note: Individual sample descriptive statistics

Source: Own calculations

Table 6

Group A models with HPR as dependent variable

Variables	Model OLS A		Model OLS B		Model OLS C		Model OLS D		Model OLS E		Model OLS F	
Dependent (responsive) variable→	HPR		HPR		HPR		HPR		HPR		HPR	
Explanatory variables ↓	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
C	-1.371	0.000	-1.165	0.000	-0.033	0.000	-1.721	0.000	-0.024	0.000	-1.658	0.000
LOGEQUITY	0.143	0.000	0.131	0.000	0.004	0.000	0.170	0.000	0.167	0.000	0.168	0.000
MARGINRATIO	-0.112	0.000	-0.095	0.000	-0.028	0.000	-0.021	0.000	-0.023	0.000	-0.021	0.000
AR(1)							0.984	0.000			0.979	0.000
AR(2)											-0.006	0.001
D01082018			-0.123	0.000	-0.002	0.005	-0.005	0.004	-0.004	0.000	-0.006	0.000
D01012018			-0.140	0.000	-0.002	0.006			-0.004	0.000	-0.006	0.000
HPR(-1)					0.969	0.000			0.977	0.000		
LOGEQUITY(-1)									-0.167	0.000		
MARGINRATIO(-1)									0.015	0.000		
HPR(-2)									-0.006	0.001		
LOGEQUITY(-2)									0.002	0.122		
MARGINRATIO(-2)									0.003	0.000		
Number of observations	303 168		303 168		301 444		279 260		263 630		263 630	
Adjusted R-squared	0.64		0.65		0.98		0.98		0.98		0.98	
F-statistic	199.54		212.04		5064.04		5571.07		6290.02		6293.16	
Prob(F-statistic)	0.00		0.00		0.00		0.00		0.00		0.00	

Source: Own calculations.

Table 7

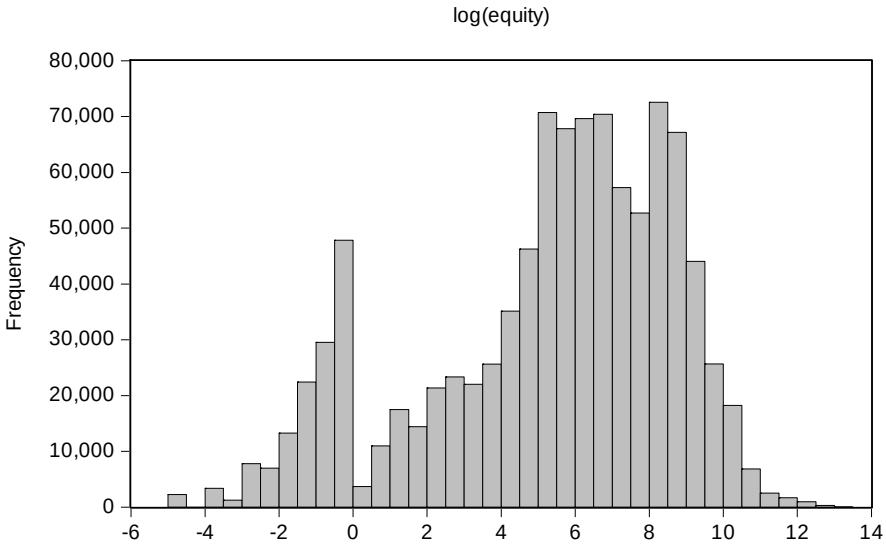
Group B models with MARGINRATIO as dependent variable

Variables	Model OLS G		Model OLS H		Model OLS I		Model OLS J		Model OLS K	
Dependent (responsive) variable→	MARGINRATIO		MARGINRATIO		MARGINRATIO		MARGINRATIO		MARGINRATIO	
Explanatory variables ↓	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value	Coef.	P-value
C	0.959	0.000	0.928	0.000	0.935	0.000	0.242	0.000	0.097	0.000
MARGINRATIO(-1)							0.800	0.000	0.894	0.000
HPR	-0.085	0.000	-0.074	0.000	-0.073	0.000	-0.020	0.000	-0.019	0.000
LOGEQUITY	-0.074	0.000	-0.073	0.000	-0.073	0.000	-0.022	0.000	-0.007	0.000
D01082018			0.072	0.000	0.077	0.000	0.010	0.000	0.013	0.000
D01012018					-0.014	0.000			-0.011	0.000
Number of observations	303 168		303 168		303 295		279 778		279 778	
Adjusted R-squared	0.477		0.480		0.480		0.788		0.789	
F-statistic	103.043		104.217		104.070		402.696		402.607	
Prob(F-statistic)	0.000		0.000		0.000		0.000		0.000	

Source: Own calculations

Figure 1

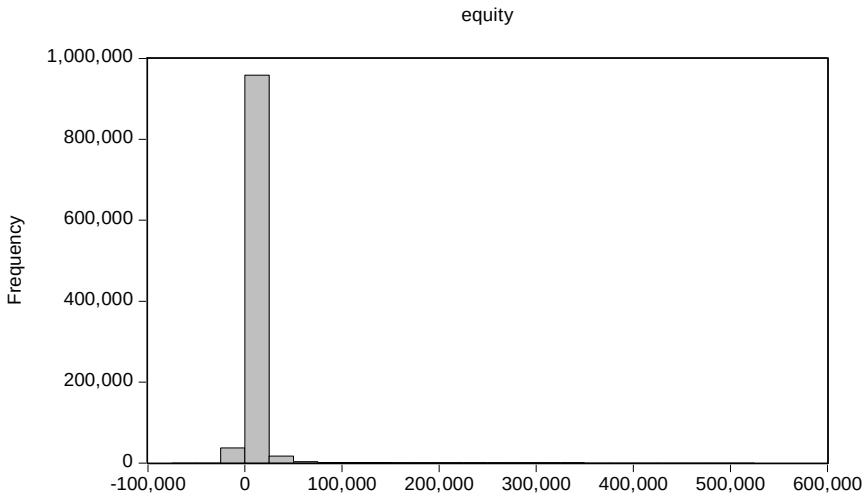
Natural logarithm of the equity of retail investors variable



Source: Own calculations

Figure 2

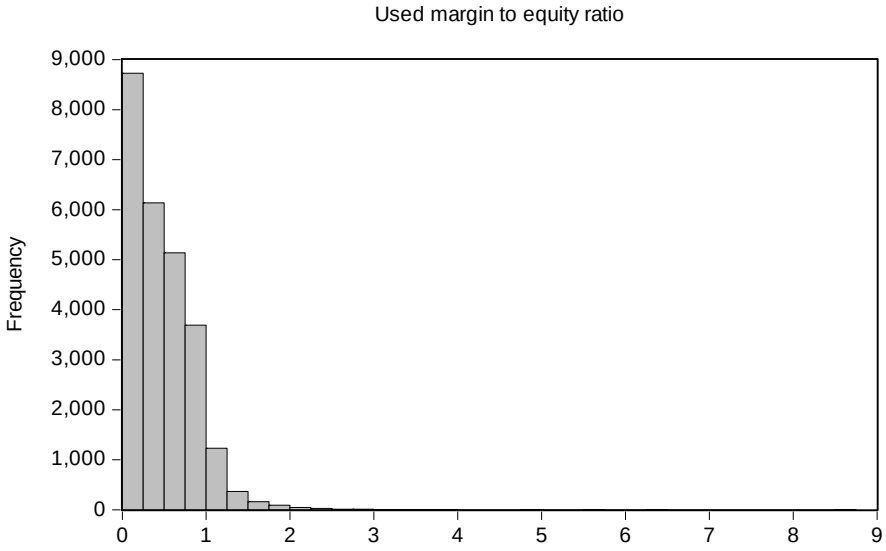
Equity of retail investors variable



Source: Own calculations

Figure 3

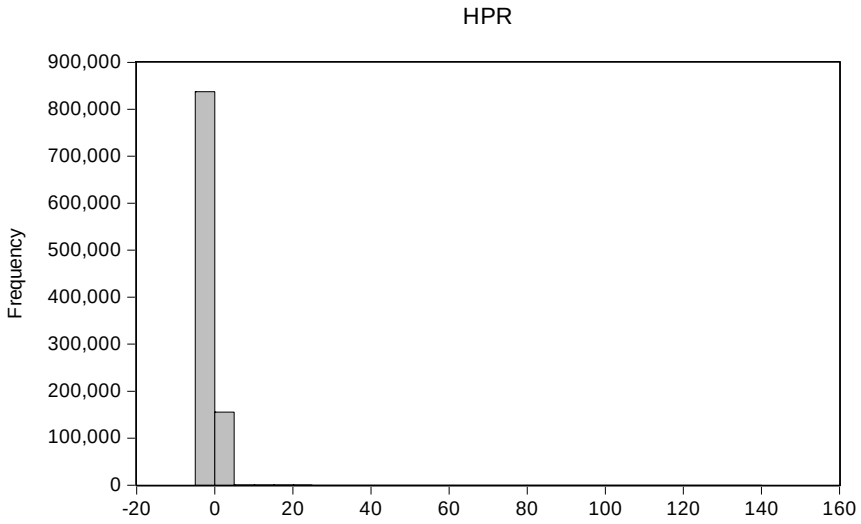
UMER (Margin ratio) variable



Source: Own calculations

Figure 4

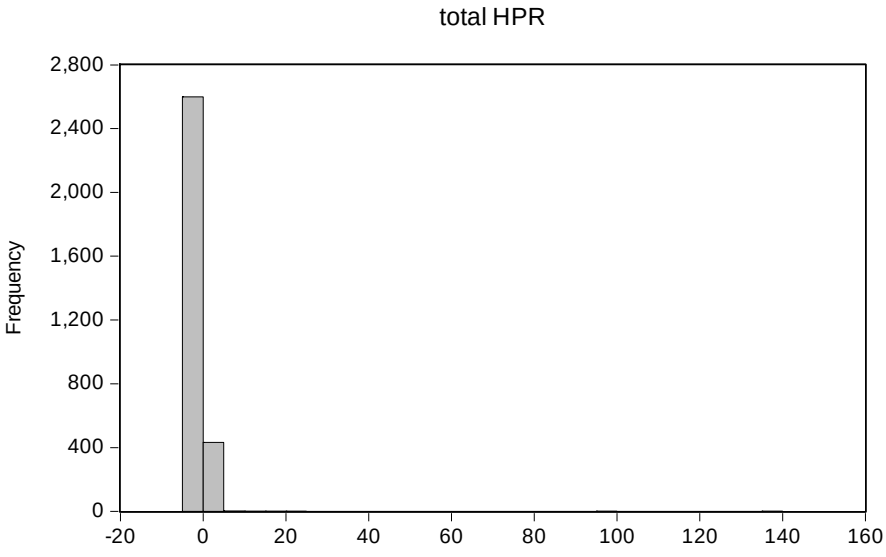
The HPR variable



Source: Own calculations

Figure 5

The Total HPR variable



Source: Own calculations