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THE DYNAMICS OF SHORT-TERM ETF FLOWS AND RETURNS BEFORE AND DURING COVID-19 PANDEMIC

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Abstract
This paper investigates the relationships between flows and returns for Beta ETF WIG20TR and WIG20 index before and during *covid crisis*. Four alternative hypotheses are tested, including the price pressure hypothesis, information hypothesis, feedback trading hypothesis, and smoothing hypothesis. A Vector Autoregressive (VAR) model is used to analyze the relationships between each flows and returns. The sample periods were from 7 January 2019 to 31 August 2020, with having 407 observations. Sub-sample during *covid crisis* is since 12 March 2020 to 31 August 2020. This paper will also shows what is influenced by the hypotheses from the investor's point of view and what it means in practice. ETF can more easily spread risk for investors. The COVID-19 pandemic has resulted in panics as well as the temporary closure of businesses in most economies. The COVID-19 pandemic has brought the most challenging social and economic crisis the world has faced since World War Two.

Keywords: ETF, price pressure hypothesis, information hypothesis, feedback trading hypothesis, smoothing hypothesis, WIG20, GPW

JEL Codes: G14, G15, C32

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1. Introduction

Exchange traded funds (ETFs) are financial innovations. ETFs are funds structured to imitate the performance of selected finance, usually stock indexes, bonds, commodities, futures contracts or a combination of these instruments. ETFs were introduced on U.S. and Canadian exchanges in the early 90s. Exchange traded funds originated in the United States, where the first product of this type, (SPDR – Standard & Poor's Depository Receipt), was created in 1993. In March 1996, the first international ESF debuted on Wall Street, first emerging market ETF (Gierałtowska, 2015). In Europe, ETFs have been operating since the year 2000, with increasing success. First were in Deutsche Boerse and London Stock Exchange. ETFs are close-end funds, which, after sales of investment certificates in the primary market, introduce them to public turnover, and then to the stock exchange turnover (Borowski, 2006). The US ETF market is the most extensive. In 2010 was created first ETF in Poland, certificates

imitating the WIG20 index. After that in 2011 entered Lyxor ETF S&P 500 and Lyxor ETF DAX. Three more ETFs entered in 2019, that were: Beta ETF WIG20 TR PFIZ (7.01), Beta ETF mWIG40TR PFIZ (5.09) and Beta ETF WIG20short PFIZ (27.11)[1]. As ETF are listed in stock exchanges, investors can be linked to price movements and a specific index of stock investment portfolio. Popularity, attractiveness, and success of ETF are a reflection of its simplicity and many advantages for investors.

Knowing what instrument we are going to deal with, it is worth emphasizing that the amount of profit and risk depend on the sensitive environment. In general, we observe in the literature that there are many relationships. Researchers try to generalize the nature of these relations as certain mechanisms formulated in the form of hypotheses. Among them there are the following four that are worth considering, because they are not verified on the Polish capital market. Therefore, the aim of the article was to analyze the relationship between rates of return and flows in periods differing in the level of risk exposure. It should be emphasized that it is important from the point of view of investors operating on a given capital market.

2. Review of the literature

In empirical research, a lot of attention was paid to testing hypotheses in the field of complementary theories, i.e. the efficient market hypothesis and behavioral finance. Relatively little attention has been paid to testing hypotheses at the interface between these two theories, including: feedback trading, smoothing hypothesis, information hypothesis, price pressure hypothesis.

The feedback trading hypothesis for investors point of view [Jinjarak et al. 2011]. When the market returns in the current period are positive, investors are optimistic about market prospects, thence expecting future market returns to continue to rise. Investors choose to buy securities so that securities flows rise. When the market returns in the current period are negative investors are pessimistic about market prospects, thence expecting future market returns to continue to decrease. Investors choose to sell securities so that securities flows decrease [Boyer and Zheng, 2009].

The smoothing hypothesis suggests that market returns and current securities flows are negatively related. This relationship suggests that investors regard a rise in security prices as an overreaction in the market, and choose to sell securities, thereby reducing securities flows. This relationship suggests that investors regard a fall in security prices as an overreaction in the market, and choose to buy securities, thereby reducing securities flows. [Rakowski and Wang, 2009].

1 https://www.gpw.pl/etfy [acess: 08.07.2020]

The information hypothesis refers to flows in the stock market and current market returns having a positive relationship. Investors have superior private information when trading funds, which means that useful information is present in the market. [Chang, Ke 2014].

Price pressure hypothesis means that the effect of flows on current market returns is negative. Warther (1995) empirical results show that the flows of three fund markets and their respective returns do not have a significant negative relationship, studies are unable to support the price pressure hypothesis [Chang and Ke, 2014].

Rakowski and Wang (2009) use Korean mutual fund data and find that investors with higher marketing expenses have lower search costs, so that it is easier to obtain information. An increase in marketing costs affects fund flows positively, but investors may be less willing to bear the costs required for the fund's redemption, which may result in reduced fund flows. A Vector Auto Regression (VAR) of flows and returns shows that the behavior of fund investors is more consistent with contrarian rather than momentum characteristics. Past flows have a positive impact on future returns with an information effect rather than the price pressure effect driving this link. Daily fund flows are also positively related with future fund returns, and information, rather than price pressure, seems to drive this result. Boyer and Zheng (2009), analyzing the data of American funds, concluded that there is no positive correlation between rates of return and flows, so their empirical results do not confirm the feedback trading hypothesis.

Jinjarak et al. (2011) examine the relationship between stock fund flows and returns, as well as the relevance of bond fund flows and rewards. They divide international funds into emerging countries and developed countries to explore the relationship between fund flows and market returns across different regions. They also find that emerging Europe, the Middle East and Latin America's fund returns are positively related to current fund flows, thereby supporting the feedback trading hypothesis. In addition to analyzing the relationship between fund flows and returns, argue that, when the stock market experiences a negative impact, it will cause investors to reconfigure their portfolios.

Ülkü and Weber (2013) analyze the relevance between Korean stock flows and market returns, dividing stocks into three major investment groups. The empirical results show that, only the domestic stocks group supports the price pressure hypothesis. Chang and Ke (2014) examines the relationships between flows and returns for five ETF in the U.S. energy sector. The empirical results show that energy returns and next energy ETF flows have a negative relationship, thence supporting the smoothing hypothesis.

Okorie and Lin (2020) provides empirical pieces of evidence on the fractal contagion effect of the COVID-19 on the stock markets. Authors choose date of begining the influance of covid crisis 1 January 2020. They found considerable fractal contagion on the market return and market volatility. Salisu et. al. (2020) provide some preliminary estimates about the

behaviour of oil-stock nexus during COVID-19 pandemic. A panel Vector Autoregressive model is constructed to analyse the response of oil and stocks to shocks. The collapse of stock prices in March 2020 marks one of the biggest stock market crashes in history.

3. Data and methodology

The data were downloaded from the Stooq- finance database (https://stooq.pl/), with daily data of the Beta ETF WIG20TR and WIG20 closing prices and trading volumes. In the case of a national holiday, the value of the previous day is used. The sample periods were from 7 January 2019 to 31 August 2020, with having 407 observations. There were two sub-samples. Sub-sample before covid crisis is from 7 January 2019 to 11 March 2020. Sub-sample during covid crisis is since 12 March 2020 to 31 August 2020, with having 120 observations. The COVID-19 pandemic has resulted in panics as well as the temporary closure of businesses in most economies. Problem was choose the date of begining the influance of COVID-19 to GPW. The global market crash began on 20 February 2020 (Folger-Laronde, Pashang, Leah Feor & Amr ElAlfy, 2020). Since 15 March 2020 the Fed unveiled interventions in a brisk place (Haddad, Moreira, Muir 2020).

The literature on fund flows and market returns typically uses the Vector Autoregressive (VAR) model [Rakowski, Wang 2009] to analyze the relationships among the endogenous and exogenous variables. In order to support the information hypothesis, the paper also decomposes ETF fund flows into expected and unexpected flows [Chang, Ke 2014].

$$\begin{bmatrix} Return_t \\ Flow_t \end{bmatrix} = \begin{bmatrix} \alpha_1 \\ \alpha_2 \end{bmatrix} + \sum_{i=1}^{p} \begin{bmatrix} \beta_{11,i} & \beta_{12,i} \\ \beta_{21,i} & \beta_{22,i} \end{bmatrix} \begin{bmatrix} Return_{t-i} \\ Flow_{t-i} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix}$$

$Return_t$ – ETF returns at time t,

$Flow_t$ – ETF flow at time t, ε1t and ε2t are white noise error terms. The four hypotheses to be tested are given as follows:

(H1) $\beta_{12} < 0$: price pressure hypothesis;

(H2) $\beta_{12} > 0$: information (or price release) hypothesis;

(H3) $\beta_{21} > 0$: feedback trading hypothesis;

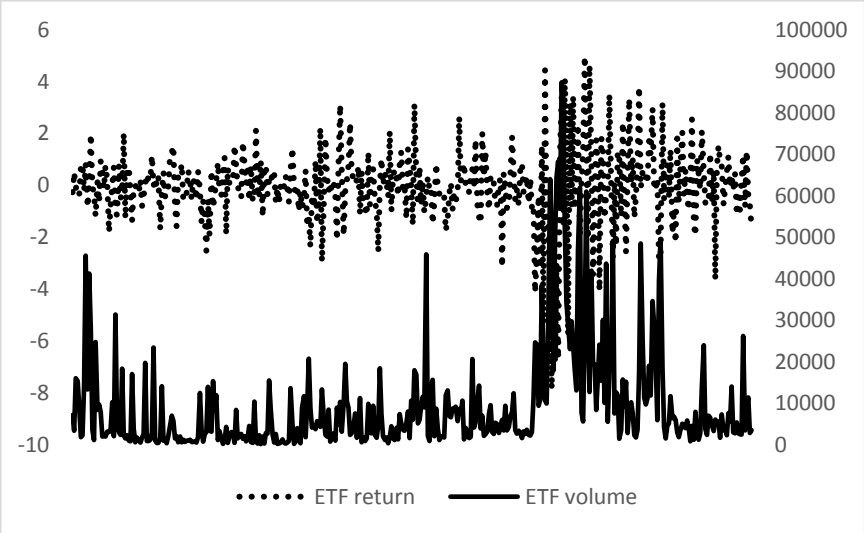
(H4) $\beta_{21} < 0$: smoothing hypothesis.

According to Rakowski and Wang (2009) Vector Auto Regression (VAR) of flows and returns shows that the behavior of fund investors is more consistent with contrarian rather than momentum characteristics.

4. Results

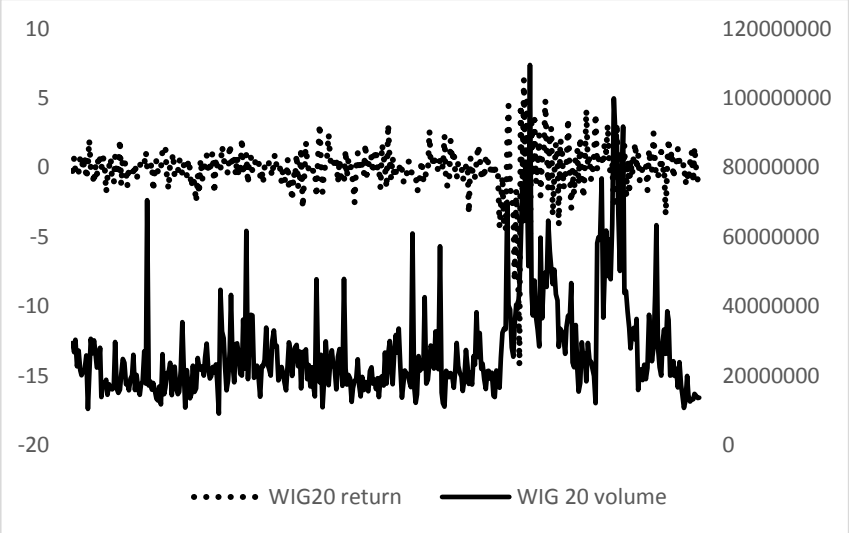
For the non-stationary series of ETF prices and WIG20 index values, logarithmic rates of return were calculated to observe the potential structural changes due to COVID-19. The time series of both trading volumes were not converted as the ADF test performed showed that they are stationary (table 1). The dynamic of all analyzed time series is illustrated in figures 1 and 2.

Figure 1. ETF return and volume



Source: own work.

Figure 2. WIG20 return and volume



Source: own work.

The first and second figures show quite large fluctuations, especially during a pandemic. There is more fluctuations on WIG20.

Subsequently, the properties of time series and stationarity were examined using descriptive statistics and ADF unit root. Results are presented in Table 1.

Table 1. Descriptive statistics and ADF unit root test

statistics	**return ETF**	**volume ETF**	**return WIG20**	**volume WIG20**
average	-0.06	9343	-0.06	27184299
median	-0.03	4391	-0.02	22470230
SD	1.48	12955	1.62	14937574
kurtosis	4.90	10	16.65	6.34
skewness	0.76	3	-1.82	2.28
range	12.84	87198	20.58	100439066
minimum	7.85	173	-14.25	9077091
maximum	4.99	87371	6.34	109516157
ADF test	-7.63*	-3.94*	-8.68*	-3.89*

*significant at the level 0.05
Source: own work.

Average for ETF return and WIG20 return is the same, the value is 0.06, median is similar in both cases. Standard deviaton is quite high, the value is around 1.5, this may indicate the risk of price changes - it is slightly higher in the case of rWIG20. Especially on rWIG20 can be unusual events -e.g. strong changes that actually occur much more often than the normal distribution would assume. A negative value of the skewness on rWIG20 coefficient indicates a fairly significant asymmetry, i.e. quite frequent occurrence of values above the average level of the average and a few extremely below. The positive value of kurtosis indicates the presence of a large concentration of volumes close to the average and the presence of several extremely low and high volumes.

The ADF tests of unit roots are also shown in Table 1. The unit root tests for the ETF and WIG20 flows and returns reject the null hypothesis of a unit root, which means that their flows and returns are stationary, so that the VAR model can be conducted on the flows and returns.

Model estimation results

Model estimation results ETF and WIG 20 before and during COVID-19 are in Table 2. and 3.

Table 2. Estimation for ETF

variable	before COVID-19		during COVID-19	
	return ETF	volume ETF	return ETF	volume ETF
const	-0.0006	2138***	0.0016	3706***

rETF(-1)	-0.0182	−106424***	-0.0499	110467*
rETF(-2)	0.06130	-11493	0.04358	-144250**
rETF(-3)	0.0469	12357	0.13	-102488*
rETF(-4)	0.0156	-67158	0.0146	-18154*
rETF(-5)	0.1389**	-35361	0.0304	-18997
vETF(-1)	-0.0000003***	0.312801***	-0.0000001	0.5033***
vETF(-2)	0.0000001	-0.0225977	0.0000002	-0.01379
vETF(-3)	0.0000002	0.117144*	-0.0000002	0.0122
vETF(-4)	-0.0000009	0.159748**	-0.0000002	0.3446***
vETF(-5)	-0.0000005	0.0883230	-0.0000006	-0.0962
T	287	287	120	120
F dla rETF	1.2036	2.2493	0.5539	3.7288
F dla vETF	3.087	11.991	0.4787	20.783
R2	0.0578	0.2364	-0.0268	0.5839

*significant at the level 0.05
Source: own work.

From the results in Table 2: there were 287 observations before COVID-19 and 120 during COVID-19, lags up to the fifth row, more relevant values are during COVID-19. The most important is lags up to the first row. ETF flows before and during pandemic generally have positive correlations up to five lags, whithout first lag. ETF returns before and during pandemic generally have negative correlations up to five lags, whithout second lag.

Table 3. Estimation for WIG20

variable	before COVID-19		during COVID-19	
	return WIG20	volume WIG20	return WIG20	volume WIG20
const	0.0004	0.0000001***	-0.0004	0.0000005*
rWIG20(-1)	0.2173**	-0.0000001***	-0.0237	-0.0000001
rWIG20(-2)	-0.1048	-0.0000004	0.0489	-0.0000004
rWIG20(-3)	0.1399	-0.0000006	0.0978	0.0000002
rWIG20(-4)	-0.0353	-0.0000006	0.0336	-0.0000001***
rWIG20(-5)	0.0221	-0.0000001	-0.0767	0.0000007
vWIG20(-1)	0.0000002	0.1064*	-0.0000003**	0.596371***
vWIG20(-2)	0.0000001	0.0773	0.0000004**	0.0441
vWIG20(-3)	0.0000002	0.0603	-0.0000002	0.2401**
vWIG20(-4)	0.0000001	0.0844*	0.0000003*	0.3131
vWIG20(-5)	-0.0000002**	0.0406	-0.0000001	0.5348
T	287	287	120	120
F dla rWIG20	2.19	2.2027	0.3318	3.1939
F dla vWIG20	2.05	2.7887	2.0905	19.708
R2	0.049062	0.0749	0.0202	0.5839

*significant at the level 0.05
Source: own work.

From the results in Table 3: There were 287 observations before COVID-19 and 120 during COVID-19, lags up to the fifth row, more relevant values are during COVID-19. The most important is lags up to the first row. WIG20 flows before pandemic have both: positive and negative correlations. WIG20 returns during pandemic generally have negative correlations up to five lags.

5. Concluding remarks

Concluding remarks for all research are in Table 4.

Table 4. Concluding remarks

	ETF		WIG20	
hypothesis	before	during	before	during
1	ü	×	×	×
2	×	ü	×	ü
3	ü	×	×	×
4	×	ü	×	ü

Source: own work.

During stock market downturns, investors invest in ETF, which is consistent with general market movements. Although the crisis did not start in the financial markets, it will nevertheless have profound impacts that will affect the financial industry over the long term. There has been a dislocation of markets by asset class, an explosion of ETF flows increasing the risks for less informed investors, and a rethinking of the role and model of banks. During the estimation of the structural parameters of the models and subsequent testing of their significance, only partially confirmed the truthfulness of the hypotheses formulated on the Polish capital market, both in the period before and during the COVID-19 pandemic.

As the limitation of the presented empirical research it should be pointed: all the hypotheses were not confirmed, but it was to be expected. There is a space for futher research: during COVID-19 crisis, with expected and unexpected flows, in the overview with WIG20TR index. The study should also be carried out on a larger number of financial instruments and for different capital markets.

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