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Do institutional investors destabilize stock prices? evidence from an emerging market[☆]

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Abstract

In this paper, we provide empirical evidence on the impact of institutional investors on stock market returns dynamics in Poland. The Polish pension system reform in 1999 and the associated increase in institutional ownership due to the investment activities of pension funds are used as a unique institutional characteristic. We find robust empirical evidence that the increase of institutional ownership has changed the autocorrelation and volatility structure of aggregate stock returns. However, the findings do not support the hypothesis that institutional investors have destabilized stock prices. The results are interpretable in favor of a stabilizing effect on index stock returns induced by institutional trading.

JEL classification: G14; G23

Keywords: Institutional traders; Polish pension fund investors; Stock market volatility

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1. Introduction

The increase in the number of institutional investors trading on stock markets world-wide since the end of the 1980s has been associated with a rise in the financial economists' interest in institutions' impact on stock prices. In particular, there is a popular belief that institutional traders destabilize stock prices. Due to their specific investment behavior institutions are supposed to move stock prices away from fundamentals and thereby induce stock returns autocorrelation and increase returns volatility. Herding and positive feedback trading are the two main arguments put forward for the destabilizing impact on stock prices induced by institutional investors. Consequently, empirical investigations in the existing literature have been focused on the question of whether institutional traders exhibit these types of investment behavior.[1]

However, evidence in favor of herding and positive feedback trading does not necessarily imply that institutional traders destabilize stock prices. If institutions herd and all react to the same fundamental information in a timely manner, then institutional investors will speed up the adjustment of stock prices to new information and thereby make the stock market more efficient. Moreover, institutional investors may stabilize stock prices, if they collectively counter irrational behavior in individual investors' sentiment. If institutional investors are better informed than individual investors, institutions are likely to herd to undervalued stocks and away from overvalued stocks. Such herding can move stock prices towards rather than away from fundamental values. Similarly, positive feedback trading has been shown to be stabilizing, if institutional traders underreact to news (Lakonishok et al., 1992).

Cohen et al. (2002) provide empirical evidence on the stabilizing impact of institutions for US data. Institutions respond to positive cash-flow news by buying stocks from individual investors, thus exploiting the less than one-for-one response of stock prices to cash-flow reports. Moreover, in case of a price increase in the absence of any cash-flow news institutions sell stocks to individuals. The findings by Cohen et al. indicate that institutional investors push stock prices to fundamental values and, hence, stabilize rather than destabilize stock prices. Barber and Odean (2003) find for the US that individual investors display attention-based buying behavior on days of abnormally high trading volume, extremely negative and positive 1 day returns and when stocks are in the news. In contrast, institutional investors do not exhibit attention-based buying. While the behavior of individual investors may contribute to stock returns autocorrelation and volatility, institutions may induce a stabilizing effect on stock price dynamics.[2]

We can conclude from the short discussion above that empirical findings on institutional investors' herding and positive feedback trading behavior are not necessarily evidence in favor of the destabilizing effect on stock prices. However, these results provide us with only indirect empirical evidence on the destabilizing effects of institutional investors' trading behavior on stock prices. The existing literature on institutional trading behavior is pre-

[1] Evidence on institutions' trading behavior can be found in, for example, Lakonishok et al. (1992), Grinblatt et al. (1995), Nofsinger and Sias (1999), Wermers (1999), Badrinath and Wahal (2002) and Griffin et al. (2003).

[2] These findings are in contrast to the empirical results in, for example, Sias and Starks (1997), Sias et al. (2001) and Dennis and Strickland (2002) which come to the conclusion that institutional investors trading has a destabilizing effect on stock returns.

dominantly forced to rely on quarterly ownership data to compute changes in institutional holdings and in turn draws conclusions about the behavior of institutional investors. In contrast, under the condition that the entrance date of a large number of institutions in the stock market is known, a GARCH-type event study may provide direct empirical evidence of whether institutions change significantly the autocorrelation and the volatility structure of stock index returns. In a time series framework we are able to investigate empirically the consequences of a structural break in institutional ownership on the stock returns behavior.

The specific history of the Polish stock market provides a unique institutional feature and opportunity allowing us to contribute to the literature on the institutional investors' impact on stock prices, arising from the pension system reform in Poland in 1999, when privately managed pension funds were established and allowed to invest on the capital market. We focus on the autocorrelation pattern and, in particular, on the volatility behavior of stock returns prior to and after the first transfer of money to the pension funds on 19 May 1999. The appearance of large institutional traders and the resulting increase in institutional ownership allows us to investigate the impact on stock returns autocorrelation and volatility. Specifically, we use a variant of the asymmetric GARCH model put forward by Glosten et al. (1993) to test whether the model's key coefficients change after the entrance of institutional traders in the Polish stock market.

The remainder of the paper is organized as follows. Section 2 contains a brief description of the pension system reform and its consequences for the investors' structure in the stock market in Poland. In Section 3, the time series methodology is outlined and in Section 4, the data as well as the empirical findings are presented. Section 5 summarizes and concludes.

2. Pension system reform and investors' structure on the stock market in Poland

Re-established in 1991, the Polish stock market has grown rapidly during the last decade in terms of the number of companies listed and market capitalization. In comparison to the two other European Union accession countries in the region, i.e., Czech Republic and Hungary, the capitalization of the Polish stock market is significantly higher. The capitalization is comparable to the smaller, mature European markets, like the Austrian stock market, and equals currently about 45 billion $-US.

The major change in the investors' structure on the Polish stock market has its origin in the pension system reform. In 1999, the public system was enriched by a private component, represented by open-end pension funds. Participation in this component, often called the "second pillar", is mandatory for employees below certain age. They are obliged to transfer 7.3% of their gross salary to the government-run social insurance institute called Zakład Ubezpieczeń Społecznych (ZUS), which in turn transfers the collected contributions to the pension funds. The first transfer of money from the ZUS to the pension funds took place on 19 May 1999. This date marks a significant change of the investors' structure in the Polish stock market. In 1999, about 20% domestic institutional investors and 45% domestic individual investors traded at the Warsaw Stock Exchange. This situation has nearly reversed and the number of institutional traders approximately doubled after 1999. Constantly about 35% of the investors on the Polish stock market adhere to the group of foreign investors.

While before 19 May 1999 the majority of traders were small, private investors, after that date pension funds became important players on the stock market in Poland. There were also some mutual funds active in the market but they had relatively small amounts of capital under management. Moreover, the role of corporate investors, i.e., companies investing their capital surpluses, was very marginal. It is this feature in the history of the Polish stock market which constitutes the major change in the investors' structure. This unique institutional characteristic allows us to compare the period before 19 May 1999 characterized predominantly by non-institutional trading with the period after that date, where pension funds as institutional investors started to act on the stock market.

The number of pension funds in the 1999–2003 period varied between 15 and 21. The change in their number occurred mainly due to the acquisitions of the smaller funds by the larger ones. It is important to note, however, that their structure as well as the structure of the assets under their management remains invariant. By the end of 2003, 17 pension funds operated in the Polish stock market with about 8 billion \$-US under management. In comparison, Polish insurance companies and mutual funds had only 3 and 1 billion \$-US of assets, respectively. In 2003, the pension funds invested about 3 billion \$-US in stocks listed on the Warsaw Stock Exchange. Those funds account for about 17% of the Warsaw Stock Exchange daily turnover. Their stock holdings predominantly consist of large capitalization stocks that are listed in the blue-chip index WIG20 and usually belong to the Top 5 in their industries (Karpinski, 2002). Therefore, pension funds have emerged as important players on the Polish stock market with the capital to affect stock prices.

3. GARCH-type event study methodology

Our empirical investigation on the institutional traders' influence on stock market autocorrelation and volatility relies on the following asymmetric GARCH model:

$$R_t = \sum_{i=1}^{5}\alpha_{i0} DoW_{it} + \sum_{i=1}^{5}\alpha'_{i0} D_t DoW_{it} + \alpha_1 R_{t-1} + \alpha'_1 D_t R_{t-1} + \alpha_2 \sqrt{h_t} R_{t-1} + \alpha'_2 D_t \sqrt{h_t} R_{t-1} + \alpha_3 R^{F}_{t-1} + \varepsilon_t, \quad (1)$$

$$h_t = (1+\gamma_D D_t)(\gamma_0 + \gamma_1 h_{t-1} + \gamma_2 \varepsilon^2_{t-1} + \gamma_3 \varepsilon^2_{t-1} I_t) \quad (2)$$

$$D_t = \begin{cases} 1 \text{ if } t \geq 1999:5:19 \\ 0 \text{ if } t < 1999:5:19 \end{cases}. \quad (3)$$

The index return is defined as the logarithmic difference $R_t = \ln P_t - \ln P_{t-1}$ and $\varepsilon_t = N(0, h_t)$ denotes the unpredictable component of index returns. $\sum_{i=1}^{5} DoW_{it}$ are dummy variables for Monday, Tuesday, Wednesday, Thursday and Friday $i = 1,\ldots,5$. With the dummy variable D_t we model the structural change in the components of the mean Eq. (1) and the conditional volatility process (Eq. (2)) connected with the entrance of institutional traders on the Polish stock market on 19 May 1999. R^{F}_{t-1} denotes the logarithmic return on a foreign stock market index. I_t takes on the value of 0 if the return innovation is 0 or positive, $\varepsilon_{t-1} \geq 0$, and 1 in case the return shocks are negative, $\varepsilon_{t-1} < 0$.

In its general form the mean equation takes into account: (1) a day-of-the-week-effect; (2) first-order autocorrelation in stock index returns; (3) non-linearity in the first-order autocorrelation pattern; (4) international interdependence of the Polish stock market as well as (5) a structural change in the autoregressive structure after the entrance of institutional traders. The inclusion of the dummy variables DoW_{it} is motivated by the often documented seasonalities in stock returns across the days of the week (French, 1980; Lakonishok and Levi, 1982; Agarwal and Tandon, 1994). Moreover, substantial empirical evidence shows that the autocorrelation pattern of stock returns exhibits complexities that cannot be captured by the simple first-order autocorrelation coefficient (LeBaron, 1992; Sentana and Wadhwani, 1992; Campbell et al., 1993; Koutmos, 1997). To account for this effect, we assume that autocorrelations of daily stock returns change with the square root of the conditional variance of returns which are from our asymmetric GARCH model (Sentana and Wadhwani, 1992). In addition, due to the interdependence of the Polish stock market with international stock markets, we include index returns on a foreign stock market R^{F}_{t-1} as a control variable (Jochum et al., 1999; Tse et al., 2003; Voronkova, 2004).

For the day-of-the-week dummies as well as the linear and non-linear first order autoregressive components the possibility of a structural change after the entrance of institutional traders is modeled using the dummy variable D_t. Statistically significant coefficients α'_{i0}, α'_1 and α'_2 indicate a structural change in the pattern of stock returns after 19 May 1999. In particular, while α_1 measures the extent of autocorrelation during the period before the entrance of institutional investors, the sum $(\alpha_1 + \alpha'_1)$ provides an autocorrelation measure for the period after the appearance of institutional investors.

The volatility Eq. (2) is a version of the asymmetric GARCH model put forward by Glosten et al. (1993) in which positive and negative shocks can have different effects on subsequent volatility via the dummy variable I_t. Setting the asymmetry coefficient γ_3 equal to 0, yields the conventional GARCH specification as a special case of GJR model. More important for the question under scrutiny are the properties of the estimated parameter γ_{D}. If institutional traders have an influence on the volatility structure of index returns, the coefficient γ_{D} should be statistically significant. The estimated coefficient γ_{D} provides, thus, a measure of the shift in the conditional volatility process. A statistically significant and positive coefficient γ_{D} can be interpreted as the evidence in favor of the destabilizing hypothesis. In this case the entrance of institutional investors increases stock market volatility. If γ_{D} is statistically significant but negative, then institutional investors exhibit a dampening influence on volatility.

Eqs. (1) and (2) are jointly estimated via maximum likelihood using the Bernd et al. (1974) algorithm. Bollerslev and Wooldridge (1992) robust errors are reported. We implement a general-to-specific procedure by starting with the mean Eq. (1) in its general form including the day-of-the-week dummies, the linear and non-linear first-order autoregressive arguments and the lagged foreign stock returns. Next, we successively exclude the day-of-the-week dummies and the non-linear components to get an impression about the robustness of the empirical findings.[3]

[3] In case of the exclusion of the day-of-the-week dummies we include a constant term α_0 in the mean equation.

The dummy variable D_t is set at 0 before 19 May 1999 and 1 after the cut-off date of 19 May 1999, when the first transfer from to the ZUS to the pension funds was made. However, including data shortly after 19 May 1999 may bias the results towards finding no impact of institutional investors on stock returns. To take into account that the pension funds have probably been entering the market only gradually, we provide also the findings for the models with three different dummy variables as an alternative to the one defined in (3). In particular, we set the dummy variable equal to 1 starting a quarter of a year later (19 August 1999), half of a year (19 November 1999) later and 1 year (19 May 2000) later.

4. Data and empirical results

Our empirical analysis relies on the stock market indices WIG and WIG20 which are the most important indices of the Polish stock market. While the WIG20 is composed of the Polish blue-chip stocks, the WIG is a broader index containing the stocks traded on the main market of the Warsaw Stock Exchange. We measure the international influence on the Polish stock market with the US S&P500 index.[4] The data source for the WIG and the WIG20 is the Warsaw Stock Exchange and for the S&P500 index it is Datastream. The three stock market indices are available at the daily frequency at the close of every trading day. The sample selected begins with the first complete month during which trading took place 5 days a week, i.e., 1 November 1994, and ends on 30 December 2003. Before November 1994, the trading sessions were organized only 4, 3, 2 and 1 times a week in the years 1994, 1993, 1992 and 1991, respectively.

Before we discuss the estimation results on Eqs. (1) and (2), we would like to point out some stylized facts concerning the development of the WIG and the WIG20 before and after 19 May 1999. Fig. 1 shows both stock indices and Fig. 2 illustrates their returns. When looking at Fig. 2, it is obvious that index returns fluctuate in a narrower band after 19 May 1999 compared to the period before. Moreover, taking into account the well-known property of the stock prices, saying that lower stock returns volatility occurs more often during bull markets relative to bear markets, the reduction of volatility after 19 May 1999 cannot be caused by the market's good performance. As it can be seen in both graphs in Fig. 1, the Polish stock market experienced a relatively long period of declining stock prices starting in April 2000 and ending in October 2001. Fig. 1 indicates also that the Polish market experienced up and down swings before and after 19 May 1999. Hence, the argument of lower stock returns volatility during increasing markets relative to decreasing markets cannot explain the drop in volatility after 19 May 1999.

Related to the argument above is the effect of major financial crises on the volatility of Polish stock returns. Financial crises before May 1999 might be responsible for the

[4] As an alternative to the S&P500 index we implemented our estimation procedures with two European indices, namely the British FTSE100 and the German DAX. The empirical findings (not reported but available on request) do not change our main conclusions. Furthermore, two further variants of the mean equation were investigated. We included returns with higher autoregressive lags and moving average components. In addition, we experimented with an error correction term in Eq. (1) due to the possibility of a cointegrating relationship between the WIG and the S&P500 index. The estimated coefficients of the lagged returns and the error correction term are statistically insignificant. Moreover, the inclusion of moving average components did not change our main conclusions.

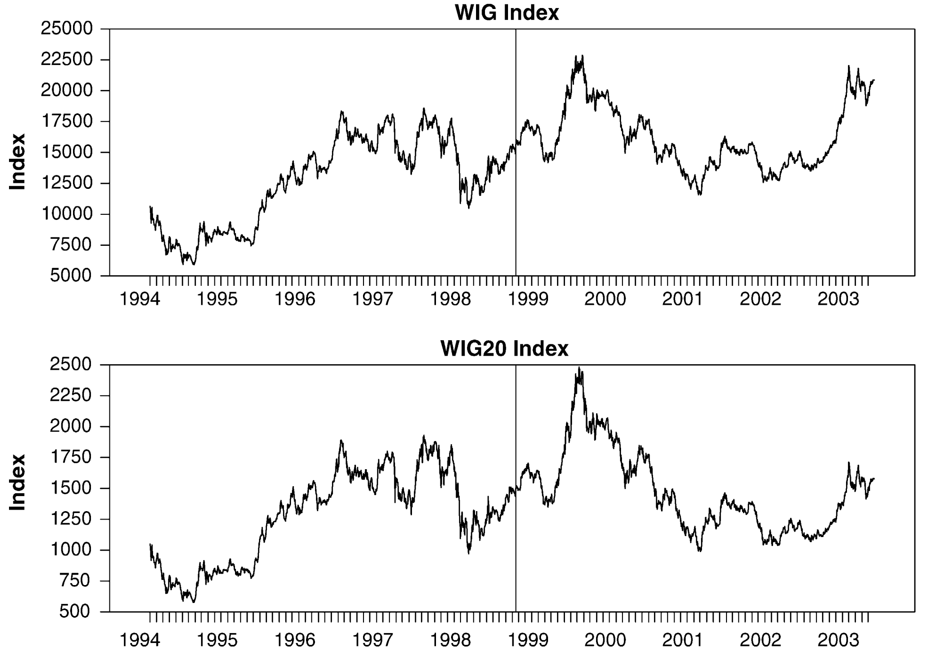

Fig. 1. Polish stock market indices.

relative lower volatility in the period after the entrance of pension fund investors in the Polish stock market. Before May 1999 there was the Asian (October/November 1997), the Russian (August/September 1998) and the Brazilian crisis (January 1999). After May 1999 a number of crisis took place as well, i.e., the Turkish crisis (February/March 2001), the terrorist acts (September 2001), the Argentinean crisis (January/February 2001), the accounting scandals in the US (June/July 2002) and the Iraq war (March/April 2003). Hence, financial crises appeared over the whole sample under investigation from November 1994 to December 2003. It is rather unlikely that the drop in volatility after May 1999 is due to higher volatility in the pre-May 1999 period induced by the Russian and Asian crises. We also provide empirical findings on this issue below.

Table 1 reports the empirical findings for the WIG and the WIG20 index relying on the 19 May 1999 dummy and applying the general-to-specific estimation strategy. The coefficients of the day-of-the-week dummies are with only two exceptions statistically insignificant (columns 2, 3, 6 and 7). Hence, the evidence does not confirm the existence of a day-of-the-week effect in Polish stock returns. The non-linear first-order autoregressive coefficients $\hat{\alpha}_2$ are negative and significant, while the $\hat{\alpha}'_2$ parameters are insignificant (columns 2, 4, 6 and 8). Furthermore, when including the non-linear arguments we observe a drastic increase in the first-order autoregressive coefficients. At the same time the contribution of the non-linear components to the explanatory power of the regressions is only marginal.

Consequently, we exclude the day-of-the-week dummies as well as the non-linear first-order autoregressive variables and receive the estimation results of the restricted model

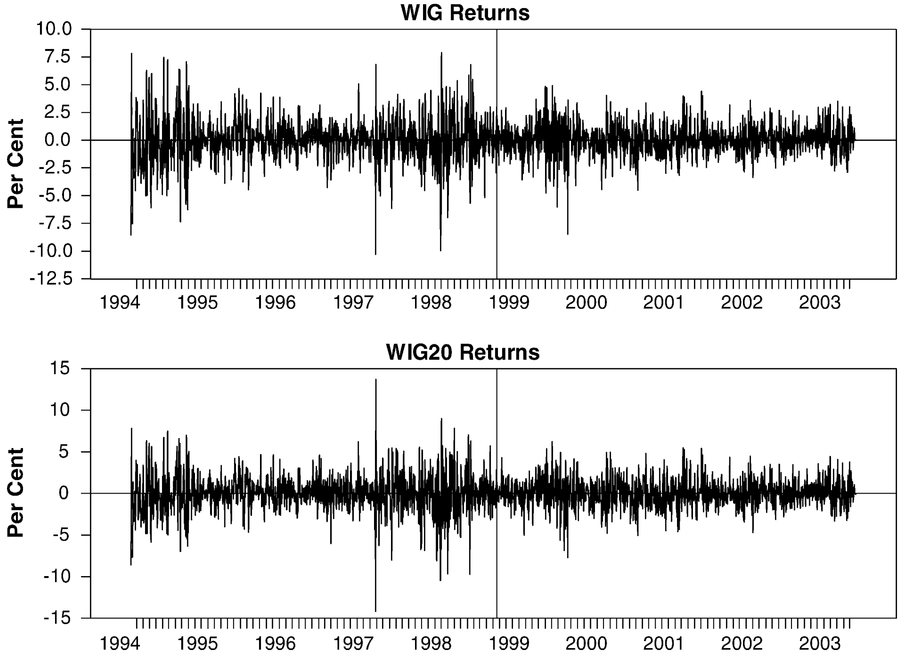

Fig. 2. Polish stock market returns.

contained in columns 5 and 9 for the WIG and the WIG20, respectively. The estimated autoregressive coefficients $\hat{\alpha}_1$ are statistically significant and positive and the parameters $\hat{\alpha}'_1$ are statistically significant and negative. Hence, the entrance of institutional investors on the Polish stock market has resulted in a considerable decrease in the extent of positive index returns autocorrelation. While in the period before the pensions reform and the appearance of institutional investors index returns exhibit a strong predictable component measured by $\hat{\alpha}_1$, the sums $(\hat{\alpha}_1 + \hat{\alpha}'_1)$ are – 0.02 in the period after the structural change.

The estimated coefficients $\hat{\alpha}_3$ of the control variable in the mean equation are in all cases statistically significant and positive. This demonstrates the strong interdependence between US and Polish stock returns dynamics. With respect to the summary statistics it should be noted that the Ljung-Box statistics are statistically significant and indicate the existence of autocorrelation in residuals. As discussed above we included stock returns with higher autoregressive lags, moving average components and an error correction term in Eq. (1). However, the Ljung-Box statistics mainly remain statistically significant (results are not reported but available on request).

Next, when looking at the estimated coefficients describing the conditional volatility process of the GJR models we find the well-established result of volatility persistence measured by the coefficients $\hat{\gamma}_1$. In addition, the asymmetry coefficients of the GJR models for the WIG $\hat{\gamma}_3$ are statistically significant showing that volatility is higher in periods of market decline than during market upturns, which can be theoretically justified by the leverage

Table 1
Results of GJR models for the WIG and WIG20 index

	WIG				WIG20			
$\hat{\alpha}_{10}$	0.08 (0.85)	0.10 (1.08)			0.05 (0.54)	0.08 (1.08)		
$\hat{\alpha}_{20}$	−0.06 (0.60)	−0.03 (0.28)			−0.16 (1.38)	−0.14 (1.21)		
$\hat{\alpha}_{30}$	−0.12 (1.19)	−0.10 (1.05)			0.06 (0.44)	0.07 (0.54)		
$\hat{\alpha}_{40}$	0.01 (0.09)	0.02 (0.16)			0.11 (0.98)	0.12 (1.14)		
$\hat{\alpha}_{50}$	0.08 (0.82)	0.09 (0.91)			0.09 (0.66)	0.11 (0.77)		
$\hat{\alpha}'_{10}$	−0.07 (0.54)	−0.09 (0.71)			−0.07 (0.50)	−0.01 (0.66)		
$\hat{\alpha}'_{20}$	−0.09 (0.64)	−0.12 (0.89)			0.02 (0.13)	0.001 (0.01)		
$\hat{\alpha}'_{30}$	0.04 (0.26)	0.02 (0.13)			−0.08 (0.44)	−0.10 (0.56)		
$\hat{\alpha}'_{40}$	0.23 (1.81)*	0.22 (1.79)*			0.06 (0.45)	0.05 (0.34)		
$\hat{\alpha}'_{50}$	−0.01 (0.07)	−0.01 (0.09)			−0.003 (0.02)	−0.01 (0.05)		
$\hat{\alpha}_{0}$			0.01 (0.30)	0.02 (0.52)			0.02 (0.59)	0.02 (0.75)
$\hat{\alpha}_{1}$	0.66 (8.47)***	0.21 (9.50)***	0.66 (8.64)***	0.21 (9.34)***	0.52 (5.82)***	0.09 (3.35)***	0.52 (5.91)***	0.09 (3.43)***
$\hat{\alpha}'_{1}$	−0.59 (2.77)***	−0.23 (5.73)***	−0.57 (2.88)***	−0.23 (5.65)***	−0.40 (1.81)*	−0.11 (2.88)***	−0.39 (1.85)*	−0.11 (2.86)***
$\hat{\alpha}_{2}$	−0.23 (6.25)***		−0.23 (6.35)***		−0.18 (5.81)***		−0.18 (6.00)***	
$\hat{\alpha}'_{3}$	0.17 (1.23)		0.16 (1.26)		0.10 (0.91)		0.10 (0.91)	
$\hat{\alpha}_{3}$	0.38 (10.74)***	0.38 (10.38)***	0.38 (11.19)***	0.38 (10.79)***	0.30 (8.17)***	0.30 (8.01)***	0.30 (8.54)***	0.30 (8.37)***
$\hat{\gamma}_{0}$	0.29 (11.33)***	0.30 (11.66)***	0.29 (13.39)***	0.30 (13.37)***	0.29 (8.33)***	0.31 (8.29)***	0.30 (11.14)***	0.32 (10.66)***
$\hat{\gamma}_{D}$	−0.05 (4.01)***	−0.06 (4.07)***	−0.05 (4.19)***	−0.05 (4.22)***	−0.03 (3.08)***	−0.03 (3.06)***	−0.03 (3.27)***	−0.03 (3.25)***
$\hat{\gamma}_{1}$	0.74 (32.38)***	0.73 (30.92)***	0.75 (34.81)***	0.74 (32.69)***	0.80 (45.50)***	0.79 (41.20)***	0.80 (51.31)***	0.79 (45.40)***
$\hat{\gamma}_{2}$	0.13 (6.06)***	0.14 (5.64)***	0.13 (6.09)***	0.14 (5.70)***	0.11 (6.52)***	0.11 (5.96)***	0.11 (6.54)***	0.11 (5.90)***
$\hat{\gamma}_{3}$	0.05 (1.87)*	0.06 (1.76)*	0.05 (1.84)*	0.05 (1.73)*	0.04 (1.47)	0.04 (1.50)	0.04 (1.54)	0.05 (1.57)
$\bar{R}^2$	0.15	0.13	0.15	0.13	0.09	0.05	0.08	0.05
LL	−2079.83	−2093.81	−2088.45	−2102.28	−2588.42	−2601.16	−2593.12	−2605.99
Q_{24}	58.81***	38.61**	56.24***	36.64**	45.15***	49.81***	43.34***	48.86***

Note: Equations $R_t = \sum_{i=1}^{5} \alpha_{i0} DoW_{it} + \sum_{i=1}^{5} \alpha'_{i0} D_t DoW_{it} + \alpha_1 R_{t-1} + \alpha'_1 D_t R_{t-1} + \alpha_2 \sqrt{h_t} R_{t-1} + \alpha'_2 D_t \sqrt{h_t} R_{t-1} + \alpha_3 R^F_{t-1} + \varepsilon_t$ and $h_t = (1 + \gamma_D D_t)(\gamma_0 + \gamma_1 h_{t-1} + \gamma_2 \varepsilon^2_{t-1} + \gamma_3 \varepsilon^2_{t-1} I_t)$ are jointly estimated. R_t denotes stock returns on the Polish WIG and WIG20 index, $\varepsilon_t = N(0, h_t)$ the unpredictable component of stock index returns, DoW_{it} dummy variables for the days of the week and R^F_{t-1} returns on a foreign stock market index. I_t takes on the value of 0 if $\varepsilon_{t-1} \geq 0$ and 1 in case $\varepsilon_{t-1} < 0$. With the dummy variable D_t we model the structural change due to 19 May 1999. $\bar{R}^2$ denotes the adjusted coefficient of determination, LL the log likelihood and Q_{24} the Ljung-Box statistic with 24 autocorrelation coefficients. *t*-statistics are in parantheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

effect (Bekaert and Wu, 2000; Wu, 2001). For the WIG20 the asymmetry coefficients are insignificant.[5]

More importantly, the parameters of the dummy variable in the conditional volatility process $\hat{\gamma}_{\mathrm{D}}$ are statistically significant at the 1% level and negative. Relying on this empirical finding we can conclude that the entrance of institutional investors on the Polish stock market reduced stock market volatility. This result supports the hypothesis that Polish pension fund investors did stabilize stock prices. The empirical finding on the coefficient $\hat{\gamma}_{\mathrm{D}}$ is robust across various specifications.[6]

Table 2 reports the results on the robustness check in terms of different cut-off dates for the dummy variable D_t. Due to the evidence on the day-of-the-week effect and the non-linear components above we implement the restricted version of Eq. (1). The findings for the different dummy variables confirm the empirical results we have reported in Table 1. The differences are marginal. We find robust evidence that the entrance of institutional investors in the Polish stock market induced a structural break in the autocorrelation and conditional volatility structure of stock returns. The findings do not support the hypothesis of a destabilizing effect due to the investment activities of institutional investors. On the contrary, the Polish pension fund investors seem to have stabilized stock prices at the Warsaw Stock Exchange.

As discussed above the 1994–2003 period contains other institutional changes and shocks to the Polish stock market which supposedly might have had an effect on index returns volatility. To take into account the aspect that other events than the entrance of institutional investors could have possibly influenced volatility of Polish stock index returns, shorter sample periods than the original one were investigated. We start with a sample of 24 months before and after May 1999 and then reduce this period successively by 3 months at the beginning and the end of each sample. The procedure stops when reaching 6 months before and after May 1999. The alternative samples have therefore the length of 24, 21, 18, 15, 12 and 6 months before and after the division line in May 1999. Due to the insignificance of the asymmetry coefficient in the conditional volatility Eq. (2), we rely on the conventional GARCH specification throughout.

Table 3 contains the empirical findings where due to space considerations only the estimated γ_{D} coefficients are reported (detailed results are available on request). While the values of the estimated parameters show some variation depending on the sample, they are all negative and with only one exception significant. Keeping aside the relatively high values in absolute terms for the shortest period from 1 November 1998 to 30 November 1999, the values for other periods are very close to the ones reported in Tables 1 and 2. Hence, the findings on the shorter samples in Table 3 confirm our previous empirical results that the entrance of pension fund investors had a dampening effect on the volatility of Polish stock returns. The evidence on the shorter samples allows us to exclude other sources than the

[5] We also performed GARCH models instead of GJR models for the WIG20 and received qualitatively identical empirical results. The findings are not shown but available on request.

[6] The Eqs. (1) to (3) were also estimated for the Czech Republic and Hungarian stock market indices PX50 and BUX, respectively, to get an impression of whether other countries experienced the same changes in the autocorrelation and volatility structure of stock returns as the Polish market. The findings (not reported but available on request) are mixed allowing no clear cut conclusion.

Table 2
Results for alternative dummy variables

	19 August 1999		19 November 1999		19 May 2000	
	WIG	WIG20	WIG	WIG20	WIG	WIG20
$\hat{\alpha}_0$	0.02 (0.49)	0.03 (0.75)	0.02 (0.54)	0.03 (0.78)	0.02 (0.49)	0.03 (0.71)
$\hat{\alpha}_1$	0.20 (9.02)***	0.09 (3.42)***	0.20 (8.94)***	0.08 (3.24)***	0.17 (7.22)***	0.07 (2.91)***
$\hat{\alpha}'_1$	−0.22 (5.21)***	−0.11 (2.91)***	−0.22 (5.22)***	−0.10 (2.54)***	−0.19 (4.04)***	−0.10 (2.36)***
$\hat{\alpha}_3$	0.38 (10.67)***	0.30 (8.35)***	0.38 (10.70)***	0.30 (8.27)***	0.37 (10.18)***	0.30 (8.24)***
$\hat{\gamma}_0$	0.29 (13.78)***	0.30 (11.05)***	0.28 (14.18)***	0.29 (11.21)***	0.32 (12.82)***	0.32 (10.50)***
$\hat{\gamma}_D$	−0.04 (3.48)***	−0.02 (2.61)***	−0.04 (3.27)***	−0.02 (2.40)**	−0.08 (5.30)***	−0.04 (4.28)***
$\hat{\gamma}_1$	0.74 (33.80)***	0.79 (46.97)***	0.74 (35.90)***	0.79 (47.82)***	0.73 (32.43)***	0.79 (46.83)***
$\hat{\gamma}_2$	0.13 (5.74)***	0.11 (5.91)***	0.13 (5.86)***	0.11 (5.91)***	0.13 (5.42)***	0.11 (5.72)***
$\hat{\gamma}_3$	0.06 (1.78)*	0.04 (1.59)	0.05 (1.71)*	0.04 (1.55)	0.06 (1.97)**	0.05 (1.70)*
$\bar{R}^2$	0.13	0.05	0.13	0.05	0.12	0.05
LL	−2106.21	−2607.27	−2106.48	−2608.22	−2104.71	−2604.45
Q_{24}	36.18**	48.52***	36.38**	47.76***	34.07*	48.29***

Note: The model estimated is $R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha'_1 D_t R_{t-1} + \alpha_3 R^F_{t-1} + \varepsilon_t, h_t = (1 + \gamma_D D_t)(\gamma_0 + \gamma_1 h_{t-1} + \gamma_2 \varepsilon^2_{t-1} + \gamma_3 \varepsilon^2_{t-1} I_t)$. R_t denotes stock returns on the Polish WIG and WIG20 index, $\varepsilon_t = N(0, h_t)$ the unpredictable component of stock index returns and R^F_{t-1} returns on a foreign stock market index. I_t takes on the value of 0 if $\varepsilon_{t-1} \geq 0$ and 1 in case $\varepsilon_{t-1} < 0$. With the dummy variable D_t we model the structural change due to 19 August 1999, 19 November 1999 and, alternatively, 19 May 2000. $\bar{R}^2$ is the adjusted coefficient of determination, LL the log likelihood and Q_{24} the Ljung-Box statistic with 24 autocorrelation coefficients. t-statistics are in parantheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

Table 3
Summary of findings on shorter samples

Sample period	WIG	WIG20
1997:05:01–2001:05:31	−0.03 (1.91)*	−0.04 (2.90)***
1997:08:01–2001:02:28	−0.06 (2.27)**	−0.09 (3.53)***
1997:11:01–2000:11:30	−0.06 (2.33)**	−0.10 (3.72)***
1998:02:01–2000:08:31	−0.10 (2.90)***	−0.28 (5.03)***
1998:05:01–2000:05:31	−0.05 (2.16)**	−0.02 (1.58)
1998:08:01–2000:02:28	−0.08 (1.74)*	−0.23 (2.50)**
1998:11:01–1999:11:30	−0.41 (4.56)***	−0.76 (14.06)***

Note: The model estimated is $R_t = \alpha_0 + \alpha_1 R_{t-1} + \alpha'_1 D_t R_{t-1} + \alpha_3 R^F_{t-1} + \varepsilon_t$, $h_t = (1 + \gamma_D D_t)(\gamma_0 + \gamma_1 h_{t-1} + \gamma_2 \varepsilon^2_{t-1})$. R_t denotes stock returns on the Polish WIG and WIG20 index, $\varepsilon_t = N(0, h_t)$ the unpredictable component of index returns and R^F_{t-1} returns on a foreign stock market index. With the dummy variable D_t we model the structural change due to 19 May 1999. Only the estimated γ_D coefficients are reported. *t*-statistics are in parantheses.

* Statistical significance at the 10% level.

** Statistical significance at the 5% level.

*** Statistical significance at the 1% level.

one of interest to be responsible for the lower volatility in Polish stock index returns after 19 May 1999.

5. Summary and conclusions

One of the most prominent changes in financial markets during the recent decades is the surge of institutional investors. Concerning their specific investment behavior numerous studies indicate that institutional investors engage in herding and tend to exhibit positive feedback trading strategies and thus contribute to stock returns autocorrelation as well as to excess volatility. In this paper, we challenge this popular view and provide different empirical evidence on the influence of institutional investors on stock returns dynamics. The Polish pension reform in 1999 is used as an institutional peculiarity to implement a variant of an event study in the asymmetric GARCH framework. It is this institutional feature of the Polish emerging stock market together with the econometric technique that allows us to answer the following questions: did the increase of institutional ownership after the appearance of Polish pension funds on 19 May 1999 result in a change in the autocorrelation and volatility structure of stock index returns? Did Polish pension fund investors destabilize or stabilize stock prices?

Relying on the framework outlined above we provide robust empirical evidence in favor of a change in the autoregressive structure of stock index returns and in the conditional volatility process due to the increased importance of institutional investors on the Polish stock market. However, in contrast to the popular belief that institutional investors induce autocorrelation in stock returns and increase volatility, our findings support the hypothesis that the pension fund investors in Poland reduced positive returns autocorrelation as well as returns volatility. Hence, our empirical evidence is in favor of a stabilizing rather than a destabilizing effect induced by pension funds investors in Poland.

In a broader perspective our findings are supportive of the view that institutional investors can be characterized as informed investors who speed up the adjustment of stock prices to new information thereby making the stock market more efficient. Institutions can create an informational advantage by exploiting economies of scale in information acquisition and processing. The marginal costs of gathering and processing are lower than for individual traders. If individual investors contribute to stock returns autocorrelation and volatility, a significant decrease in trades by individuals relative to institutions might provide an explanation for the stabilizing effect. Moreover, institutional investors may stabilize stock prices and counter irrational behavior in individual investors' sentiment. Herding and positive feedback trading by institutions thus does not necessarily imply that institutional traders destabilize stock prices.

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