

# “Influence of non-monetary information signals of the USA on the Ukrainian stock market volatility”

Roman Pavlov  <https://orcid.org/0000-0001-7629-2730>

 <https://publons.com/researcher/S-2421-2017/>

Tetiana Pavlova  <https://orcid.org/0000-0001-7178-3573>

 <https://publons.com/researcher/S-8740-2017/>

Anna Lemberg  <https://orcid.org/0000-0001-6200-5921>

Oksana Levkovich  <https://orcid.org/0000-0002-4570-4963>

 <https://publons.com/researcher/V-2616-2017/>

Iryna Kurinna  <http://orcid.org/0000-0003-3872-7283>

## AUTHORS

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Anna Lemberg, Oksana Levkovich,  
Iryna Kurinna, 2019

Roman Pavlov, Ph.D. in Economics,  
Associate Professor, Department  
of Finance, Oles Honchar Dnipro  
National University, Ukraine.

Tetiana Pavlova, Doctor of  
Philosophical Science, Associate  
Professor, Oles Honchar Dnipro  
National University, Ukraine.

Anna Lemberg, Ph.D. in Economics,  
Associate Professor Department  
of Economics, Entrepreneurship  
and Enterprise Management, Oles  
Honchar Dnipro National University,  
Ukraine.

Oksana Levkovich, Ph.D. in  
Economics, Associate Professor  
Department of Finance, Oles  
Honchar Dnipro National University,  
Ukraine.

Iryna Kurinna, Senior Lecturer,  
Department of Economics,  
Entrepreneurship and Enterprise  
Management, Oles Honchar Dnipro  
National University, Ukraine.



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Roman Pavlov (Ukraine), Tetiana Pavlova (Ukraine), Anna Lemberg (Ukraine),  
Oksana Levkovich (Ukraine), Iryna Kurinna (Ukraine)

# INFLUENCE OF NON-MONETARY INFORMATION SIGNALS OF THE USA ON THE UKRAINIAN STOCK MARKET VOLATILITY

## Abstract

The Ukrainian PFTS stock index volatility reaction as a whole and its constituent economic sectors ("Basic Materials", "Financials", "Industrials", "Oil & Gas", "Telecommunications", "Utilities") to seven non-monetary US information signals ("Consumer price index", "Personal spending", "Unemployment rate", "Gross domestic product", "Industrial production", "Consumer confidence", "Housing starts") was carried out for the period 2000–2017 on the basis of closing stock quotations in the trading day format. To assess the "surprise" component direct influence nature of the USA selected non-monetary information signals on the PFTS stock index, an AR-GARCH econometric modelling device was used. The results achieved clearly indicate the presence of some PFTS stock index economic sectors heterogeneous reaction to the United States individual non-monetary information signals announcement. For example, such economic sectors as "Basic Materials", "Financials", and "Oil & Gas" volatility response to the US non-monetary information signal "Consumer price index" "surprise" components the opposite of the overall PFTS stock index reaction. It can also be concluded that the United States non-monetary information signals influence on the Ukrainian stock market volatility depends not only on the financial cycle phase and data frequency, but also on the PFTS stock index economic sector.

## Keywords

non-monetary signals, component of "surprise", stock index, economic sector, AR-GARCH, volatility, return

## JEL Classification

E44, G12, G14

## INTRODUCTION

The impact of non-monetary information signals on the stock market returns is of high interest both for investors and scientists. This is evidenced by the financial press increased attention to market forecasts regarding the main macroeconomic indicators' dynamics. Moreover, in many works (e.g. Flannery & Protopapadakis, 2002), non-monetary information signals are considered as a potential risk factor. Thus, forecasting the stock market's reaction to their public disclosure will allow investors to improve the quality of their own investment decisions (Chen & Lien, 2017; O. Velychko & L. Velychko, 2017a) and create the basis for developing more effective financial risk management strategies.

In general, information signals concern the US economy state, and this choice is due to the fact that it is the leading economy on a global scale (Gilbert, 2011; Sardak et al., 2017) and has a significant impact on the development of other countries' economies and their national (local) markets shares. Topical scientific literature (e.g. Nikkinen & Sahlström, 2001; Vrugt, 2009; Füss et al., 2011; Hussain et al., 2015) emphasizes the importance of information signals regarding US macroeconomic indicators in other global stock markets.

It should be noted that the influence of non-monetary information signals on the stock market return is considered in many studies. However, works that focus on the second aspect of return that is volatility are more rare. Nevertheless, given the 2008 financial crisis, it can be concluded that non-monetary information signals are able to provide important information about the future economic situation in the country (Lapp & Pearce, 2012; Bogodistov et al., 2017; Krupskyi & Grynko, 2018), that is, potentially generate instability in the market shares, as well as changes in its return. Thus, the question arises about the degree of non-monetary information signals' influence on the volatility of Ukrainian stock market. That is, it is necessary to establish the nature of the specified information signals impact (stabilizing or destabilizing) on the Ukrainian stock market.

Many scientists believe that an "unexpected" increase (decrease) in the value of a non-monetary information signal leads to an increase (decrease) in volatility during the day of this signal publication. As for European stock markets, the Harju and Hussain (2011) and Dimpfl (2011) studies have found that six American non-monetary information signals increase volatility in the leading EU equity markets. In other works, in particular, Jones et al. (2005), the conclusion is made about the stabilizing effect of the informational context of non-US signals "surprise" component, the publication of which allows predicting the future parameters of the banking regulators' monetary policy. Thus, in this case, we can speak of a potential decrease in the level of uncertainty for a particular stock market.

In these works, which use aggregated data on stock indices, it is stated that the United States individual non-monetary information signals publication destabilizes the stock market as a whole. The importance of non-monetary information signals, and therefore the reaction of the stock market may differ depending on the sector of the national economy. Also, the use of aggregated data regarding the stock market may cause non-detection of its reaction to individual non-monetary information signals. Thus, it is necessary to emphasize the importance of determining the non-monetary information signals' impact on the stock market, depending on the economic enterprises sectors whose shares are used in the calculation of a particular stock index.

So, during this study, testing will be conducted on the basis of event analysis in order to identify:

1. peculiarities of Ukrainian stock market volatility reaction as a whole to the "surprise" component of non-monetary information signals of the USA;
2. features of the stock prices reaction of enterprises issuing certain economic sectors' PFTS stock index.

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## 1. THE "SURPRISE" COMPONENT OF THE NON-MONETARY INFORMATION SIGNAL

According to Fama (1965), stock prices must be immediately and accurately adapted to information. This information may include announced non-monetary information signals, involving forecasts. Therefore, the change in the stock price at the time the non-monetary information signal is released should be explained solely by the deviation between the published value and the forecast for

such information signal. In other words, this "surprise effect" greatly influences stock market quotes and also encourages investors to rethink their own investment strategies.

In connection with the above, it is necessary to single out the "surprise" component of the non-monetary information signal content. Methodical developments on this issue are most detailed in Balduzzi et al. (2001) and Fleming and Remolona (1999), according to which the "surprise" component of a non-monetary information signal content is equal to the difference between the corresponding actual value and the consensus forecast.

Value of the “surprise” component for different non-monetary signals may vary in a very wide range. Thus, the use of econometric models with such data may lead to incorrect results (Plastun et al., 2018; O. Velychko & L. Velychko, 2017b). Therefore, it is advisable to carry out the statistical normalization procedure of the input data with respect to the “surprise” component on selected non-monetary information signals, in which the attributes value forming the input vector is reduced to a certain specified range. After normalization, all values of the input features will be brought to a certain narrow range, which will allow getting correct results.

In our case, there are relatively rare “outliers” in the source data regarding the “surprise” component values for different non-monetary signals, which significantly exceed the typical spread. Thus, it is advisable to focus not on extreme values, but on typical ones. Therefore, it is necessary to perform normalization on standard deviation.

## 2. DATA AND METHODS

PFTS stock index daily closing quotes are taken from the Datastream database for the period 2000–2017. Also, to study the FTS stock index reaction sectoral features, stock quotes of issue companies were analyzed separately depending on their belonging to the first-level economic sectors according to Industry Classification Benchmark. As of the end of 2017, a sample of such PFTS Stock Exchange (Kyiv) sectors was received: “Basic Materials”, “Financials”, “Industrials”, “Oil & Gas”, “Telecommunications”, “Utilities”.

Further, these quotes were used to calculate the yield in the trading day format without considering the dividends’ reinvestment. The use of such profitability calculation is justified by two reasons:

1. In the short term, current yield largely depends on the revalued shares price level and dividend payments do not significantly affect the stock returns.
2. Revenue is calculated as the first difference between the logarithms of closing rates for the current and previous trading days, which makes it possible to get a stationary time series

of returns. That is, such time series of returns make it possible to evaluate the short-term PFTS stock index reaction to the non-monetary information signals disclosure, avoiding the problem of non-stationarity.

Rigobon and Sack (2008) substantiate macroeconomic information signals that can significantly affect stock prices. In this regard, the United States non-monetary information signals were selected, for which there are data necessary in the context of this study:

1. “Consumer price index” (CPI) as an inflation indicator. The source of announcement – Bureau of Labor Statistics. Announcement frequency – monthly. The announcement time is 13:30 (GMT).
2. “Personal spending” (PS) as one of the most important consumption indicators in the United States. The source of announcement is Bureau of Economic Analysis. Announcement frequency – monthly. The announcement time is 13:30 (GMT).
3. “Unemployment rate” (UR) as one of the most important indicators characterizing the general economic situation in the United States. The announcement source is Bureau of Labor Statistics. Announcement frequency – monthly. The announcement time is 13:30 (GMT). It should be noted that quite often there is a significant stock market reaction to the US “Nonfarm Payrolls” employment rate as actual values of the UR, as a rule, do not go beyond the consensus forecasts or these deviations are minor.
4. “Gross domestic product” (GDP) as one of the most important general economic situation indicators in the United States. The source of announcement is Bureau of Economic Analysis. Announcement frequency – quarterly. The announcement time is 13:30 (GMT).
5. “Industrial production” (IP) as one of the most important general economic situation indicators in the United States. The announcement source is Federal Reserve. Announcement frequency – monthly. The announcement time is 14:15 (GMT).

6. “Consumer confidence” (CC) as one of the most important indicators characterizing the households’ degree of consumer optimism regarding the economic situation in the United States. The announcement source is the New York-based Conference Board. Announcement frequency – monthly. The announcement time is 15:00 (GMT).
7. “Housing starts” (HS) as one of the most important real estate market indicators. The source of announcement is Bureau of the Census. Announcement frequency – monthly. The announcement time is 13:30 (GMT).

The actual values of selected non-monetary information signals are taken from Bloomberg data. Next, the standardized “surprise” component is calculated as the difference between the actual value and the consensus forecast, normalized by the standard deviation:

$$S_k = \frac{F_k - A_k}{\sigma_k}, \quad (1)$$

where  $S_k$  is the standardized “surprise” component on a US non-monetary information signal  $k$ ,  $F_k$  is the actual value of the US non-monetary information signal  $k$ ,  $A_k$  is consensus forecast value for the US non-monetary information signal that is, the “expected” component  $k$ ,  $\sigma_k$  is the standard “surprise” component deviation for non-US information signals  $k$ .

Consensus forecast information on the market for the United States particular non-monetary information signal at a particular point in time is taken from the Money Market Services database. Using data from the Bloomberg agency, some missing values were added for the United States individual non-monetary information signals for the period in question. To study the United States non-monetary information signals’ influence on the volatility of Ukrainian stock market, an event analysis was chosen. The assessment was made using the econometric model AR-GARCH by supplementing its specification with conditional dispersion on the non-monetary information signal of “surprise” component. Formally, taking into account the methodological provisions of such scientific works regarding the impact of macroeconomic announcements on the volatility of markets (e.g.

Jones et al., 2005; Wongswan, 2006; Belgacem et al., 2015), the econometric model looks like:

$$R_t = \alpha + \sum_{i=1}^p \beta_i R_{t-i} + \varepsilon_t, \quad (2)$$

$$h_t = \omega + \sum_{i=1}^p \sigma_i \varepsilon_{t-i}^2 + \sum_{j=1}^q \gamma_j h_{t-j} + \sum_{k=1}^7 \theta_k S_{k,t}, \quad (3)$$

where  $R_t$  is the PFTS stock index yield at the time  $t$  (daily format),  $\alpha$  is a constant,  $\beta$  is the autoregression coefficient,  $\varepsilon_t$  is the error or influence of factors that are not related to the profitability for the previous period, but affecting the yield on the selected time interval  $t$ ,  $p, q$  – lag order selected according to the Akaike (AIC) and Schwarz (SIC) information criteria,  $S_{k,t}$  – standardized “surprise” component by US non-monetary information signal  $k$  at time  $t$ ,  $h_t$  – conditional dispersion by “surprise” component of non-monetary information signal  $S_{k,t}$ ,  $\theta_k$  – weighting coefficient of the US non-monetary data signal  $k$  direct impact on Ukrainian stock market volatility.

As part of this study, it is necessary to establish whether the positive (negative) value of the “surprise” component of the non-monetary information signal significantly increases (decreases) the volatility of the Ukrainian stock market (based on a representative PFTS stock index). To do this, it is necessary check whether the hypothesis  $H_0: \theta_k = 0$  (neutral impact when disclosing the information content of a US non-monetary signal on the volatility of Ukrainian stock market) can:

- 1) be rejected in favor of hypothesis  $H_1: \theta_k > 0$  – a case when destabilizing nature of the impact on the Ukrainian stock market is being tested, that is, when its volatility increases as a result of the promulgation of a non-monetary information signal from the US (information content of the “surprise” component);
- 2) be rejected in favor of hypothesis  $H_2: \theta_k < 0$  – the case when stabilizing impact on the domestic stock market is being tested, that is, when its volatility decreases due to the publication of a non-monetary information signal from the US (information content of the “surprise” component).



In order to check whether the response of volatility to the United States non-monetary information signals differs depending on the national economy sector, a similar methodical approach is used for various sectors of the first level according to the Industry Classification Benchmark. Similarly, hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  will be tested for the sectors.

### 3. EMPIRICAL RESULTS

The results of equations (2) and (3) evaluations of the relative Ukrainian stock index PFTS are given in Table 1, which shows that at the aggregated level, the assessment results of direct “surprise” component impact on the seven selected non-monetary US information signals indicate a significant response to the volatility of the representative PFTS stock index.

**Table 1.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of the PFTS stock index

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	0.0086**	0.0032
Personal spending	-0.0039	0.023
Unemployment rate	0.0133***	0.0034
Gross domestic product	0.0094***	0.0027
Industrial production	-0.0008	0.0032
Consumer confidence	-0.0098***	0.0014
Housing starts	-0.0079***	0.0015

Notes: Levels of statistical significance: 1% (\*\*\*); 5% (\*\*); 10% (\*). LB (12) – p-value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

An increase in the “surprise” component of the US non-monetary information signals “Consumer price index”, “Gross domestic product” and “Unemployment rate” leads to an increase in the conditional dispersion (volatility) of the Ukrainian stock market by 0.86%, 0.94% and 1.33%, respectively. The decrease in volatility by 0.98% and 0.79% is observed after an unexpected increase in values, respectively, for the signals “Consumer confidence” and “Housing starts”. It was also found that domestic stock market volatil-

ity reaction to the United States non-monetary information signals is often not short-term and often continues in subsequent trading days.

This result is partially consistent with the findings of the study by Errunza and Hogan (19980), which states that there is destabilization (stabilization) in the US and European stock markets after positive (negative) values of the US information signals (with the exception of “Gross domestic product”) “surprise” component within two months after relevant non-monetary information signals disclosure. Also in this work it is noted that the volatility in the stock market increases on the days of announcement by an average of 25%. However, unlike the results obtained in the above work, in our case, it has been established that the volatility reaction of Ukrainian PFTS stock index is usually much stronger.

It should be noted that the results obtained in the framework of our study are not consistent with the findings of the research by Jones et al. (2005), who emphasize that only “Unemployment rate” USA non-monetary information signal stabilizes the stock market, that is, leads to a decrease in volatility at the time of such announcement. This discrepancy in the results is partly due to the period of the study, differences in the functioning and development of the stock markets of economically developed countries and Ukraine.

Regarding the results obtained about the volatility reduction of the Ukrainian stock market under non-monetary information signals “Consumer confidence” and “Housing starts” “surprise” component influence, it should be noted that they are largely consistent with the findings of Kim et al. (2004), Nikkinen and Sahlström (2004) and Dimpfl (2011), in which it is noted that some non-monetary information signals of the United States reduce the volatility of economically developed countries stock markets. Scientists attribute this to the fact that individual non-monetary information signals help predict future decisions regarding the monetary policy of banking regulators. This leads to a decrease in uncertainty in the relevant stock markets. But unlike the results obtained in these papers, in our case, it has been established that PFTS stock index volatility response is much stronger.

**Table 2.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on the PFTS stock index

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$	$H_1: \theta_k > 0$	$H_2: \theta_k < 0$
	Neutral effect	Destabilizing effect	Stabilizing effect
Consumer price index	Rejected	Accepted	Rejected
Personal spending	Accepted	Rejected	Rejected
Unemployment rate	Rejected	Accepted	Rejected
Gross domestic product	Rejected	Accepted	Rejected
Industrial production	Accepted	Rejected	Rejected
Consumer confidence	Rejected	Rejected	Accepted
Housing starts	Rejected	Rejected	Accepted

Another conclusion that can be made from the data Table 1 contains concerns the fact that participants in the Ukrainian stock market view the US economy as the most important source of macroeconomic information, confirming the leading role of the US economy on a global scale.

Based on the use of daily quotations, it has been established that the reaction of the Ukrainian stock market volatility under the influence of United States non-monetary information signals is not short-term, it continues even after the end of trading. This result is to some extent consistent with the findings of Errunza and Hogan (1998) and Louhichi (2011) who note that the effect of non-monetary information signals of the United States on the volatility of equity markets in economically developed countries lasts up to two months.

The results of testing the hypotheses put forward (Table 2) confirm the hypothesis  $H_1$  about non-monetary information signals “Consumer price index”, “Unemployment rate” and “Gross domestic product” “surprise” component destabilizing effect on the Ukrainian stock market.

The  $H_0$  hypothesis of the relative non-neutral “surprise” component influence nature of non-monetary information signals “Personal spending” and “Industrial production” on the Ukrainian stock market, and the hypothesis  $H_2$  on the relative stabilization influence of the of the non-monetary information signals “Consumer confidence” and “Housing starts” “surprise” component on the domestic market was confirmed. Thus, the nature of the impact (neutral, destabilizing, stabilizing)

components of the “surprise” of non-monetary information signals of the United States on the Ukrainian stock market is heterogeneous and largely depends on investors’ subjective perception of the importance of one or another available information regarding the economic situation in the United States.

The results suggest that the reaction of volatility to the component “surprises” on non-US information signals is heterogeneous, that is, it depends on the economic sector of issuing enterprises whose shares are included in the calculation of the PFTS index. Based on the estimates of equations (2) and (3), we state that the economic sectors that significantly react to the impact of non-monetary information signals of the USA (at least four out of seven) are: “Basic Materials”, “Oil & Gas”, “Utilities”, “Financials” and Telecommunications”. This can be explained by the dependence of enterprises in these sectors on world trade conditions (Grynko et al., 2016), which is greatly influenced by the state of the US economy. And the “Industrials” economic sector only responds to three non-monetary information signals. Let us consider the results in more detail.

The results regarding the reaction of the sector “Basic Materials” are given in Table 3.

The data obtained indicate that the volatility of stock quotes of enterprises in this economic sector decreases with an increase in the value of the “surprise” component of the US non-monetary information signals “Consumer price index”, “Consumer confidence” and “Housing starts” by 1.33%, 0.47% and 0.34%, respectively, that is, there

**Table 3.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of stock prices of enterprises of Ukraine in the economic sector “Basic Materials”

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	-0.0133**	0.0068
Personal spending	-0.0006	0.0007
Unemployment rate	0.0045**	0.0009
Gross domestic product	0.0032	0.0018
Industrial production	-0.0028	0.0021
Consumer confidence	-0.0047**	0.0016
Housing starts	-0.0034***	0.0011

Notes: Levels of statistical significance: 1% (\*\*); 5% (\*\*); 10% (\*). LB (12) – p-value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

is a stabilizing nature of the impact on the corresponding component of the Ukrainian stock market. More relative to the “surprise” component of the non-monetary information signal of the United States “Unemployment rate”, it should be noted that as its value increases, the volatility of stock prices of enterprises-issuers of the economic sector under review increases by 0.45%, that is, there is a destabilizing effect on the relevant component of the Ukrainian stock market.

The results of testing the hypotheses in the sector “Basic Materials” are given in Table 4.

Hypothesis  $H_1$  was confirmed on the destabilizing effect of the “surprise” component of the non-monetary information signal “Unemployment rate” on the market quotations of Ukrainian enterprises in the “Basic Materials” sector. The  $H_0$  hypothesis was confirmed regarding the neutral influence of the “surprise” component of non-monetary information signals “Personal spending”, “Gross domestic product”, and “Industrial production”

on the market quotations of the shares of the respective issuers. The  $H_2$  hypothesis was confirmed regarding the stabilizing effect of the “surprise” component of non-monetary information signals “Consumer price index”, “Consumer confidence” and “Housing starts” on market quotations of shares of issuers in this economic sector.

Thus, there is a neutral and stabilizing effect of the “surprise” component on the majority of non-monetary information signals on the share prices of enterprises in Ukraine in the “Basic Materials” sector. This can be partly explained by the fact that investors in the Ukrainian stock market do not perceive the majority (6 out of 7) of the selected non-monetary information signals of the United States as a destructive factor for share prices of Ukrainian issuers in the economic sector “Basic Materials”. Also, the reaction of stock quotes of enterprises in this economic sector can be explained by the dependence on the world commodity trade (Grynko et al., 2017), which is greatly influenced by the state of the US economy. So, positive data on the

**Table 4.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on stock quotes of enterprises of the economic sector “Basic Materials”

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$ Neutral effect	$H_1: \theta_k > 0$ Destabilizing effect	$H_2: \theta_k < 0$ Stabilizing effect
Consumer price index	Rejected	Rejected	Accepted
Personal spending	Accepted	Rejected	Rejected
Unemployment rate	Rejected	Accepted	Rejected
Gross domestic product	Accepted	Rejected	Rejected
Industrial production	Accepted	Rejected	Rejected
Consumer confidence	Rejected	Rejected	Accepted
Housing starts	Rejected	Rejected	Accepted



**Table 5.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of stock prices of enterprises of Ukraine in the economic sector “Oil & Gas”

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	-0.0092**	0.0025
Personal spending	0.0074***	0.0021
Unemployment rate	-0.0009	0.0026
Gross domestic product	0.0081***	0.0007
Industrial production	0.0027	0.0022
Consumer confidence	-0.0035	0.0033
Housing starts	-0.0079***	0.0017

Notes: Levels of statistical significance: 1% (\*\*\*) ; 5% (\*\*); 10% (\*). LB (12) – p-value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

state of the national economy of the United States, as a rule, contribute to the growth of demand for raw materials (with a corresponding increase in prices), which often leads to a corresponding stabilization of stock prices of domestic enterprises in the “Basic Materials” sector.

The results for the reaction sector “Oil & Gas” are given in Table 5.

The data obtained indicate that the volatility of stock quotes of enterprises of the mentioned economic sector decreases with an increase in the “surprise” component of the US non-monetary information signals “Consumer price index” and “Housing starts” by 0.92% and 0.79%, respectively, that is, there is a stabilizing effect on the corresponding component of the Ukrainian stock market. Regarding the component of “surprise” of non-monetary information signals “Personal spending” and “Gross domestic product”, as its value increases, the volatility of stock prices of

companies in this sector increased by 0.74% and 0.81%, respectively, that is, there is a significant destabilizing effect on the corresponding market component shares of Ukraine.

The results of testing the hypotheses in the sector “Oil & Gas” are given in Table 6.

Hypothesis  $H_1$  was confirmed on the destabilizing effect of the “surprise” component of non-monetary information signals “Personal spending” and “Gross domestic product” on the market quotations of Ukraine’s enterprises in the “Oil & Gas” sector. The hypothesis  $H_0$  is relative to the neutral impact of the “surprise” component of non-monetary information signals “Unemployment rate”, “Consumer confidence” and “Industrial production” on market quotations of shares of issuers in this economic sector. Hypothesis  $H_2$  was confirmed regarding the stabilizing influence of the “surprise” component of non-monetary information signals “Consumer price index” and “Housing

**Table 6.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on stock quotes of enterprises of the economic sector “Oil & Gas”

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$	$H_1: \theta_k > 0$	$H_2: \theta_k < 0$
	Neutral effect	Destabilizing effect	Stabilizing effect
Consumer price index	Rejected	Rejected	Accepted
Personal spending	Rejected	Accepted	Rejected
Unemployment rate	Accepted	Rejected	Rejected
Gross domestic product	Rejected	Accepted	Rejected
Industrial production	Accepted	Rejected	Rejected
Consumer confidence	Accepted	Rejected	Rejected
Housing starts	Rejected	Rejected	Accepted

starts” on market quotations of shares of issuers in this economic sector. Thus, there is a neutral and stabilizing effect of the “surprise” component of the majority of non-monetary information signals on the stock prices of enterprises in Ukraine in the “Oil & Gas” sector. This can be partially explained by the fact that investors in the Ukrainian stock market do not perceive the majority (5 out of 7) of the selected non-monetary information signals of the United States as a destructive factor for stock prices of Ukrainian issuers in the economic sector “Oil & Gas”.

Neutral positive reaction of stock quotes of the enterprises of the economic sector “Oil & Gas” can be partially explained by the dependence of the enterprises of this sector on the situation in the world energy trade, on which the US economic situation has a great influence. Thus, positive information about the state of the national economy of the United States quite often contributes to the growth of demand for energy carriers (with a corresponding increase in their prices), which leads to the stabilization of stock prices of companies in the “Oil & Gas” sector.

The results regarding the reaction of the sector “Utilities” are given in Table 7.

The data obtained indicate that the volatility of stock prices of enterprises in this economic sector decreases with an increase in the “surprise” component of the US non-monetary information signals “Consumer confidence” and “Housing starts” by 1.87% and 0.76%, respectively, that is, there is a stabilizing effect influence on the relevant component of the Ukrainian stock market. Regarding

the components of the “surprise” non-monetary information signals of the US “Personal spending”, “Unemployment rate”, “Gross domestic product” and “Industrial production” it should be noted that with an increase in its value, the volatility of stock quotes of enterprises of the economic sector “Utilities” increases by 1.23%, 2.09%, 1.54% and 2.23%, respectively, that is, there is a destabilizing effect on the relevant component of the Ukrainian stock market.

The results of testing the hypotheses in the “Utilities” sector are given in Table 8.

Hypothesis  $H_1$  was confirmed on the destabilizing effect of the “surprise” component of non-monetary information signals “Personal spending”, “Unemployment rate”, “Gross domestic product” and “Industrial production” on market quotes for Ukrainian enterprises in the “Utilities” sector. The  $H_0$  hypothesis was confirmed regarding the neutral influence of the “surprise” component of the nonmonetary information signal “Consumer price index” on the market quotations of the issuers of the specified economic sector. Thus, there is a dominance of the destabilizing and partially neutral nature of the influence of the “surprise” component of the majority of selected non-monetary information signals of the United States on the share prices of enterprises in Ukraine in the “Utilities” sector. This can be partly explained by the fact that investors in the Ukrainian stock market perceive the majority (4 out of 7) of the selected non-monetary information signals of the United States as a destructive factor for the stock prices of Ukrainian issuers in the “Utilities” economic sector.

**Table 7.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of stock prices of enterprises of Ukraine in the economic sector “Utilities”

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	0.0067	0.0093
Personal spending	0.0123***	0.0014
Unemployment rate	0.0209***	0.0046
Gross domestic product	0.0154***	0.0012
Industrial production	0.0223***	0.0031
Consumer confidence	-0.0187***	0.0042
Housing starts	-0.0076**	0.0039

Notes: Levels of statistical significance: 1% (\*\*\*) ; 5% (\*\*); 10% (\*). LB (12) – p-value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

**Table 8.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on stock quotes of enterprises of the economic sector “Utilities”

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$	$H_1: \theta_k > 0$	$H_2: \theta_k < 0$
	Neutral effect	Destabilizing effect	Stabilizing effect
Consumer price index	Accepted	Rejected	Rejected
Personal spending	Rejected	Accepted	Rejected
Unemployment rate	Rejected	Accepted	Rejected
Gross domestic product	Rejected	Accepted	Rejected
Industrial production	Rejected	Accepted	Rejected
Consumer confidence	Rejected	Rejected	Accepted
Housing starts	Rejected	Rejected	Accepted

The destabilizing effect on stock prices of issuers of the economic sector “Utilities” can be partially explained by the dependence of enterprises in this sector on import operations, for example, the purchase of energy, imported energy equipment, components (Nakashydzhe & Gil’orme, 2015) and, accordingly, the USD / UAH exchange rate. Thus, positive data on the state of the national economy of the United States, as a rule, contribute to the growth of the USD rate against other currencies (including UAH), and this may lead to a rise in prices for import purchases and a reduction in the income of Ukrainian enterprises in the “Utilities” economic sector.

The results regarding the reaction of the sector “Financials” are given in Table 9.

The data obtained indicate that the volatility of stock prices of enterprises in this economic sector decreases with an increase in the “surprise” component of the US non-monetary information signals “Consumer price index”, “Consumer confidence” and “Housing starts” by 0.95%, 0.82% and 0.69%, respectively, that is, there is a stabilizing effect on the relevant component of the Ukrainian stock market. Regarding the component of “surprise” non-monetary American information signals “Unemployment rate” and “Gross domestic product”, it should be noted that with an increase in its value, the volatility of stock quotes of companies in this sector increased by 0.79% and 1.12%, respectively. Thus, in this case, there is a destabilizing effect on the relevant component of the Ukrainian stock market.

The results of testing the hypotheses in the “Financials” sector are given in Table 10.

The  $H_1$  hypothesis regarding the destabilizing effect of the “surprise” component of non-monetary information signals “Unemployment rate” and “Gross domestic product” on market quotations of shares of Ukrainian joint-stock companies of the “Financials” sector was confirmed. The hypothesis  $H_0$  of the relative non-neutral influence

**Table 9.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of stock prices of enterprises of Ukraine in the economic sector “Financials”

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	-0.0095**	0.0030
Personal spending	-0.0038	0.0412
Unemployment rate	0.0079**	0.0031
Gross domestic product	0.0112***	0.0018
Industrial production	-0.0018	0.0025
Consumer confidence	-0.0082***	0.0008
Housing starts	-0.0069***	0.0032

Notes: Levels of statistical significance: 1% (\*\*\*); 5% (\*\*); 10% (\*). LB (12) –  $p$ -value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

**Table 10.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on stock quotes of enterprises of the economic sector “Financials”

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$	$H_1: \theta_k > 0$	$H_2: \theta_k < 0$
	Neutral effect	Destabilizing effect	Stabilizing effect
Consumer price index	Rejected	Rejected	Accepted
Personal spending	Accepted	Rejected	Rejected
Unemployment rate	Rejected	Accepted	Rejected
Gross domestic product	Rejected	Accepted	Rejected
Industrial production	Accepted	Rejected	Rejected
Consumer confidence	Rejected	Rejected	Accepted
Housing starts	Rejected	Rejected	Accepted

of the component of the “surprise” of non-monetary information signals “Personal spending” and “Industrial production” on the market quotations of shares of issuers of the specified economic sector was confirmed. The hypothesis  $H_2$  of the stabilizing effect of the “surprise” component of non-monetary information signals “Consumer price index”, “Consumer confidence” and “Housing starts” on market quotations of shares of issuers of the considered economic sector was confirmed.

Thus, there is a neutral and stabilizing effect of the “surprise” component of the majority of non-monetary information signals on the stock quotes of joint-stock companies of Ukraine in the “Financials” sector. This can be partly explained by the fact that investors in the Ukrainian stock market do not perceive the majority (5 out of 7) of the selected non-monetary information signals of the United States as a destructive factor for share prices of Ukrainian issuers in the “Financials” economic sector.

Also, the reaction of stock quotes of issuers of the financials economic sector can be partially explained by the dependence of joint-stock companies of this sector on the business activity of Ukrainian enterprises, which, in turn, largely depend on the state of the US economy (for example, exporting enterprises). The economic situation of a given country affects global demand in many commodity positions. Thus, positive data on the state of the national economy of the United States, as a rule, contribute to the growth of business activity of domestic exporters, which often leads to an increase in demand for bank lending (Khmarskyi & Pavlov, 2017) and, accordingly, stabilization of stock prices of domestic joint-stock companies of the “Financials” sector.

The results regarding the reaction of the “Telecommunications” sector are given in Table 11.

The data obtained indicate that the volatility of stock prices of enterprises of the “Telecommunications”

**Table 11.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of stock prices of enterprises of Ukraine in the economic sector “Telecommunications”

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	0.0142**	0.0071
Personal spending	0.0139*	0.0734
Unemployment rate	0.0181***	0.0077
Gross domestic product	0.0166***	0.0015
Industrial production	0.0195***	0.0047
Consumer confidence	-0.0171***	0.0058
Housing starts	-0.0166***	0.0043

Notes: Levels of statistical significance: 1% (\*\*\*) ; 5% (\*\*); 10% (\*). LB (12) – p-value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

**Table 12.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on stock quotes of enterprises of the economic sector “Telecommunications”

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$	$H_1: \theta_k > 0$	$H_2: \theta_k < 0$
	Neutral effect	Destabilizing effect	Stabilizing effect
Consumer price index	Rejected	Accepted	Rejected
Personal spending	Rejected	Accepted	Rejected
Unemployment rate	Rejected	Accepted	Rejected
Gross domestic product	Rejected	Accepted	Rejected
Industrial production	Rejected	Accepted	Rejected
Consumer confidence	Rejected	Rejected	Accepted
Housing starts	Rejected	Rejected	Accepted

economic sector decreases with an increase in the “surprise” component of the non-monetary information signals “Consumer confidence” and “Housing starts” by 1.71% and 1.66%, respectively, that is, there is a stabilizing effect to the corresponding component of the Ukrainian stock market. Regarding the “surprise” component of US non-monetary information signals “Consumer price index”, “Personal spending”, “Unemployment rate”, “Gross domestic product” and “Industrial production”, it should be noted that with an increase in its value, the volatility of stock quotes of enterprises in this sector increased by 1.42%, 1.39%, 1.81%, 1.66% and 1.95%, respectively. Thus, in this case, there is a destabilizing effect on the relevant component of the Ukrainian stock market.

The results of testing hypotheses in the “Telecommunications” sector are given in Table 12.

Hypothesis  $H_1$  was confirmed about the destabilizing effect of the “surprise” component on non-monetary information signals “Consumer price index”, “Personal spending”, “Unemployment rate”, “Gross domestic product” and “Industrial production” on market quotations of Ukrainian enterprises in the “Telecommunications” sector. The  $H_0$  hypothesis regarding the neutral influence of the “surprise” component on a single non-monetary information signal on market quotations of shares of issuers of the specified economic sector has not been confirmed. The  $H_2$  hypothesis regarding the stabilizing influence of the “surprise” component of non-monetary information signals of this economic indicator has been confirmed.

Thus, there is mainly a destabilizing effect of the “surprise” component on the majority of non-monetary information signals on the share prices of enterprises in Ukraine in the “Telecommunications” sector. This can be partially explained by the fact that investors on the Ukrainian stock market perceive the majority (5 out of 7) of the selected non-monetary information signals of the United States as a destructive factor for stock prices of Ukrainian issuers of the economic sector “Telecommunications”.

The results regarding the reaction of the “Industrials” sector are given in Table 13.

The data obtained indicate that the volatility of stock prices of enterprises in this economic sector decreases with an increase in the “surprise” component of the US non-monetary information signal “Consumer confidence” by 0.38%, that is, there is a stabilizing effect on the corresponding component of the Ukrainian stock market. Regarding the “surprise” component of the non-monetary US information signal “Gross domestic product”, it should be noted that as its value increases, the volatility of stock prices of companies in this sector increased by 0.75%, that is, there is a destabilizing effect on the relevant component of the Ukrainian stock market. Regarding the “surprise” component of US nonmonetary information signals “Consumer price index”, “Personal spending”, “Unemployment rate”, “Industrial production” and “Housing starts”, there was no significant reaction of the volatility of stock prices of companies in the “Industrials” sector, that is, there is a neutral effect on the corresponding component stock market of Ukraine.



**Table 13.** The influence of the component of “surprise” on non-monetary information signals of the USA on the volatility of stock prices of enterprises of Ukraine in the economic sector “Industrials”

Source: Compiled and calculated by the authors.

Information signal	Direct impact weight coefficient ( $\theta$ )	Standard deviation
Consumer price index	0.00316	0.0018
Personal spending	0.0005	0.0013
Unemployment rate	0.0019	0.0012
Gross domestic product	0.0075***	0.0012
Industrial production	0.0014	0.0017
Consumer confidence	-0.0038***	0.0012
Housing starts	-0.0011	0.0008

Notes: Levels of statistical significance: 1% (\*\*\*) ; 5% (\*\*); 10% (\*). LB (12) – p-value of the statistical Ljung-Box criterion for the absence of autocorrelation of 12 order.

**Table 14.** The results of testing the hypotheses  $H_0$ ,  $H_1$ ,  $H_2$  regarding the nature of the influence of the component of the “surprise” of non-monetary information signals on stock quotes of enterprises of the economic sector “Industrials”

Source: Compiled and calculated by the authors.

Information signal	$H_0: \theta_k = 0$	$H_1: \theta_k > 0$	$H_2: \theta_k < 0$
	Neutral effect	Destabilizing effect	Stabilizing effect
Consumer price index	Accepted	Rejected	Rejected
Personal spending	Accepted	Rejected	Rejected
Unemployment rate	Accepted	Rejected	Rejected
Gross domestic product	Rejected	Accepted	Rejected
Industrial production	Accepted	Rejected	Rejected
Consumer confidence	Rejected	Rejected	Accepted
Housing starts	Accepted	Rejected	Rejected

The results of testing hypotheses in the “Industrials” sector are given in Table 14.

Hypothesis  $H_1$  was confirmed regarding the destabilizing effect of the “surprise” component of the non-monetary information signal “Gross domestic product” on the market quotations of Ukrainian enterprises in the sector “Industrials”. Hypothesis  $H_0$  was confirmed regarding the neutral influence of the “surprise” component of non-monetary information signals “Consumer price index”, “Personal spending”, “Unemployment rate”, “Industrial production” and “Housing starts” on the market quotations of shares of issuers of this economic sector.  $H_2$  hypothesis regarding the sta-

bilizing influence of the “surprise” component non-monetary information signal “Consumer Confidence” on the market quotations of shares of issuers of the abovementioned economic sector.

Thus, there is mainly a neutral effect of components “surprise” for the majority of non-monetary data signals on the share prices of companies sector in Ukraine “Industrials”. This can be partly explained by the fact that investors in the Ukrainian stock market do not perceive the majority (6 out of 7) of the selected non-monetary information signals of the United States as a destructive factor for stock prices of Ukrainian issuers in the economic sector.

## CONCLUSION

Economic sectors often react non-uniformly to non-monetary US information signals, that is, not always in the same direction as the PFTS index. For example, the volatility response of the “Basic Materials”, “Financials”, and “Oil & Gas” sectors to the “Consumer price index” signal is the opposite of the overall PFTS index. Thus, the “surprise” component of a non-monetary signal information content, which has a

positive effect on the change in the PFTS index value, does not always have a similar effect on the issuers stock prices of a given economic sector.

It is proved that the reaction of volatility to the component of “surprise” on non-monetary information signals is heterogeneous, that is, it depends on the economic sector of enterprises whose shares are included in the calculation of the PFTS index. It has been revealed that the sectors of “Basic Materials”, “Oil & Gas”, “Utilities”, “Financials” and “Telecommunications” largely react to the influence of the United States non-monetary information signals. This can be explained by the dependence of enterprises in these sectors on world trade conditions, which are greatly influenced by the state of US economy. These sectors often react non-uniformly, that is, not always in the same direction as the domestic PFTS stock index. It also confirmed the findings that the Ukrainian stock market participants often view macroeconomic information about the state of the US economy as the most important source of information and react to it rather quickly.

The results of this study allow us to conclude that the influence of the “surprise” component on non-monetary information signals depends, in addition to the financial cycle phase (e.g. McQueen & Roley, 1993; Funke & Matsuda, 2006) or the data frequency (Becker et al., 2010) also on the economic sector activities of enterprises-issuers. Promising areas for further research are to assess the impact on the profitability and volatility of the Ukrainian stock market as a whole and in the sectoral context of non-monetary information signals on the state of the Ukrainian national economy.

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