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Occurence of Economic Terms in the Hungarian Online Media Before and After the Economic Crisis

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Abstract

The purpose of our study is to find an answer to how real economic processes and their online media representation are connected, that is, whether the economic crisis of 2008-2009 has generally changed the way how Hungarian journalists use economic terms and expressions and whether a learning procedure has begun of a more informed and proficient form of journalism about economic processes.

Based on our analysis we can state that the occurrence of economic terms in connection with economic policy, foreign trade, companies and the crisis contain a break in the trend at the start of the crisis. We can say that because of the crisis the word usage rates within the above word groups increased significantly – except in the case of the foreign trade group, where it fell.

We can also say that knowledge of the occurrence of the economic policy, credit, macroeconomy, financial market, company and crisis word groups provide additional information to estimate industrial sales about a month in advance as compared to if we only use the previous two values of the time series for our estimation.

Key Words: economic crisis, media, nowcast, industrial production, economic terms

JEL Classification: C01, D83, E23, G01

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Introduction and Motivation

The global economic crisis of 2008-2009 brought about dramatic changes in most of the economies of developed countries, including Hungary, with a strong decline in almost all macroeconomic indicators (GDP, industrial production, foreign trade volume). Two and a half years since the low point of the crisis (mid 2009) the recovery, a long-awaited period of quiet growth, has yet to be felt within Europe. The debt accumulated by national treasuries coupled with unsustainable welfare spending has led to newer shocks to the financial system, hence the global economic crisis was followed by the Greek crisis, the Italian crisis, and even the euro zone crisis – and we still do not see the end of the process.

Naturally, these turbulent times have left its mark on the mass media as well. Economic reports appear more often in the press headlines and as top news stories. Information related to the economy has increased in importance; economic forecasts are now not only of interest to researchers and government decision makers, but other economic stakeholders have a significant vested interest in up-to-date information. In conjunction with the dissemination of the internet in the 2000's, online media has gone through explosive growth, which has been able to fulfill the aforementioned needs. With the acceleration of events and the expansion of the online media, the flow of information has accelerated while the response time of those involved has probably decreased.

The purpose of our study is to find an answer to how real processes can affect the process of thinking, that is, has the economic crisis of 2008-2009 generally changed the Hungarian journalists' use of term, the appearance and use of new expressions within the daily press, and whether a learning procedure has begun of a more informed and proficient form of journalism about economic processes and relationships.

The research was conducted by using Textplore[1], an online content and text analysis software developed by IEER, which is designed to make possible the text analysis of online documents from the internet (such as journal articles, newspaper articles, research studies) as well as the user's own documents.

During the research, articles published from January 2000 to March 2012 of major Hungarian online press organs were taken into consideration.[2]

1. International research experience

The appearance of economic trends in the media – especially the actual data pertaining to economic circumstances – is important in many ways for the economic research. Printed newspapers and online news portals play an intermediary role between the primary sources representative of the situation of the economy (e.g. statistical offices) and experts on the one hand, and those considered as laymen on the other. The main reason for this is that aside from experts few devote the time to follow statistical indicators and analysis related to the state of the economy, which is generally written using mathematical, statistical, and economic jargon; moreover, it rarely appears as a direct benefit to the interest of readers, as illustrated by the theory of rational ignorance (Downs, 1957).

However, in the many news sites and online newspapers which write about everyday issues in plain language, readers are able to find current news from the world around them all in one place, thus these transmission channels are often the only source of information on the economy for the non-expert public. As a result, the subjects and use of words of news websites and online newspapers can

[1] Textplore is available at www.textplore.org

[2] index.hu, origo.hu, hvg.hu, vg.hu, nol.hu, mno.hu, fn.hu, hetivalasz.hu

have a significant impact on a given population's consciousness of financial and economic information.

Economic news releases may also have an affect on the outcome of real economic processes: news in the media may contribute to consumer expectations and the formation of consumer confidence, which in turn affects household consumption, as demonstrated by Uhl's 2010 study using empirical data.

According to Doms and Morin (2004) news from the mass media can contribute to the perception consumers have about the economy in three different ways: firstly, the publication of objective data and expert analysis; secondly, the tone and volume of articles signal to consumers the state of the economy; thirdly, the relatively large amount of articles with an economic theme also encourages readers to update their knowledge and assumptions more often.

Nevertheless, the impact of the media on the spread of economic knowledge is limited. Using a population sample from the U.S., Curtin (2010) showed that even though the potential benefit of obtaining information on economic processes has more likely outweighed the costs in 2009 than in 2007 (because of the crisis), the dissemination of knowledge about official economic statistics wasn't more prevalent among the non-professional population. As the author points out, the reason for this is because the obtaining of information still had high costs, and that a large number of articles with qualitative descriptions were used instead of publishing numerical data.

Extreme situations, such as the economic crisis, provide a particularly good opportunity to test these effects in an empirical way, whereas at other times it can be difficult to detect any visible effects. Along with the extremism, these effects are reinforced by the fact that the crisis is a negative event, and a number of empirical results previously showed that the positive and negative events reflected in the media is not symmetric, thus negative events are much more prominently displayed (Soroka, 2006; Goidel – Langley, 1995; Blood – Phillips, 1995).

In our study using the above mentioned theoretical framework, our aim is to answer the following questions and to test our two hypotheses (H1 and H2):

- With the onset of the economic crisis has the vocabulary used by Hungarian online media changed in connection with economic issues? Can it be observed that as a consequence of the crisis economic news play a larger role in online media, thus the occurrence of economic terms became more frequent?

  H1: As a consequence of the crisis the occurrence of economic terms became more frequent in the online press.

- Is there a relationship (and in what direction) between the occurrence of economic terms and certain real economic processes?

  H2: There is a relationship between the occurrence of economic terms and certain real economic processes: we assume that the use of terms of the media follows the real economic statistics.

2. Methodology

The database on which the research was based was created using the online content and text analysis software called Textplore which was developed by IEER. Textplore makes it possible to conduct text analysis on various documents found on the internet (such as journal articles, newspaper articles, studies) as well as the user's own documents. The software has its own article database, which is derived from online archives and content updates that are downloaded daily. This makes possible the analysis of approximately two million articles, that is, articles published on the largest news portals, as well as in the online versions of daily and weekly newspapers.

In the wake our research questions, we tried to examine how the 2008-2009 economic crisis changed the weight of articles on the economy in the online news media. First, 217 words and multi-word phrases related to the economy were selected – based on some works on economics, on some newspaper articles with economical topic and on our own intuition. With the help of Textplore, we examined the articles contained at least one of these words or phrases in the largest Hungarian online press organs[3] from January 2000 to March 2012 (a total of 1,709,822 articles were published in this period). Those words which appeared less than 50 times in the articles were deleted, resulting in 188 words which were taken into account when creating the database of articles (a list of these words can be found in the Appendix, Table A1). Our database contains a total of 1,050,959 word occurrences of the 188 words over 147 months, thus one of the 188 words occurred in at least one article. However, this database also includes multiple occurrences as some articles appear more if it contains more examined words. We have to note here that – due to some special features of the software – a certain article is not counted more than once even if given words can be found in it several times. This have not caused a problem during the analysis because due to our assumptions an article can be judged as richer in information and professionally more profound if it contains more economy-related terms, while the multiple use of one phrase can be seen as a simple stylistical element.

The variance of the word occurrences partly arises from the fact that different quantity of articles was published in every month. Because of that, prevalence rates were taken into account instead of absolute prevalence of words during the analysis. That is, the proportion of the articles that contain the particular word (at least once) in all articles published in a given month.

The 188 words were classified and 11 word groups were created, which cover 11 main topics (the word groups and the words are listed in the Appendix, Table A1). The word groups were generated as a total of word occurrences, so here we can see again that an article can appear multiple times if it contains more words from a word group, but the multiple occurrence of one word in an article does not multiple the frequency. The analysis takes into account the prevalence rates of word groups, that is, the proportion of the articles that contain at least one word from the particular word group (at least once) in all articles published in a given month.

This database of prevalence rates was compared to real economic data to find out whether the terms used by the press moved together with the changes of economic processes. Real data that was available in monthly series was combined with monthly word prevalence rates. Real data which was available only on a quarterly basis was examined together with quarterly prevalence rates – composed from monthly word prevalence data.

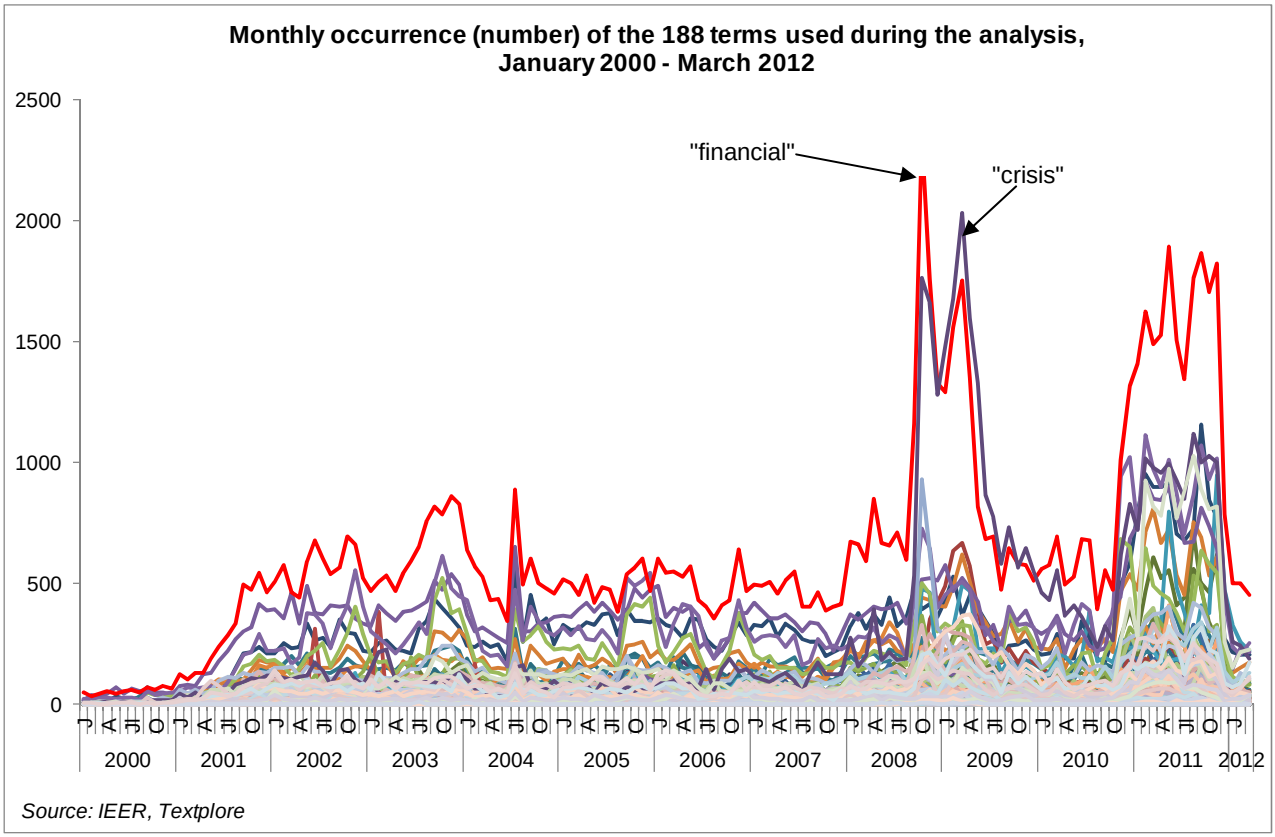
[3] index.hu, origo.hu, hvg.hu, vg.hu, nol.hu, mno.hu, fn.hu, hetivalasz.hu

3. Findings

Looking at the change of the absolute occurrence of the 188 words and the change of the prevalence rates within all the articles (see figures 3.1. and 3.2.) we can see that although a significant number of words move relatively with one another, the occurrence of a few words (e.g., "financial", "crisis") – unlike the others – increased dramatically during the economic crisis (from mid-2008 to mid-2009). This is not surprising given that during this period the economic crisis was a "hit theme" in the media and these words probably appeared the most frequently within this context.

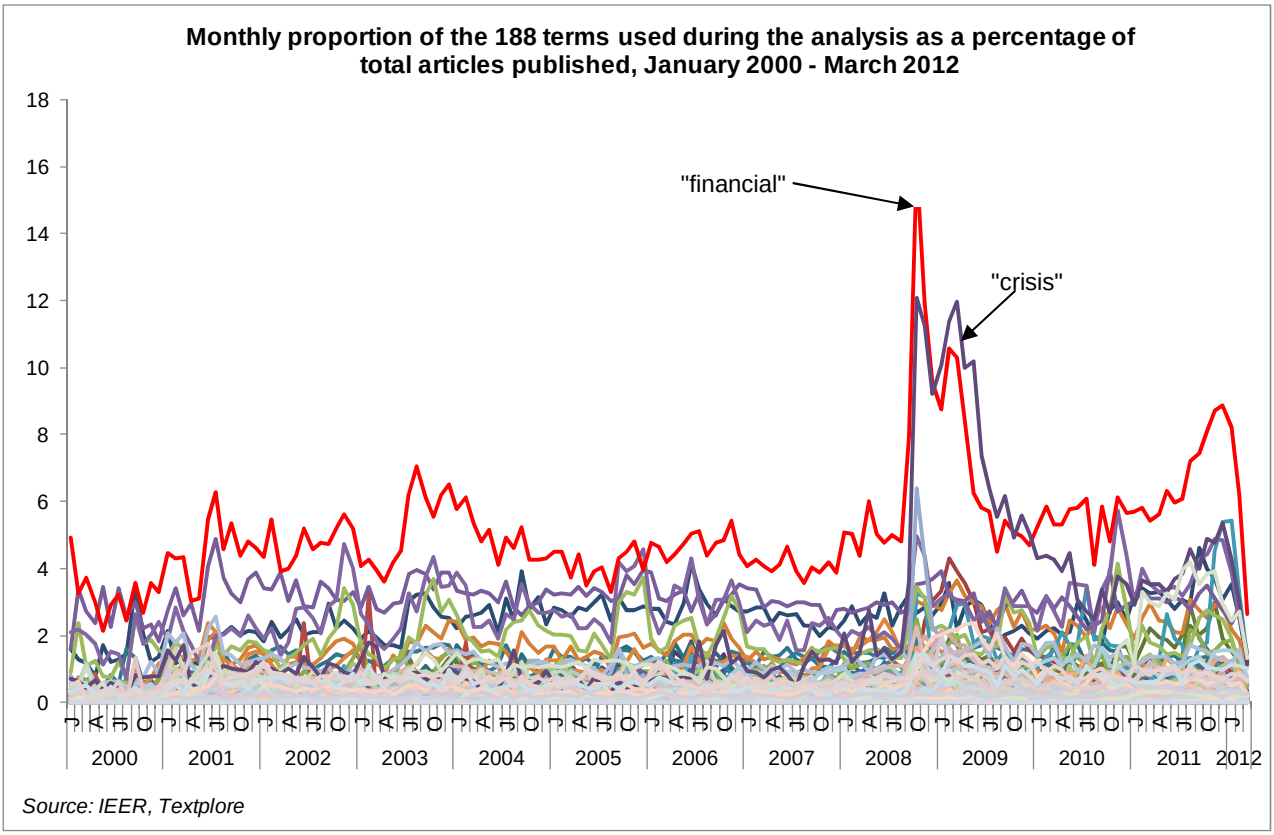
In addition, we can read from the figures that in 2011 there was a second "explosion" in the occurrence of terms related to the economy. This is due to the high number of articles referring back to the economic crisis (i.e., a "hit theme" dies hard) on the one hand, and on the other hand, aside from the global economic environment some internal governmental shocks had a strong impact on the Hungarian economy in the period under review.

Figure 3.1. Monthly occurrence (number) of the 188 terms used during the analysis, January 2000 – March 2012



Source: IEER, Textplore

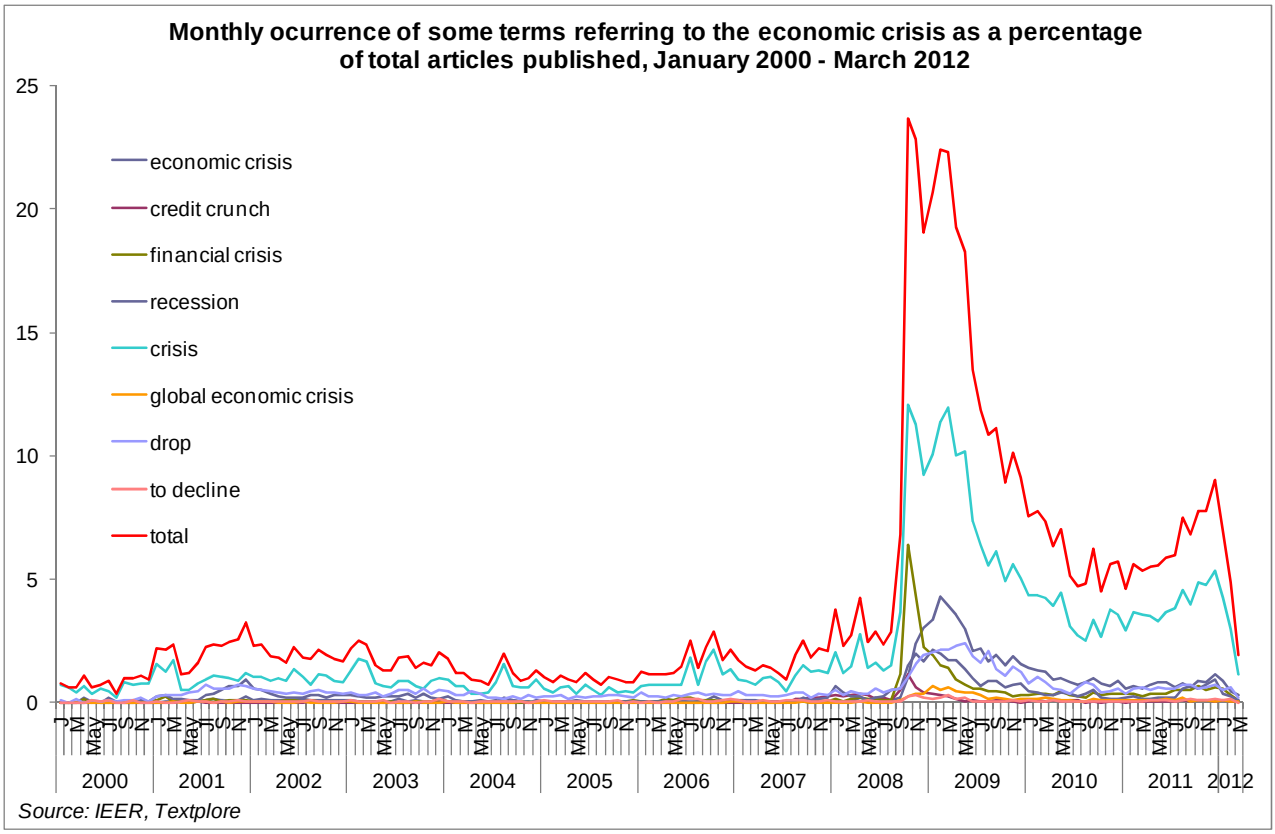
Figure 3.2. Monthly proportion of the 188 terms used during analysis as a percentage of total articles published, January 2000 – March 2012



Source: IEER, Textplore

If we study the words and phrases associated with the economic crisis separately (see Figure 3.3. below), we can see that before the crisis in the middle of 2008 these terms were very rarely used in the media, and then from 2008 to 2009 after a very significant increase it fell back to previous levels, and then in 2011 the rate increased again slightly (the latter phenomenon can be explained in part by the appearance of the euro crisis and the crisis in Greece). The figure also reveals that the terms "crisis", "economic crisis" and "financial crisis" occur most frequently.

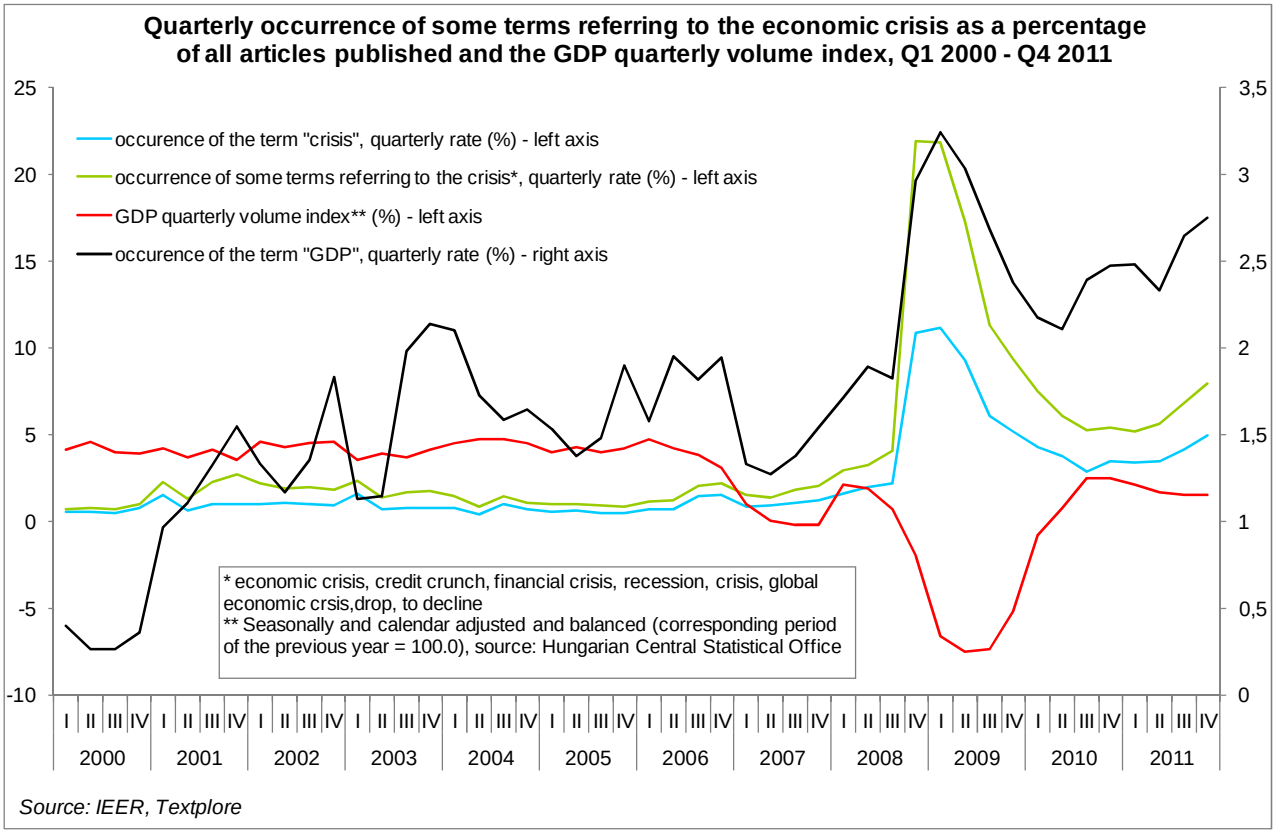
Figure 3.3. Monthly ocurrence of some of the terms referring to the economic crisis as a percentage of total articles published, January 2000 – March 2012



If we take the occurrence of the word "crisis" and the total occurrence of phrases associated with the crisis and compare it to quarterly GDP volume indices (see Figure 3.4. below), we see that for the period from mid-2008 until mid-2009 with the significant decline in GDP there was a significant increase in the use of the term. When the GDP volume index returned to pre-crisis levels at the end of 2010, the phrases associated with "crisis" became less frequent in the press. When the Hungarian GDP started to decline again in 2011, the word "crisis" showed a slight increase, but this is probably more due to the appearance of topics in the press related to the euro crisis and the crisis in Greece.

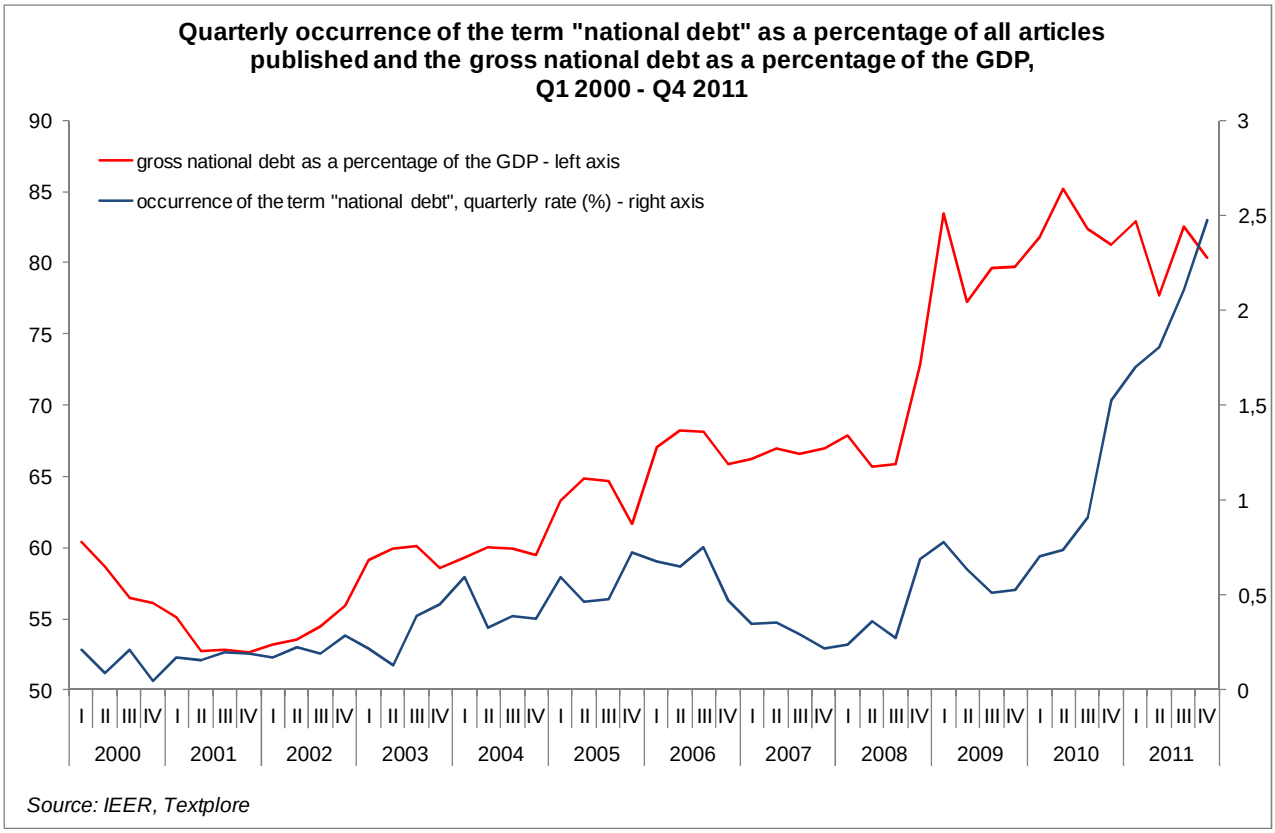
The use of the word "GDP" was very rare compared to the word "crisis" – due to the fact that the examination covers not only economy-related media, but general news and daily newspapers as well. The frequency of the word "GDP" shows a significant fluctuation from 2000, which does not move together with the GDP volume index. In the period of the crisis, however, there is a significant increase in its occurrence, and despite a smaller decline, there was a positive trend in the use of this acronym in 2010-2011.

Figure 3.4. Quarterly occurrence of some terms referring to the economic crisis as a percentage of all articles published and the GDP quarterly volume index, Q1 2000 - Q4 2011



If the occurrence of the word "public debt" is compared to the corresponding real data series (i.e. the quarterly data of gross national debt as percentage of the GDP), we can see that there is a very steep rise in the occurrence of the term during the second half of 2008 and from 2010 to 2011; hence with the increase in the national debt the relevant term moves accordingly.

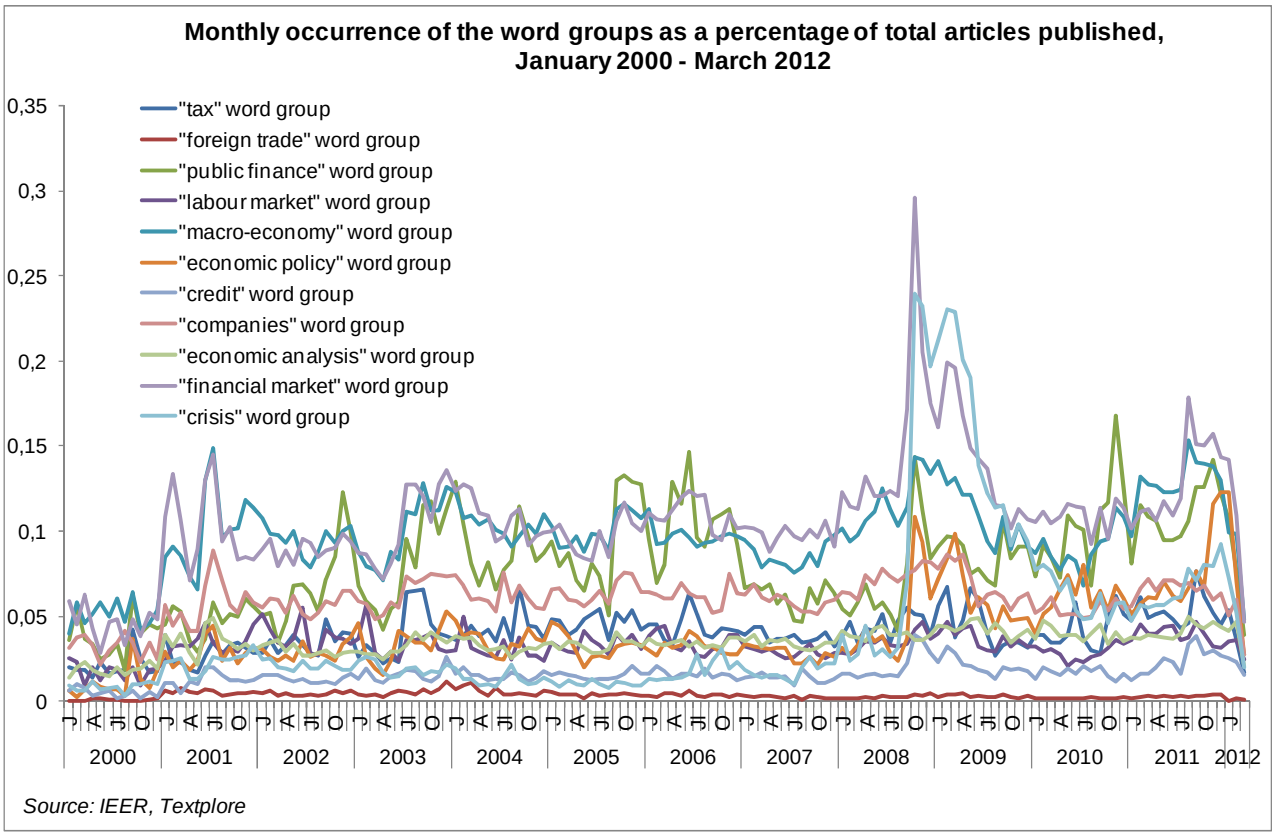
Figure 3.5. Quarterly occurrence of the term "national debt" as a percentage of all articles published and the gross national debt as a percentage of the GDP, Q1 2000 - Q4 2011



Source: IEER, Textplore

In line with our methodology described earlier, from the 188 words 11 word groups were created covering the following topics: tax, foreign trade, public finance, labour market, macro-economy, economic policy, credit, companies, economic analysis, financial markets and economic crisis. Figure 3.6. shows that the occurrence rate of word groups (that is, the aggregated occurrence of the words in the group) also shows significant changes due to the economic crisis.

Figure 3.6. Monthly occurrence of the word groups as a percentage of total articles published, January 2000 – March 2012



If we analyze the occurrence of word groups separately (see figures A1-A11), we can see that in most cases – with a linear trend fitted – the data show a positive trend over time. A relatively strong correlation (R^2 is over 0.25) can be seen at "tax", "public finance", "economic policy", "credit", "economic analysis", "financial market" and "crisis" word groups, while a weaker relationship can be detected in the "foreign trade", "labour", "macro-economic" and "companies" word groups. The only negative trend can be observed at the "foreign trade" group.

We hypothesize that during the crisis the use of some terms changed while others did not. This is worth taking into consideration when detrending the time series of the usage rates of each word group. For this we use a dummy variable with a value of zero prior to July 2008, and from that point onward with a value of 1. We tried to use a linear trend with a single break and without it as well for filtering out trends and seasonality for each word group. The data did not contain significant seasonality. Table 3.1. summarizes what trends were filtered out from which word group.

Table 3.1. Detrending the time series of the word groups usage rates (main results)

	Constant	Trend	Trend * (crisis dummy)	Contains a break in the filtered trend?
Tax	0.028815	0.000149		No
Public finance	0.052562	0.000365		No
Economic analysis	0.025979	0.000115		No
Economic policy	0.021250	0.000151	0.000200	Yes
Credit	0.008986	9.30-05		No
Foreign trade	0.003832		-1.10E-05	Yes
Macro-economy	0.080632	0.000235		No
Labour market	0.028953	4.92E-05		No
Financial market	0.076200	0.000423		No
Companies	0.047768	0.000207	-8.48E-05	Yes
Crisis	0.019289	0.000582		Yes

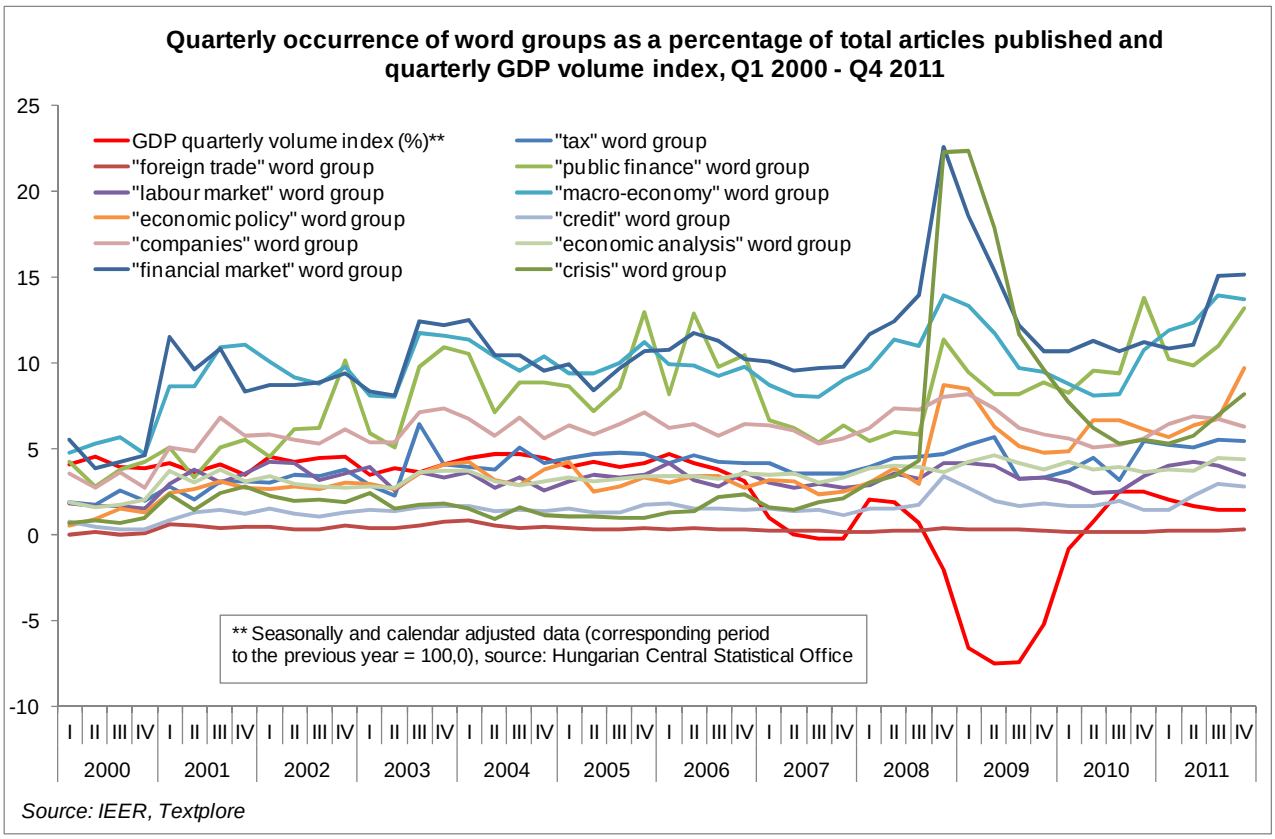
Source: IEER (own calculations)

Aside from the foreign trade and crisis word groups we found a slight positive trend, thus the word usage of these topics between 2000 and 2012 became more frequent – sometimes less, sometimes more – in the Hungarian online media.

The economic policy, foreign trade, company and crisis word groups contain a break in the trend (although for foreign trade in the pre-crisis period we cannot talk about a trend, however a downward trend appears after the start of the crisis). So we can say that because of the crisis the word usage rates within the above word groups increased significantly – except in the case of the foreign trade group, where it fell. For the economic policy, foreign trade and crisis word groups, the effect of the crisis on these trends are greater than the rest, in other words we can speak of a significant effect. This result confirms our first hypothesis (H1), thus it can be declared that as a consequence of the crisis the occurrence of economic terms became more frequent in the Hungarian online press.

If we take the occurrence rate of the word groups and compare it to quarterly GDP volume index (see Figure 3.7.), we can see that during the crisis the word groups "crisis" and "financial market" moved the most conversely to the GDP. In addition, the frequency of word usage related to "macro-economy", "public finance" and "companies" topics has increased significantly as a result of the crisis.

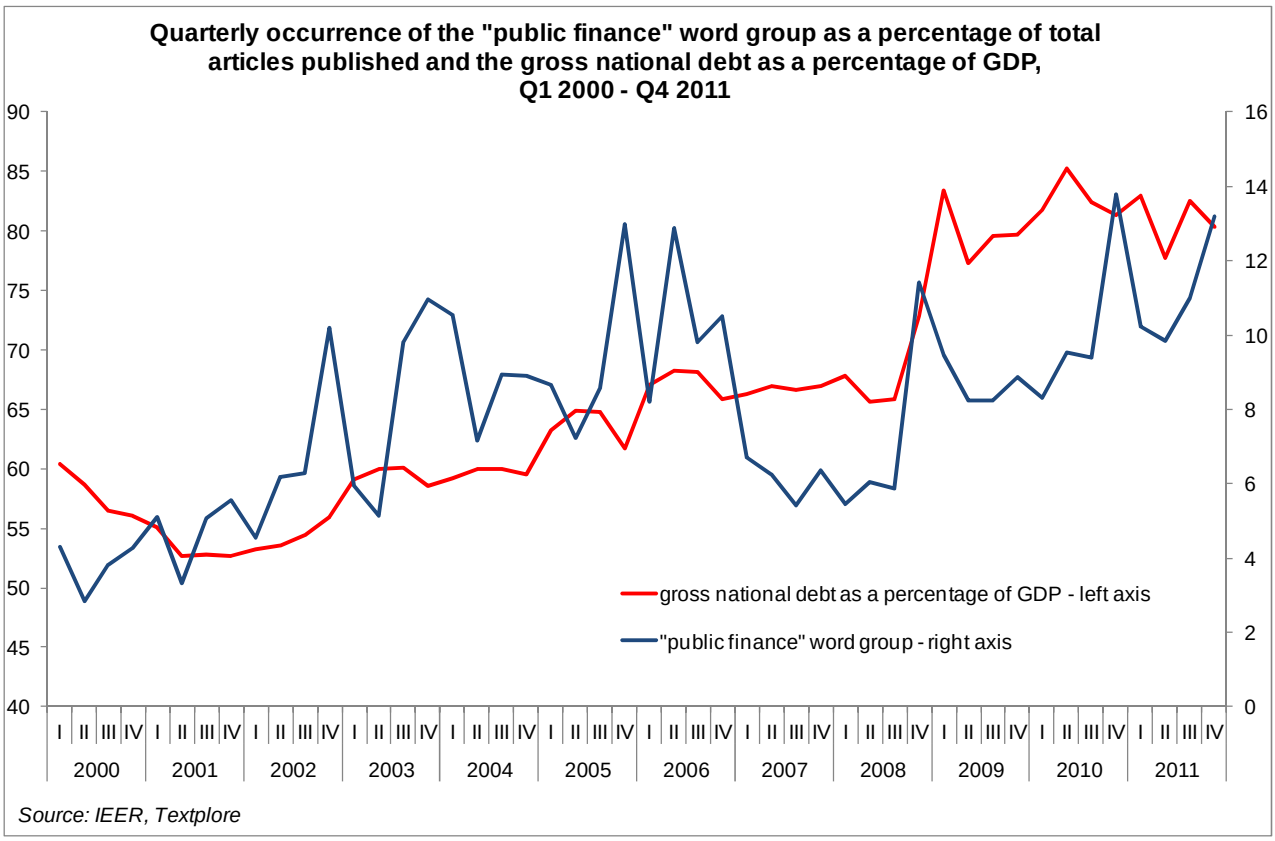
Figure 3.7. Quarterly occurrence of word groups as a percentage of total articles published and quarterly GDP volume index, Q1 2000 - Q4 2011



Source: IEER, Textplore

Figure 3.8. shows the occurrence of the "public finance" word group and the gross national debt as a percentage of the GDP over time. The two data series more or less move in tandem. The words which belong to the "public finance" group – in spite of significant fluctuations – have almost continuously been showing an upward trend over the examined period (from 2000). Concerning the gross national debt the continuous growth can be seen since 2001. From mid-2006 until the third quarter of 2008 a larger decline could be seen in the occurrence of word use. At the outbreak of the crisis (fourth quarter of 2008) a rapid growth was experienced again, followed by a surge in debt in the subsequent quarter. Then both sets of data showed a relative decline, and then again at the end of 2010 the occurence of the words increased significantly. In the beginning of 2011, a small decline can be observed in both word use and the level of debt, but both were nevertheless at a very high level in the whole year.

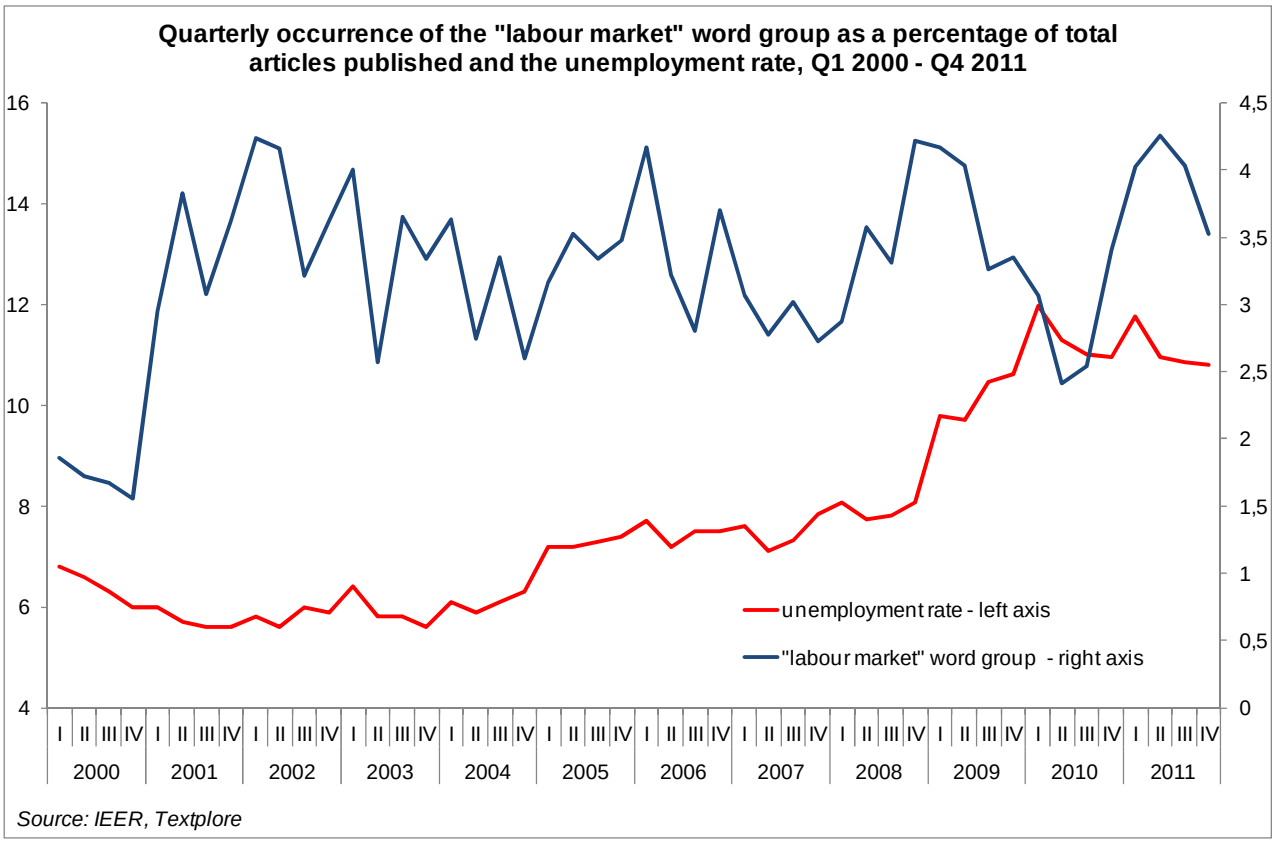
Figure 3.8. Quarterly occurrence of the "public finance" word group as a percentage of total articles published and the gross national debt as a percentage of GDP, Q1 2000 - Q4 2011



Source: IEER, Textplore

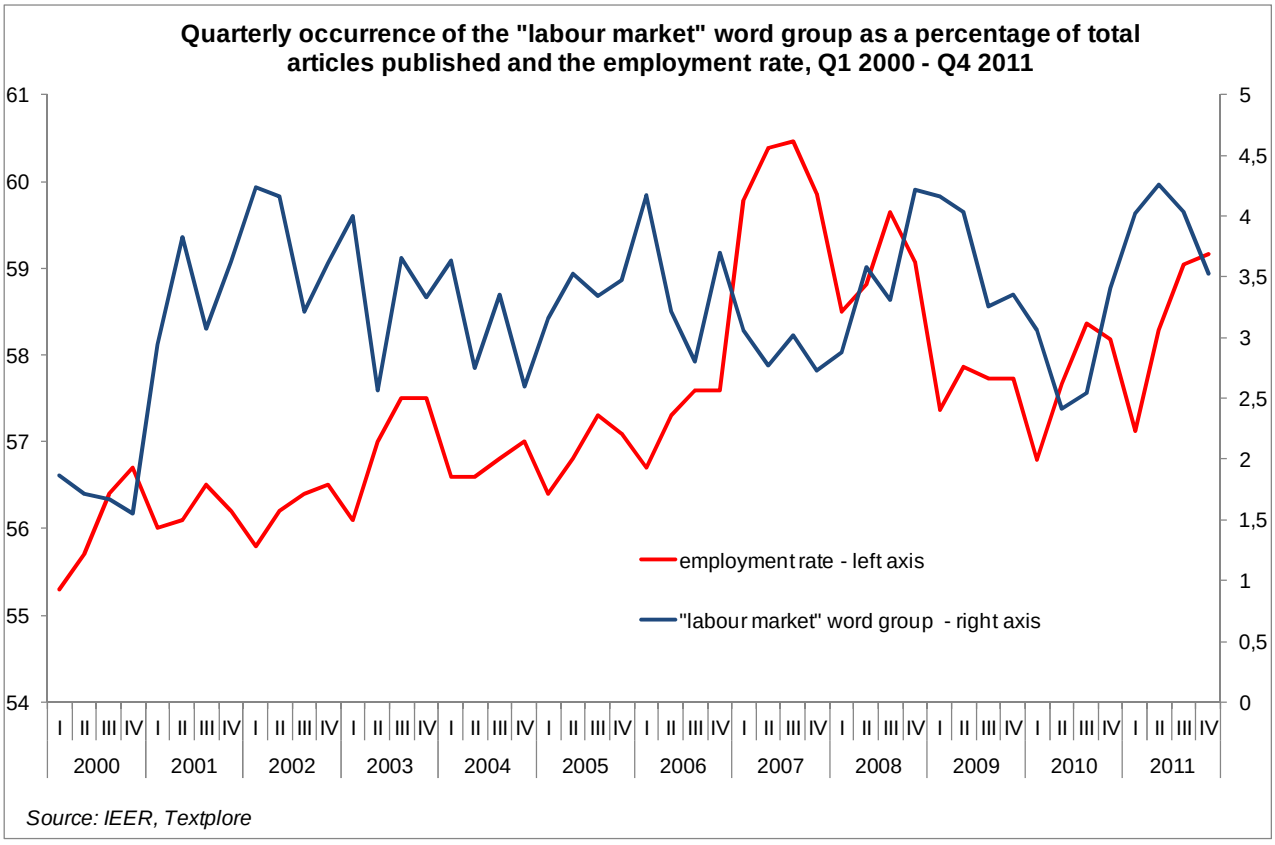
Figure 3.9. shows that the "labour market" word group has a relatively stable occurrence over the 12 year horizon, with seasonal variations aside. The unemployment rate, however, showed very rapid growth from the end of 2008 until the beginning of 2010 as a result of the economic crisis, which apparently didn't leave its mark in the online media; in fact, the low point of the word occurrence was in mid-2010. The employment rate also did not show a likewise movement (see Figure 3.10. below).

Figure 3.9. Quarterly occurrence of the "labour market" word group as a percentage of total articles published and the unemployment rate, Q1 2000 - Q4 2011



Source: IEER, Textplore

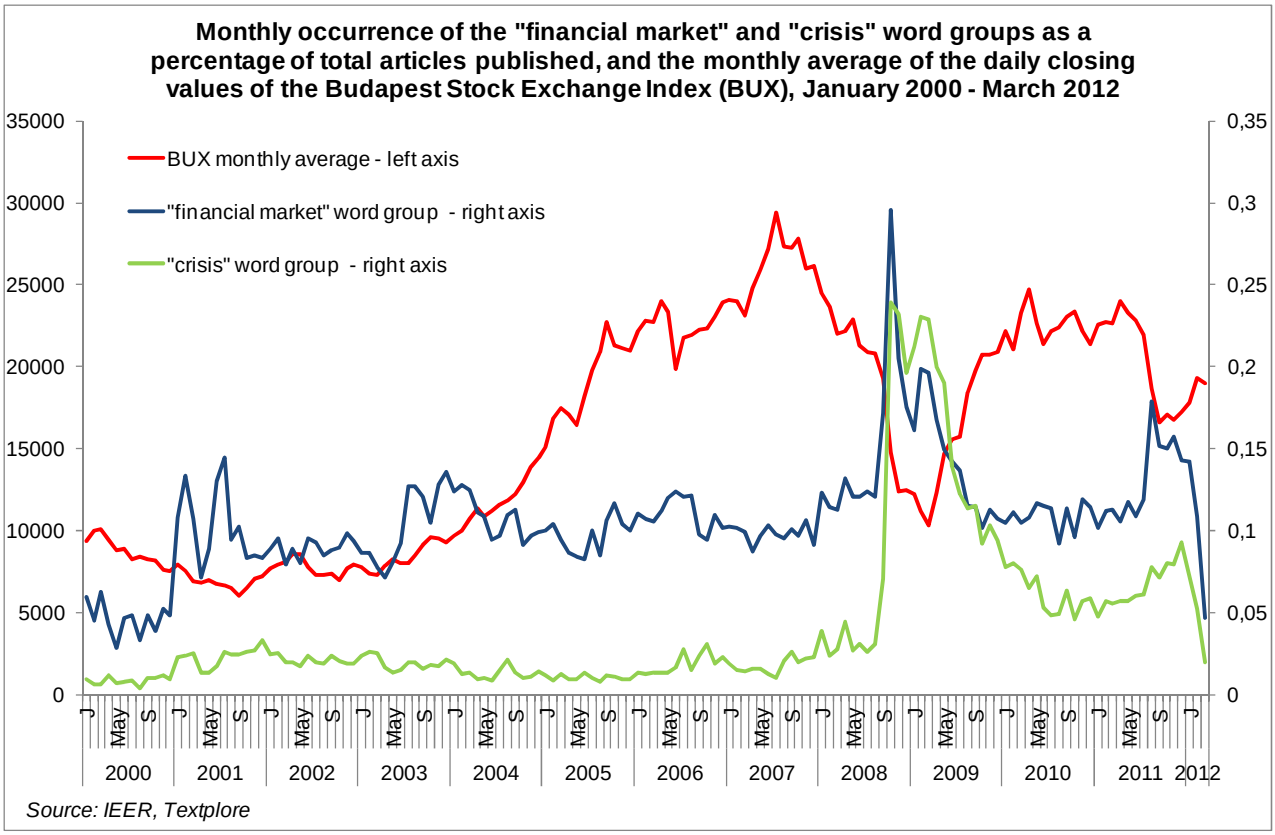
Figure 3.10. Quarterly occurrence of the "labour market" word group as a percentage of total articles published and the employment rate, Q1 2000 - Q4 2011



Source: IEER, Textplore

If the average monthly closing value of the Budapest Stock Exchange Index (BUX) is compared to the occurrence of word groups, we can see that most of the terms within the "financial market" and "crisis" groups move in tandem (see Figure 3.11. below). As a result of the economic crisis – as well as other factors – the BUX index suffered a huge decline from July 2007 to March 2009. Subsequently, words related to the crisis and the financial markets appeared in the online media at a hitherto unseen high rate. From mid-2009 until spring 2010 the Budapest Stock Exchange Index showed a relatively steady increase, hence the use of the words in this context dropped. Between April 2010 and April 2011 the BUX index showed relatively minor fluctuations but remained at high levels; the terms associated with the financial markets and the crisis, meanwhile, remained stable at a higher level compared to the period before the outbreak of the crisis. From April to November in 2011 the BUX index showed a significant drop again, and the occurrence of the relevant words rose.

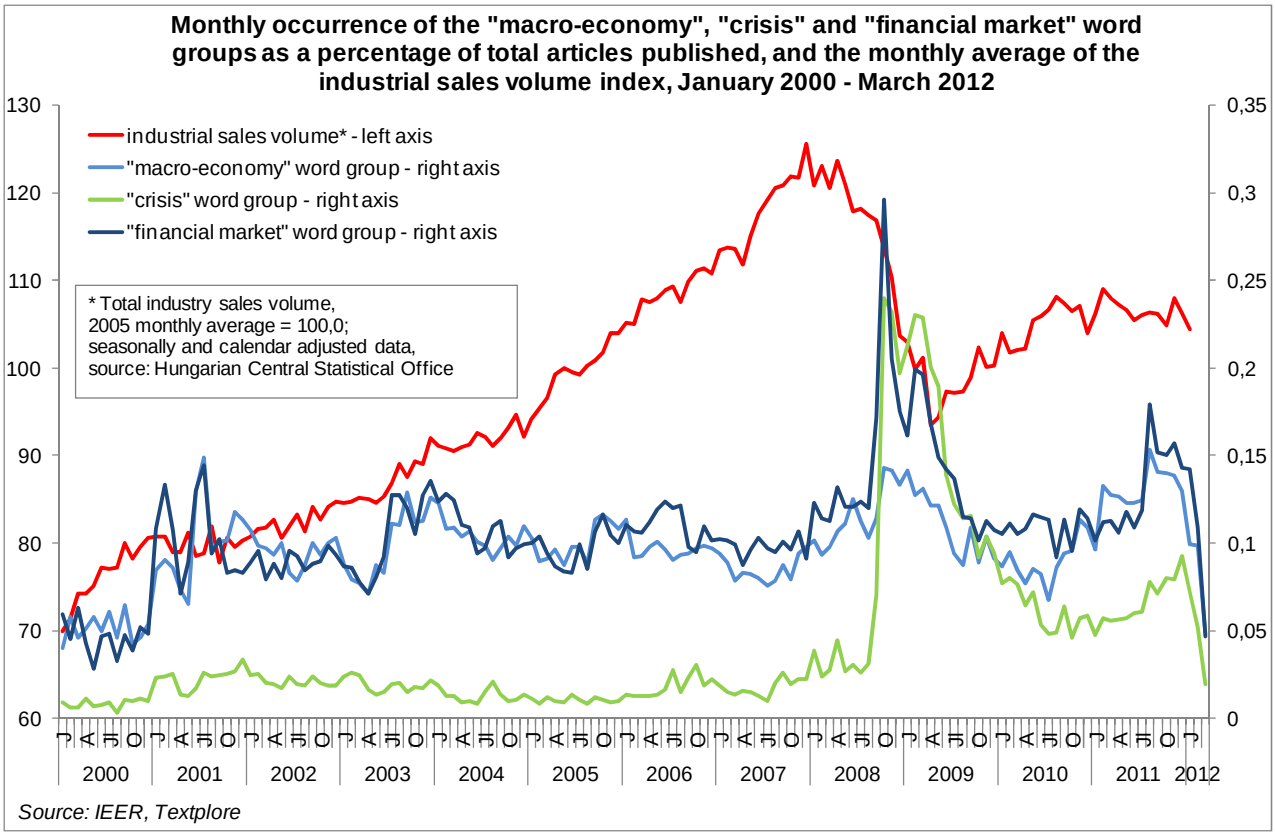
Figure 3.11. Monthly occurrence of the "financial market" and "crisis" word groups as a percentage of total articles published, and the monthly average of the daily closing values of the Budapest Stock Exchange Index (BUX), January 2000 – March 2012



The detrended and seasonally adjusted time series of the word groups' usage rates were compared to real economic reference time series. In order to do this we looked for the kind of real economic data in which the observation was frequent and extensive, and which reflected the entire economic situation in one way or another. Therefore, among the several options available we chose the first differences of the volume of total industrial sales. Before creating the differences seasonal adjustment was done on the index. Previously, we tried other real economic time series to use as a reference, such as GDP. However, the quarterly data available was not frequent enough to be usable. We believe this is due to the maximum 1-2 months lag of the effect of the real data and the word usage data on each other.

Figure 3.12. shows that the monthly volume index of industrial sales moves together with the occurrence rate of the "macro-economy," "crisis" and "financial market" word groups. Industrial sales started to decline in the spring of 2008, and the low point was reached in April 2009. The occurrence of these words jumped significantly at the end of 2008, and the rate declined continuously in 2009.

Figure 3.12. Monthly occurrence of the "macro-economy", "crisis" and "financial market" word groups as a percentage of total articles published, and the monthly average of the industrial sales volume index, January 2000 – March 2012



Source: IEER, Textplore

Since we are interested in using only stationary time series for our analysis a unit root test was performed. The presence of a unit root can be rejected at every standard level of significance in the detrended and seasonally adjusted time series of all word groups. The reference time series (volume index of total industrial sales) doesn't contain a unit root, either. For testing, an ADF test without an intersection and trend was used (because we had previously eliminated the constant and the trend).

Accordingly, to examine the desired relationship we did an analysis using an autoregressive model in where the dependent variable was ratio of articles using the specific word groups, while for the independent variables the reference data set and lagged values were used (during the analysis we used a two lags). For example, if the currently examined word group "A" and the currently used reference time series "B" is selected:

$$A(t) = \alpha + \beta_1 * d(B(t)) + \beta_2 * d(B(t-1)) + \beta_3 * d(B(t-2))$$

This equation is easily understood and meaningful as it corresponds to our concept that if something changes then it is newsworthy. The above equation was analyzed with each word group occurrence and industrial sales volume as reference time series. Table 3.2. shows the results of this analysis, with an expected 5% significance level.

Table 3.2. The autoregressive model for the word groups usage rates and the industrial sales volume (2 lags)

	D (industrial sales volume)	D (industrial sales volume) (t-1)	D (industrial sales volume) (t-2)
Tax	0.000123	-0.000617	-0.000672
	(0.7883)	(0.1766)	(0.1425)
Public finance	0.000149	0.000782	0.000515
	(0.8943)	(0.4821)	(0.6442)
Economic analysis	-0.000432	-0.000329	-0.000241
	(0.0614)*	(0.1513)	(0.2939)
Economic policy	-0.000977	-0.000868	-0.000610
	(0.1090)	(0.1518)	(0.3141)
Credit	**-0.000585**	**-0.000614**	**-0.000354**
	(0.0069)* **	**(0.0044)*** **	**(0.0978)***
Macro-economy	**-0.002270**	**-0.001803**	
	(0.0035)* **	**(0.0193)*** **	
Foreign trade	-8.53E-05	-9.75E-05	-9.15E-05
	(0.2912)	(0.2250)	(0.2559)
Labour market (AR2)	**-0.000578**	**-0.000954**	**-0.000418**
	(0.0837)*	**(0.0044)*** **	**(0.2077)**
Labour market (AR1)	-0.000733	-0.000963	
	(0.0282)**	(0.0042)***	
Financial market	**-0.004537**	**-0.004246**	**-0.003316**
	(0.0001)* **	**(0.0002)*** **	**(0.0036)*** **
Companies	**-0.001527**	**-0.001653**	**-0.000926**
	(0.0009)* **	**(0.0003)*** **	**(0.0397)** **
Crisis	**-0.006196**	**-0.007413**	**-0.005186**
	(0.0000)* **	**(0.0000)*** **	**(0.0003)*** **

Source: IEER (own calculations)

Note: we find p-values in brackets. Blank cells in the last column indicate that the analyzed model includes only one lag since the last lag was not significant.

Significant coefficients appear in the table in bold

The above table shows that the occurrence rates of the credit, economy, labor market and the company word groups are able to be predicted by changes in industrial sales for one month, while the occurrence rates of the financial market and crisis word groups can be predicted by this indicator two months in advance. The occurrence of these word groups has a very slight (but statistically significant) negative relationship with industrial sales, from which we can conclude that an unfavorable real economy process makes more probable that such topics often will appear in the press within the following one or two months.

It was broadly in line with our expectations, that precisely these word groups had a demonstrable effect. The negative coefficients indicate that with a decline in real economic data there is an increase in the discourse of economic issues. Typically the coefficients are such that generally the further that change is in the past, the less impact it will have on current word group rates.

An important question is whether Granger causality can be established in the examined time series. The test is basically an F-test, which compares two autoregressive models. In one we estimated the dependent variable with its own lagged values, while for the other in addition to this we use the lagged values of the independent variable. The null hypothesis is that there is no Granger-causality, what we reject if the second AR model is better than the first. Examined the relationship between the reference variable and the word group ratios, the following result is obtained, with a 5% level of significance (see Table 3.3.). (More detailed results of the pairwise Granger causality tests can be found in the Appendix, Table A2.)

Table 3.3. Main results of the pairwise Granger causality tests

	Granger cause of the reference variable	Granger causality of the reference variable
Tax	No	No
Public finance	No	No
Economic analysis	No	No
Economic policy	Yes	No
Credit	Yes	No
Foreign trade	No	No
Macro-economy	Yes	No
Labor market	No	No
Financial market	Yes	No
Company	Yes	No
Crisis	Yes	No

Source: IEER (own calculations)

On this basis, we can say that knowledge of the reference time series is not of any help in predicting the occurrence of different word groups, but some groups of words can help to predict the reference time series. From the outset we expected that real processes define word occurrences. However, the above result is still not counterintuitive if we consider that the press not only follows what is going on, but they are trying to figure it out in advance.

$$A(t) = \beta_1 * d(A(t-1)) + \beta_2 * d(A(t-2)) + \beta_3 * d(B(t-1)) + \beta_4 * d(B(t-2))$$

$$A(t) = \beta_1 * d(A(t-1)) + \beta_2 * d(A(t-2))$$

Based on the above we can conclude that knowledge of the occurrence of the economic policy, credit, economy, financial market, company and crisis word groups provide additional information to estimate industrial sales about a month in advance as compared to if we only use the previous two values of the time series for our estimation. These findings confirm our second hypothesis (H2), thus it can be declared that there is a significant relationship between the occurrence of economic terms and certain real economic processes. It is verified that the use of terms of the media follows the real economic statistics but the inverse causal direction seems to be true as well: the occurrence of some economy-related phrases can be used to nowcast industrial sales volume about a month in advance – thus, 10 days earlier compared to official statistical data releases.

4. Conclusions

In this study we examined the relationship between the real economic processes and the online media reports. Based on our findings it can be declared that our hypothesis was verified as the use of terms of the Hungarian online press has changed due to the economic crisis: topics related to the economy got much more attention during the crisis and the years since then compared to the period before 2008. The use of words belonging to the “economic policy”, “companies” and “crisis” word groups (topics) grew significantly – after detrending as well – while the “foreign trade” word group showed a negative change. Thus, the economic crisis caused a real break point concerning the media coverage of economy-related topics.

It remains an open question whether this effect will endure on the long term, that is, whether the interest in the phenomena of the economy lasts on in a calm period of growth – which hopefully is forthcoming – as well. This question can be answered only by further research when examining data of the 5-10 years following the crisis. The importance of this research topic lies in the fact that a great proportion of the population gets informed about the economy using sources of the online media. Thus, if these sources supply more precise, more established and more regular information, this can contribute to the development of the economic and financial consciousness of the population. The progress of the consciousness can affect real economic processes, e.g. changing the decisions in savings, credits and consumption.

In addition, we can see that a relationship can be detected between the use of terms of the media and the real economic processes (industrial sales volume in our case). This relationship is two-way, thus it can be observed that the media reacts on economic processes – especially, if they are negative – secondly, we can make nowcasts on the development of the industrial sales volume for the next few months based on the use of terms of the media. The cause of the latter relationship demands some further, deeper examination, but it can be assumed that while official statistical data are published with a lag (40 days in Hungary), the situation of industrial production is reflected in some events (e.g. group layoffs, closing and opening of factories) that draw the attention of journalists, thus these are often made public before the publishing of official statistics.

This study can be the first step in a research process. It would be interesting to examine in what situations can the media forecast (or nowcast) real processes, e.g. the balanced economic periods or during crises. The research emerges the possibility of a comparison between countries. In addition, the sources of news can be extended: besides the online press, the television and radio news can also be taken into account. Or, besides the official journalism, the weblogs expressing personal opinions would also be useful. These questions mark more research directions for the future, moreover, it could be reasonable to examine the relationships with more economic indicators.

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Appendix

Table A1 Words and word groups used in the analysis

Tax	Foreign Trade	Public Finance	Labour market, wages	Macro-economy	Economic Policy
Tax	Foreign trade deficit	Debt spiral	Average wage	Gross domestic product	Prime rate
Tax cuts	Foreign trade balance	National debt	Wage	Economic recovery	Economic policy
Tax increases	External balance	Government budget	Wage increases	Economic slowdown	Economic policy
Tax authority	Export demand	Government budget (adjective)	Wage income	Economic indicators	National bank
Tax credits	Export markets	Budget deficit	Black economy	Economic growth	National bank's prime rate
Income Tax	Balance of payments	State treasury	employment	GDP	Interest rate decision
Personal income tax	Net exports	CDS-charge	Employment rate	GDP decline	Interest rate
SZJA (Hungarian acronym for personal income tax)	International trade	deficit	income	GDP growth	Interest burden
Property tax		Welfare state budget	Minimal wage	Household income	Monetary
			Labour	Inflation	Capital inflow
		Budget (adjective)	Labour market	Industrial production	Capital outflow
		Budget deficit	Labour market (adjective)	Trade	Capital account
		Budgetary policy	unemployment	Trade (adjective)	International monetary fund
		Central budget	Unemployment rate	prosperity	World bank
		Household consumption	Real wages	cyclical	IMF
				Increasing consumption	
		Bankruptcy risk	Real earnings	Oil price	
		Austerity package	Grey economy	Market economy	
		Rescue package		privatization	
				Real economy	
				World economy	
				World economic	

The table continues on the next page

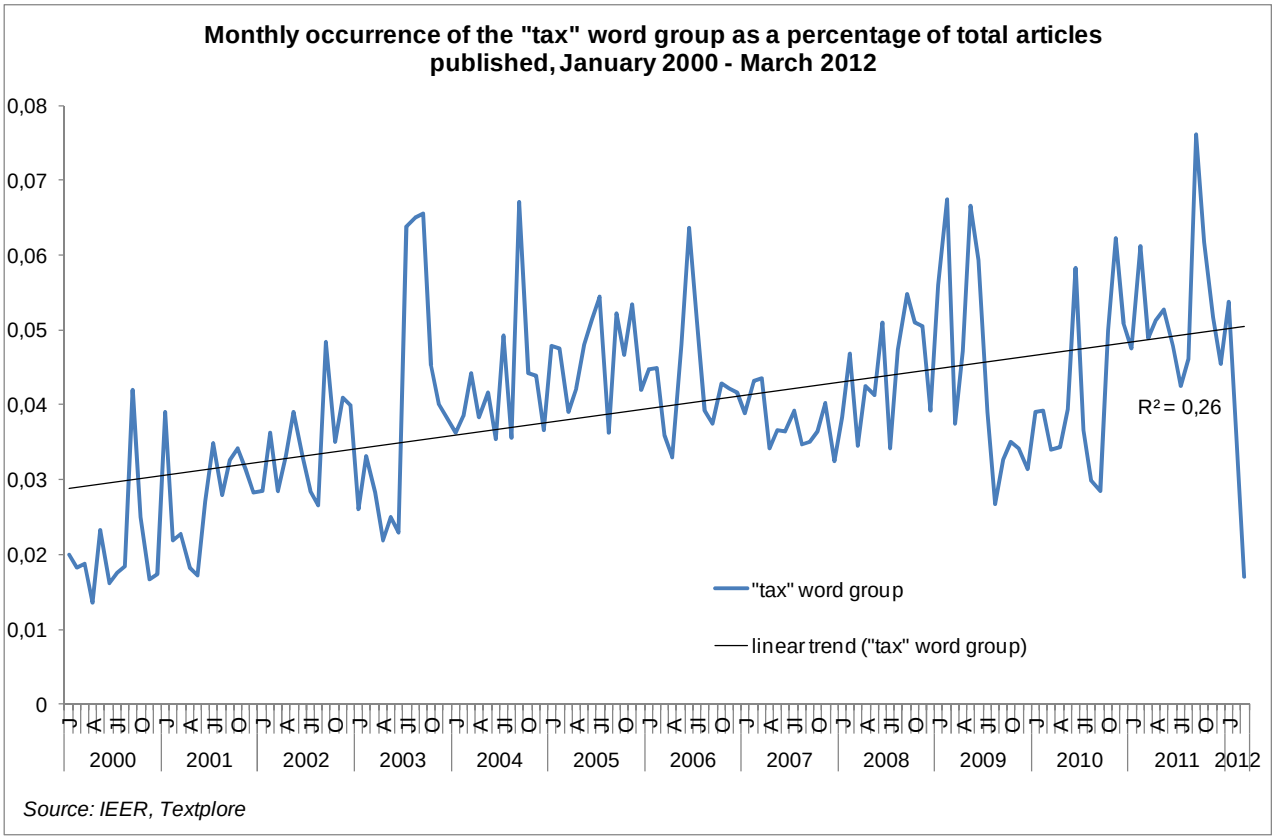
Credit	**Companies**	**Economic Analysis**	**Financial Market**	**Economic Crisis**
Foreign currency loans	investment	diagram	Government bonds	Economic crisis
loans	suppliers	analysis	Bank failures	Economic decline
			Currency exchange rate	
lending	income	Forecast		Credit crunch
Loan interest	Loss of income	Upward trend	Currency market	Financial crisis
Credit rating	assets	Market expectations	Recapitalization	recession
mortgage	Drop in turnover	prognosis	Reserve ratio	stagnant
Mortgage loan	Increase in turnover	statistics	bond	crisis
				Global economic
credit	innovation	statistical	Bond yield	crisis
interest	expenses	study	financial market	decline
Interest-free	emissions	tendency	finance	fell
	supply	Downward trend	financial	
	budget	declining trend	Financial assets	
			Financial intermediaries	
	Staff increase		Financial markets	
	Staff decrease		Financial regulation	
	layoff		Exchange rate	
	Market demand		Capital markets	
	Niche market		capital	
	profit		Foreign exchange	
	Profit maximization		Foreign exchange gains	
	productivity		Foreign exchange loss	
	production		blue chip	
	competitive		BUX	
	competitiveness			
	Restrictive competition		yield	
	bankruptcy		correction	
			portfolio	
			stocks	
			stock market	
			Stock exchange	
			Stock exchange’s	
			Stock exchange index	
			Play the market	

Table A2 Findings of the Pairwise Granger Causality Tests (2 lags)

Null Hypothesis	Obs	F-Statistic	Probability
INDUSTRY does not Granger Cause CRISIS	143	1.58163	0.20934
CRISIS does not Granger Cause INDUSTRY		10.1960	7.4E-05
INDUSTRY does not Granger Cause COMPANY	143	0.64592	0.52576
COMPANY does not Granger Cause INDUSTRY		5.00628	0.00796
INDUSTRY does not Granger Cause FINANCIAL_MARKET	143	0.48768	0.61511
FINANCIAL_MARKET does not Granger Cause INDUSTRY		15.5166	8.3E-07
INDUSTRY does not Granger Cause LABOUR_MARKET	143	1.65992	0.19393
LABOUR_MARKET does not Granger Cause INDUSTRY		2.04646	0.13309
INDUSTRY does not Granger Cause MACRO_ECONOMY	143	0.17331	0.84106
MACRO_ECONOMY does not Granger Cause INDUSTRY		6.06115	0.00300
INDUSTRY does not Granger Cause FOREIGN_TRADE	143	0.36447	0.69523
FOREIGN_TRADE does not Granger Cause INDUSTRY		1.17917	0.31061
CREDIT does not Granger Cause INDUSTRY	143	10.1140	8.0E-05
INDUSTRY does not Granger Cause CREDIT		0.28960	0.74902
ECONOMIC_POLICY does not Granger Cause INDUSTRY	143	6.52896	0.00195
INDUSTRY does not Granger Cause ECONOMIC_POLICY		0.59267	0.55425
ECONOMIC_ANALYSIS does not Granger Cause INDUSTRY	143	0.29314	0.74638
INDUSTRY does not Granger Cause ECONOMIC_ANALYSIS		0.04833	0.95283
ALLAMHAZT does not Granger Cause INDUSTRY	143	0.13628	0.87272
INDUSTRY does not Granger Cause ALLAMHAZT		0.57206	0.56569
TAX does not Granger Cause INDUSTRY	143	0.63840	0.52969
INDUSTRY does not Granger Cause TAX		1.18644	0.30840

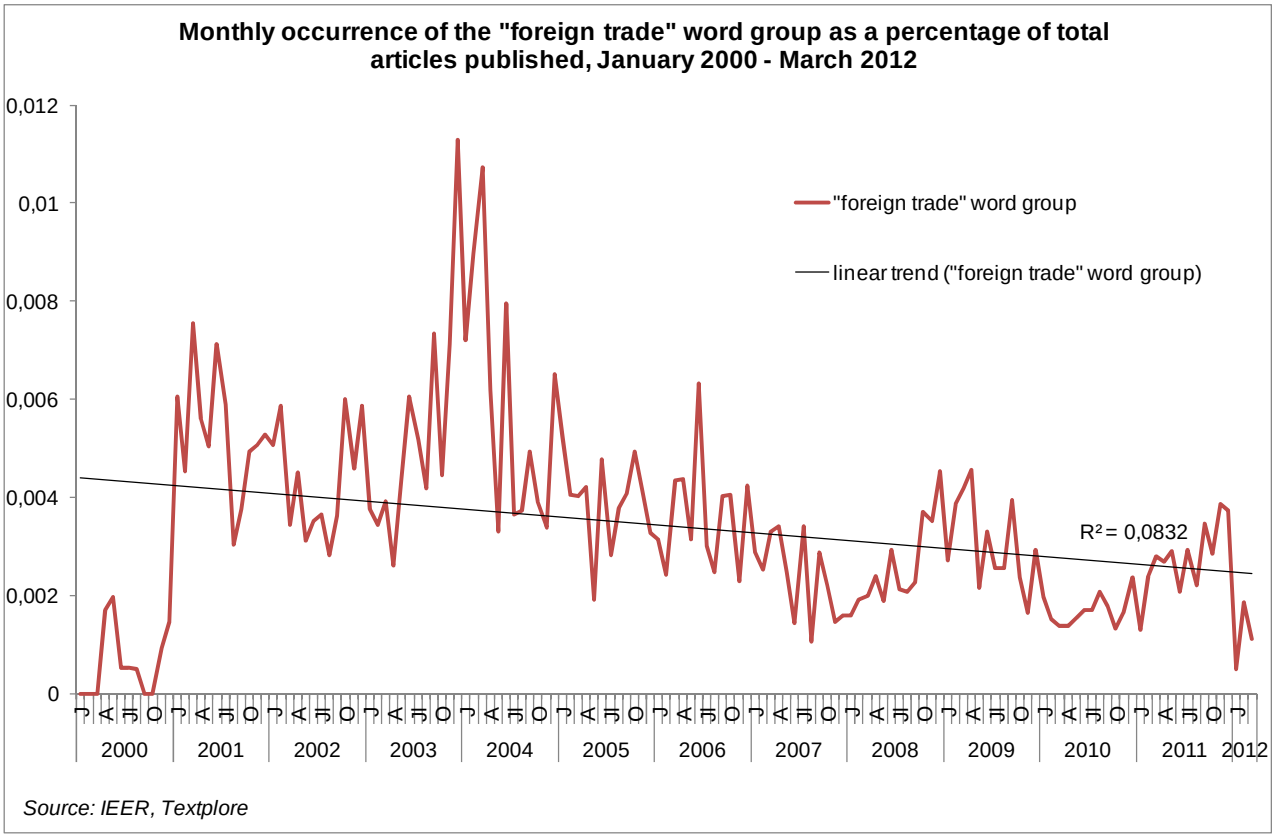
Source: IEER (own calculations)

Figure A1 Monthly occurrence of the "tax" word group as a percentage of total articles published, January 2000 – March 2012



Source: IEER, Textplore

Figure A2 Monthly occurrence of the "foreign trade" word group as a percentage of total articles published, January 2000 – March 2012



Source: IEER, Textplore

Figure A3 Monthly occurrence of the "public finance" word group as a percentage of total articles published, January 2000 – March 2012

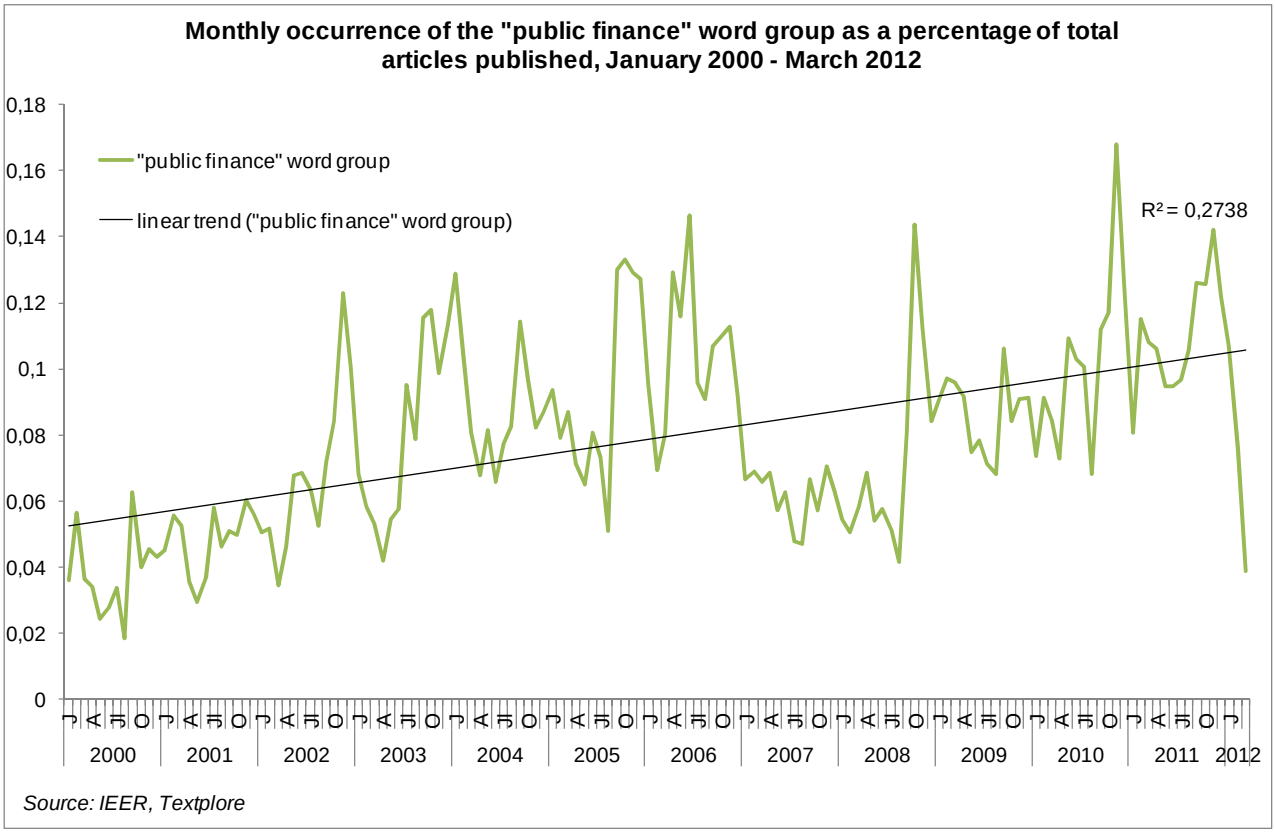
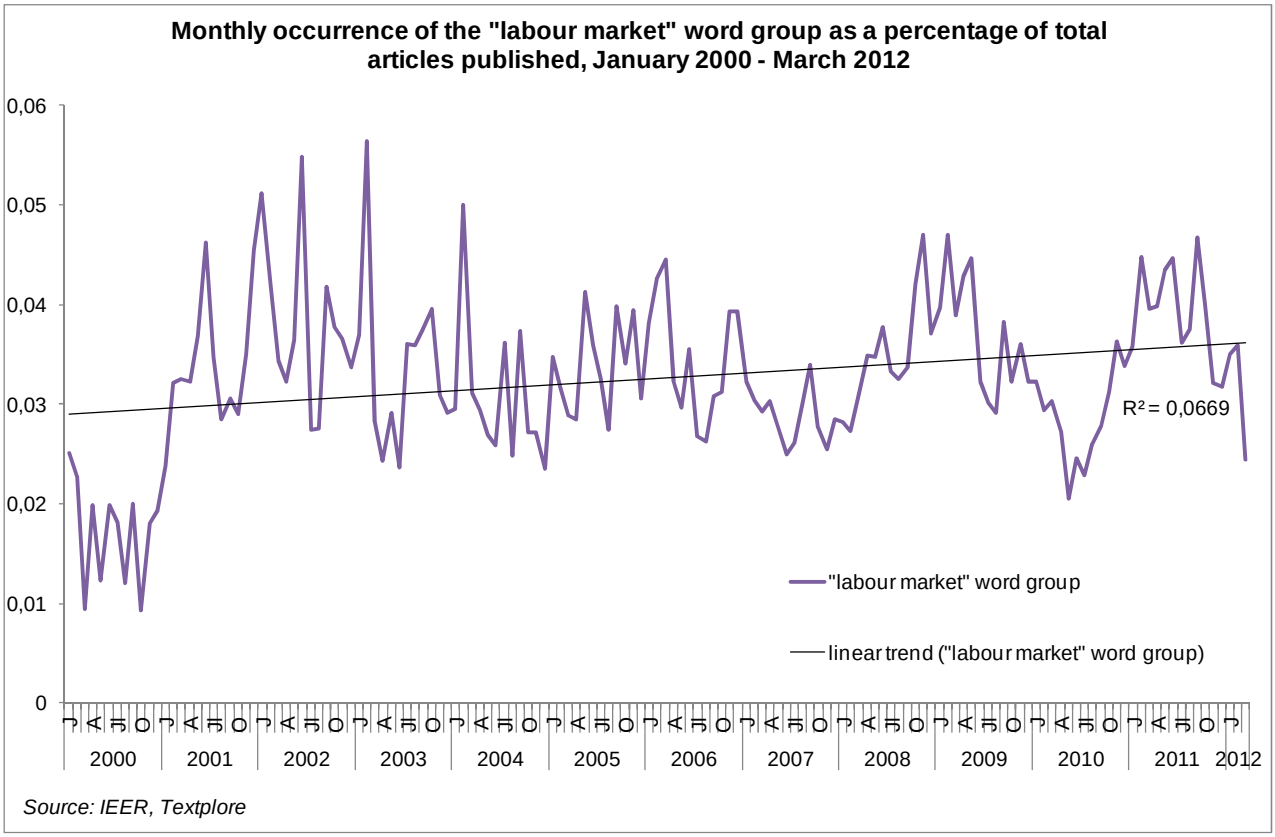
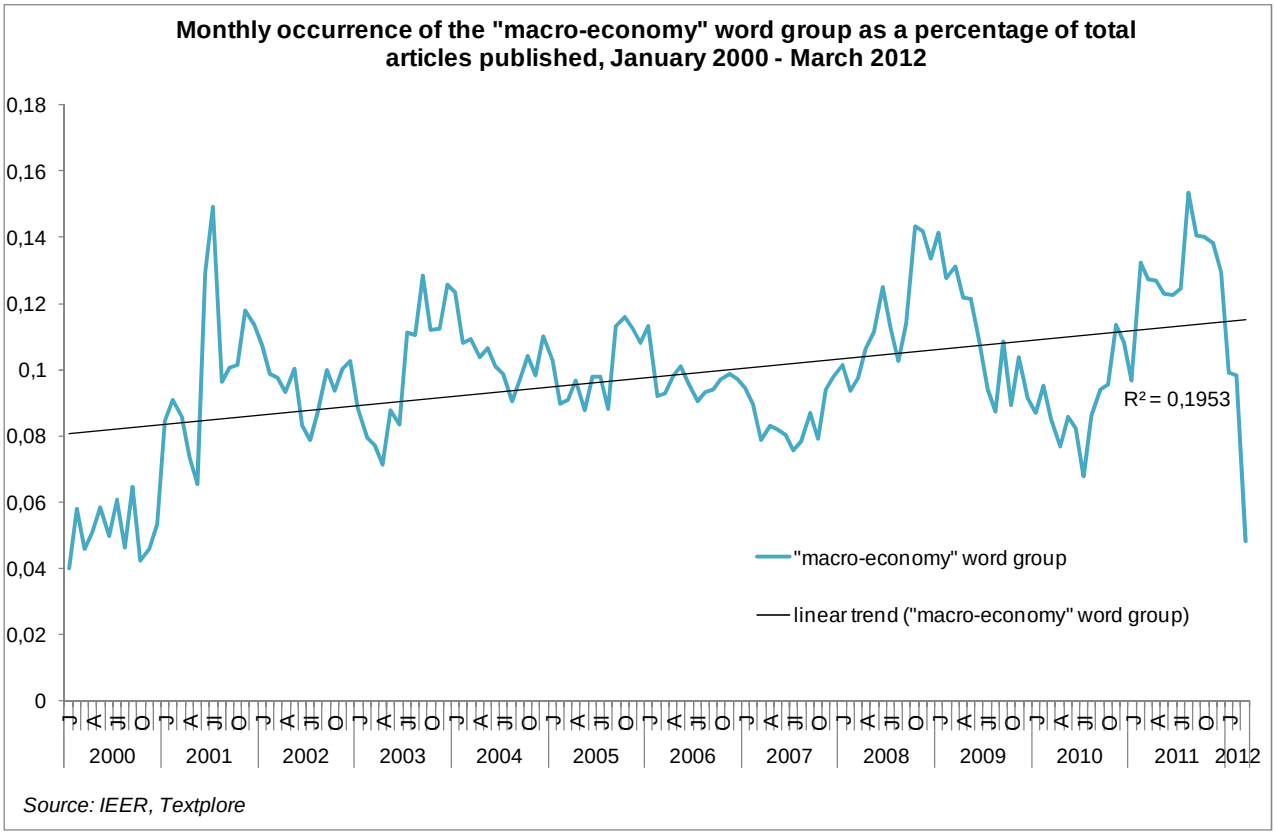


Figure A4 Monthly occurrence of the "labour market" word group as a percentage of total articles published, January 2000 – March 2012



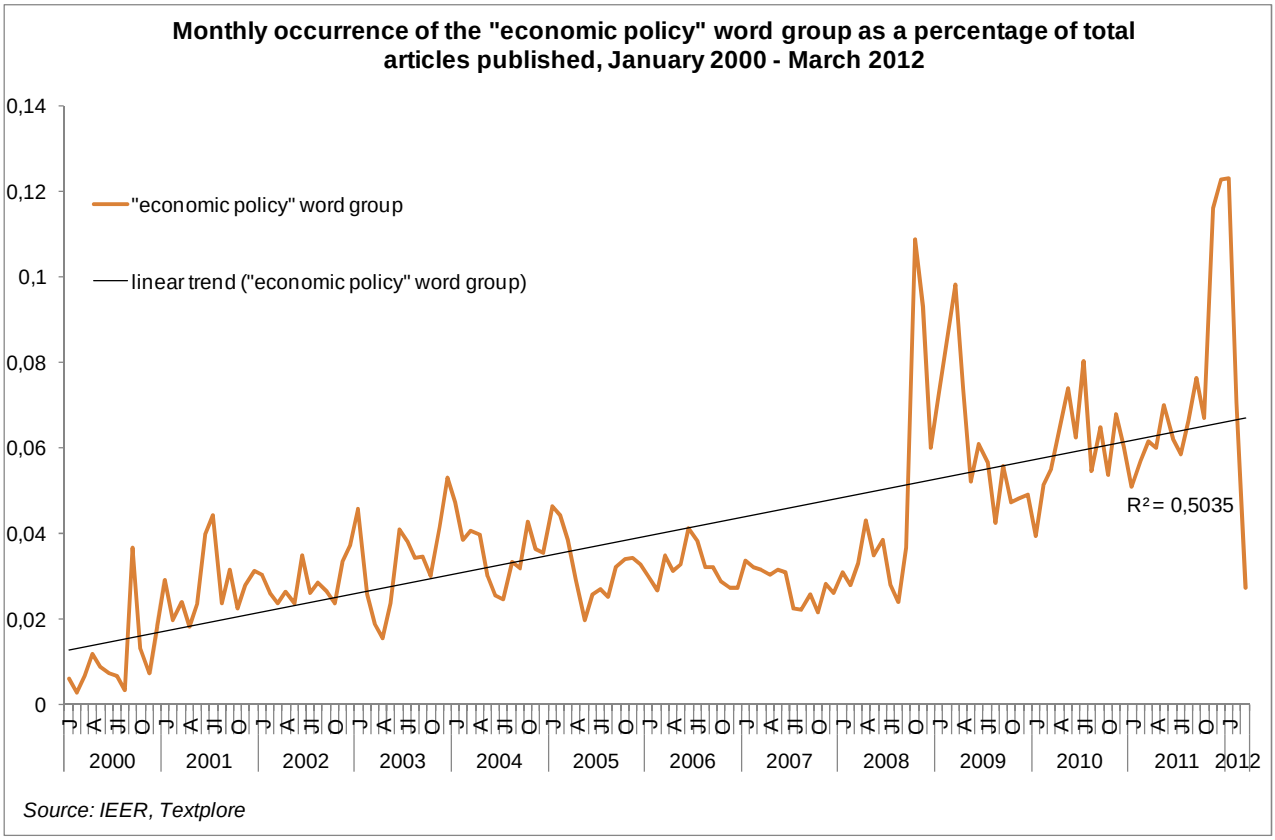
Source: IEER, Textplore

Figure A5 Monthly occurrence of the "macro-economy" word group as a percentage of total articles published, January 2000 – March 2012



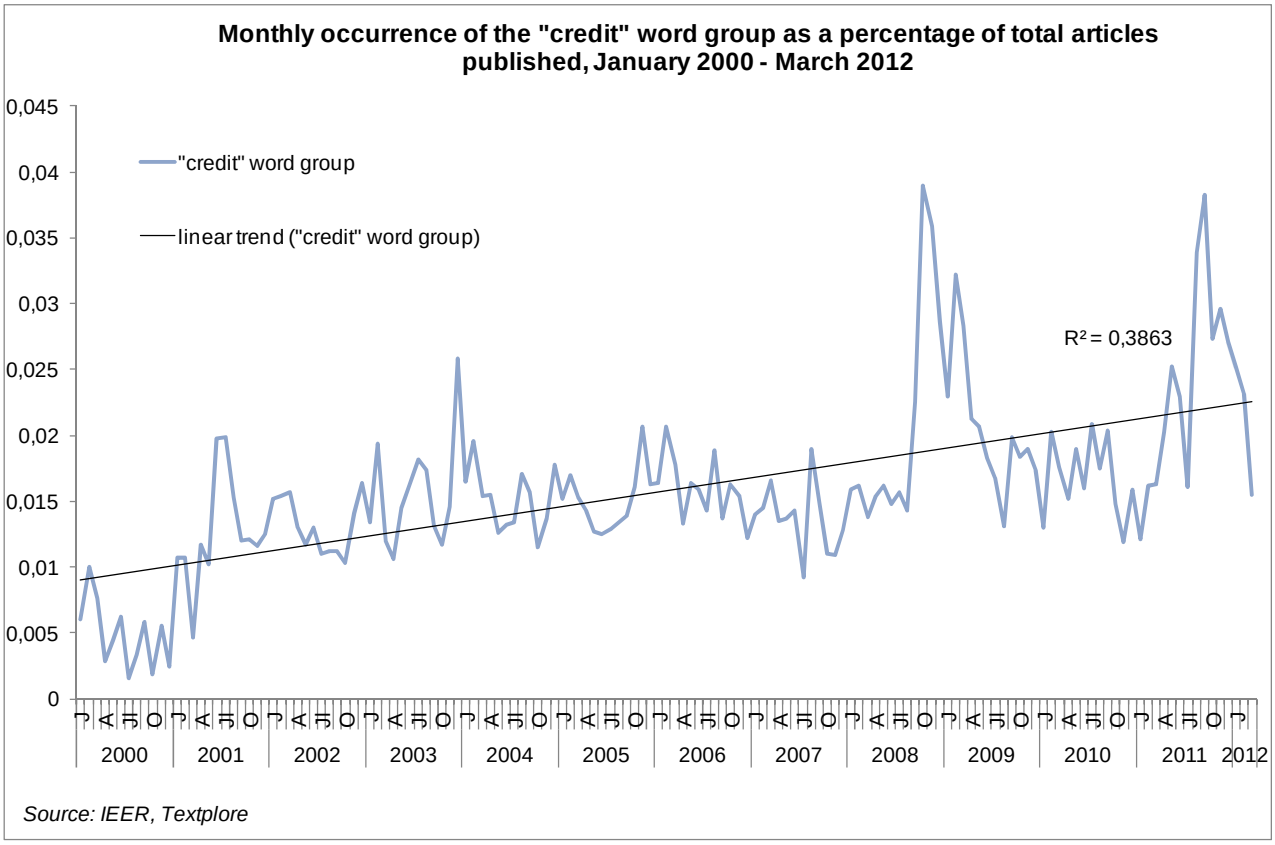
Source: IEER, Textplore

Figure A6 Monthly occurrence of the "economic policy" word group as a percentage of total articles published, January 2000 – March 2012



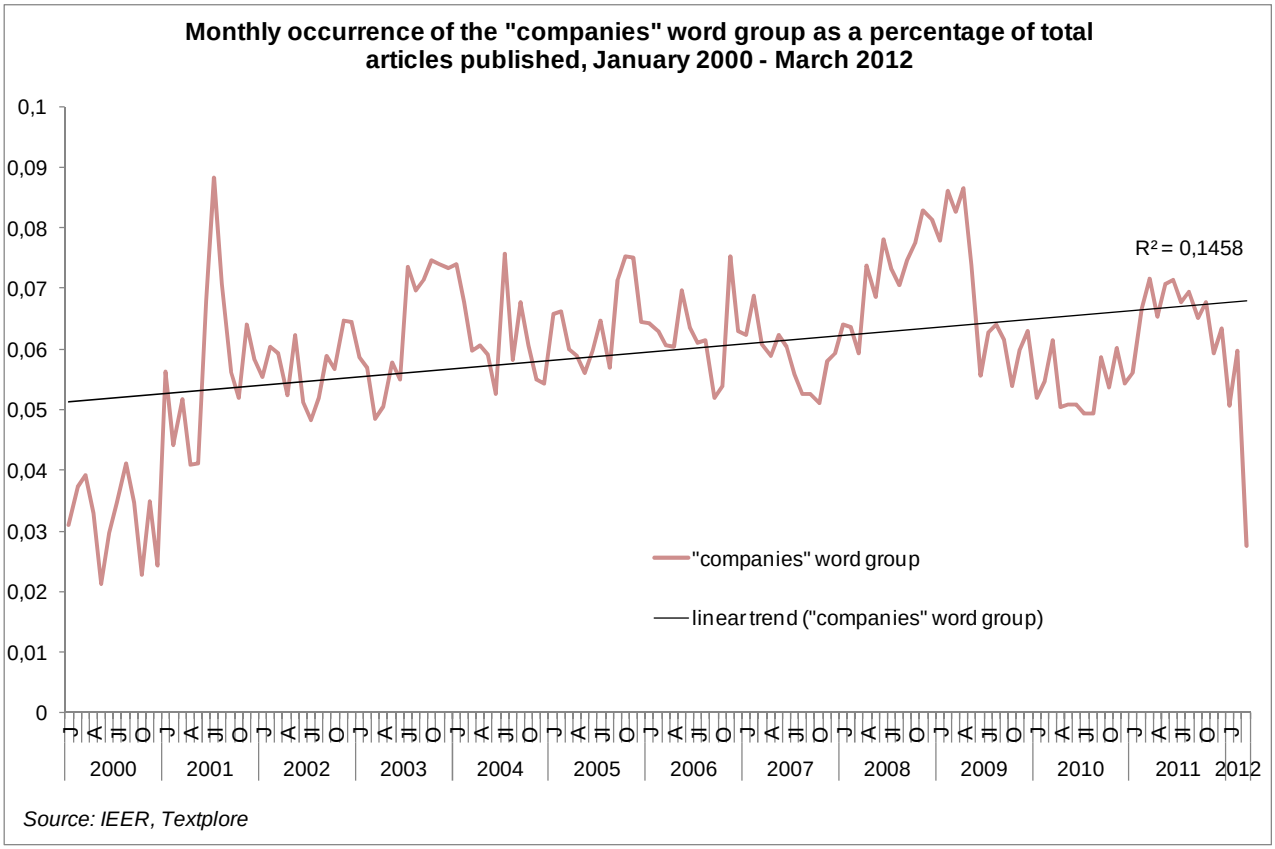
Source: IEER, Textplore

Figure A7 Monthly occurrence of the "credit" word group as a percentage of total articles published, January 2000 – March 2012



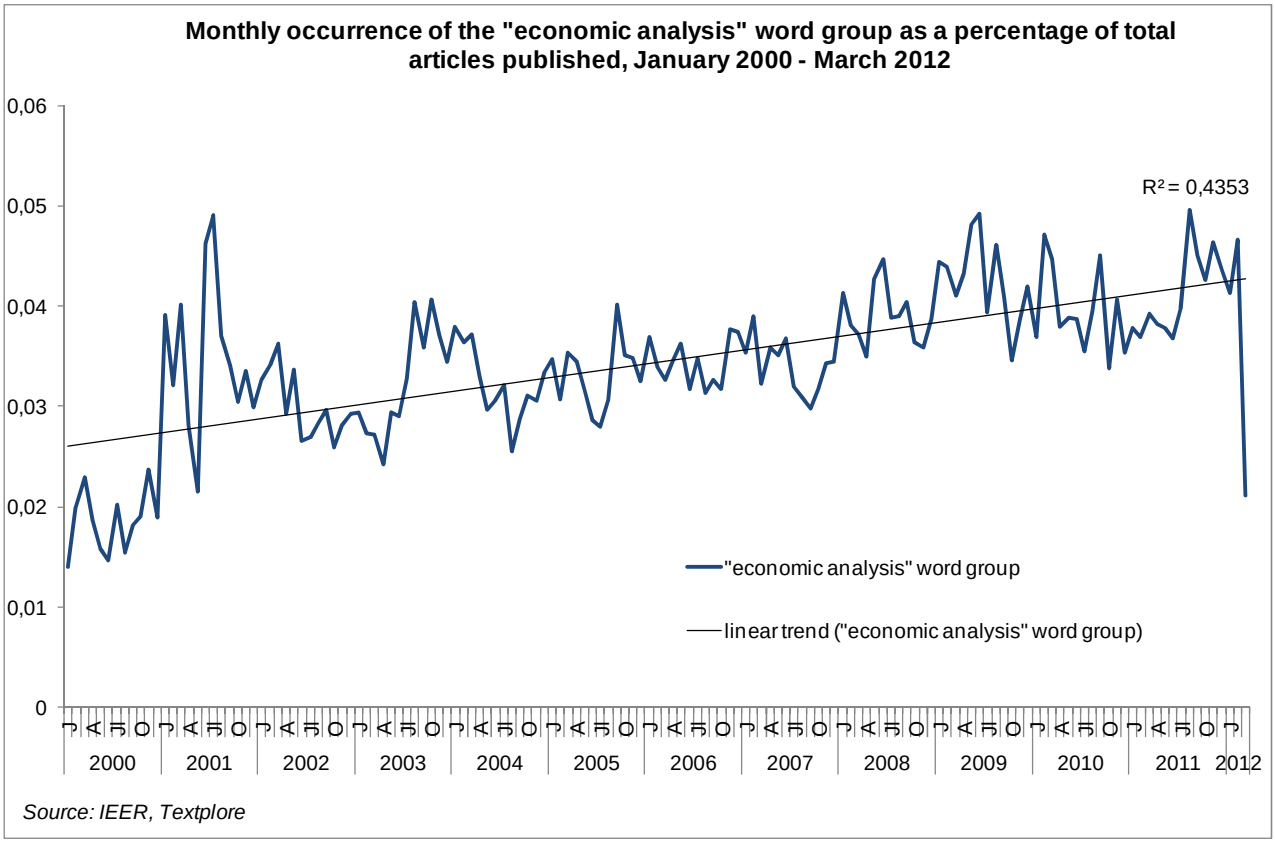
Source: IEER, Textplore

Figure A8 Monthly occurrence of the "companies" word group as a percentage of total articles published, January 2000 – March 2012



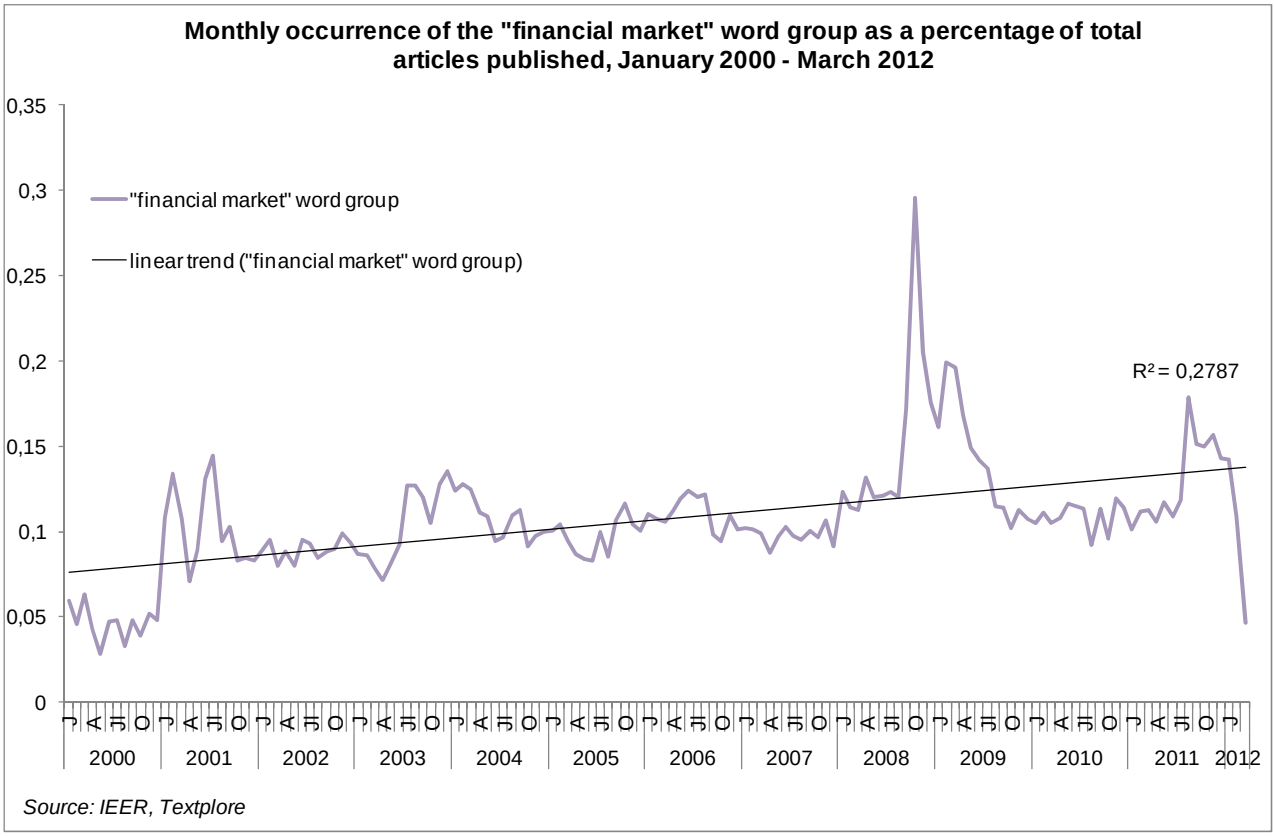
Source: IEER, Textplore

Figure A9 Monthly occurrence of the "economic analysis" word group as a percentage of total articles published, January 2000 - March 2012



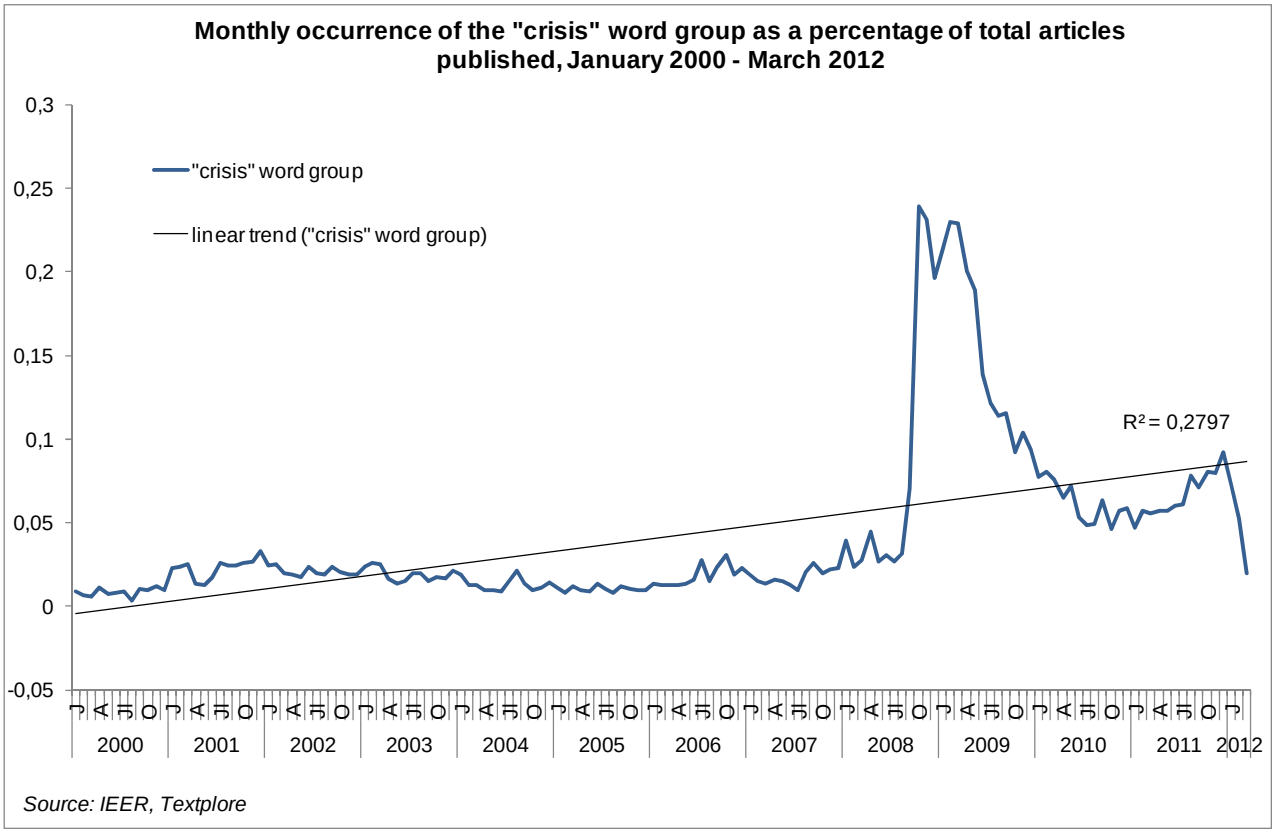
Source: IEER, Textplore

Figure A10 Monthly occurrence of the "financial market" word group as a percentage of total articles published, January 2000 – March 2012



Source: IEER, Textplore

Figure A11 Monthly occurrence of the "crisis" word group as a percentage of total articles published, January 2000 – March 2012



Source: IEER, Textplore