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Measuring the quality of the institutional environment through the development of prices of credit default swaps in times of economic disturbances

Abstract

The current economic development is facing the economic disturbances which result from international environment. These relate to the ongoing economic crisis and the deterioration of the global security situation. The financial system is characterized by high sensitivity to changes in the economy in a positive and in a negative direction. One of the highly volatile financial instruments is Credit Default Swap, abbreviated as CDS. The development of prices of this specific instrument can be analyzed on a background of efficient financial market theory and is affected by the degree of credit risk to government bonds of specific countries. The author assumes that the price development of these highly-sensitive financial market instruments may be, in addition to the business environment quality indexes, considered as a benchmark of quality of institutions. These institutions are subject to an analysis of the new institutional economics. One of the current threats to global security has become a crisis in Ukraine. There is no doubt that this crisis influences the quality of institutions as well as the whole economy. This crisis is used to test internal mechanism of the measure. The solution is designed for the economic practice, but also as a variable for use in research and science. It meets the demands for speed and simplicity of calculation.

Keywords: quality of institutional environment, CDS, peace, Ukrainian crisis.
JEL Classification: E02, E14, D80.

Introduction

New institutional economic theory, unlike the main economic schools, evolves into an analysis of all aspects of human activities that affect the entire economic complex. The current economic mainstream operates with the category of transaction costs. Hovever, these costs are difficult to measure. The analysis of economic processes is appropriated on the microeconomic level. Such an approach can be found for example in works of H. Hansenová and L. Furdová (2010) – they analyze the pattern of export prices in foreign trade entities. Business environment quality indexes are used on the macro-economic level. These indexes have their strengths but also weaknesses. In our opinion, it is possible to measure the quality of the institutional environment (to measure indirect by the amount of transaction costs), through financial markets.

The need for simple, fast and useful tool for measuring the quality of the institutional environment is growing in times of economic disruption. Results can be used by business and can serve as almost immediate assessment of the state of the environment as well as identificaten of short-term trend. Mostly international operating companies could benefit from this instrument. Beside the economic crisis the geopolitical security situation (e.g. the security situation in Ukraine) has become a new risk. Therefore, we can define a new formal institution – peace. Through this institution it is possible to test the predictive value of measuring the quality of institutional environment through the price development of a highly sensitive credit derivative – credit default swaps (abbreviated CDS). Our paper is part of a scientific project "Solving the Debt Crisis in Monetary (not Fiscal) Union and Factors of Future Deepening of the Crisis in Europe and in Slovakia" whose members have been long term dealing with issues of economic disturbances, such as E. Fifek (2013), or Z. Kittová (2014).

1. Theoretical background

A number of relevant theoretical papers have been published on this issue, but this article does not aspire to clarify all fundamentals of institutionalism. The author of this article published in earlier works theoretical results of this economic stream. However, for understanding the context of this article it is necessary to define two concepts from portfolio of theoretical school of economic institutionalism – Institutions and Transaction Costs. Against the background of the theory of efficient markets we attempt to explain the functioning of the internal mechanism of measuring the quality of the institutional environment through the CDS prices development.

1.1. Institutionalism, institutions and transaction costs. Institutionalism is developed from the work of native American institutionalists, namely T. Veblen, J. Mitchell, J.R. Commons, J.M. Clark (Mlčoch, 2005). It followed works of New institutional economists such as R.H. Coase and O.E. Williamson. This school of economics, unlike

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the main economic stream, which develops the ideas of A. Smith, refuses to work with analyzed and partial economic problems. It recognizes that the economic system is made up of a complex system of relations and structures. L. Mlčoch (2005) states that the invisible hand of Adam Smith must be complemented with visible hand, in the form of commercial courts, if those inherent fail. For this reason, the author of the article sees a need for fast, easy and relatively accessible measure of the institutional environment quality, which can be beneficial mainly for economic practice – not only for financial entities, but also for foreign business entities operating on international markets. Such an indicator can mitigate the risk of decision making under risk or uncertainty and alleviate information asymmetries. Institutions can distinguish formal and informal – formal (in the form of legal norms, constraints) and informal (culture, customs, language). This means that institutions limit human behavior (Hučka et al., 2007). In this article we would like to define a new formal institution – the peace. We based on the current security situation affecting international economic relations. Peace, as an economic institution, is a condition in which the economy is not directly threatened by hostile, offensive, military action. According to a Short Glossary of the Slovak Language (2003) it is a state of peace without war, disputes. We consider peace to be a formal institution because it depends on official, mostly elected public government. Even the state declares a war by law.

Analysis of the institutional environment on the basis of the new institutional economic theory is precisely in the current times of economic disturbances which result not only from the ongoing economic crisis, but also from the deterioration of multilateral international relations. We mean the security crisis regarding the situation in Ukraine. Professor O.E. Williamson (1990) points out that the analysis of economic processes through transaction costs, as an integral part of this school, has gained intensity in the 30th and later in the 60s of the 20th century, when market failures were considered as a result of the existence of transaction costs.

J.R. Coase (1937) in his article "The Nature of the Firm" noticed that the existence and size of firms depend on costs that are different from production costs. These costs relate to the function of the entrepreneur – the co-ordination of business processes. These are the costs of using the price mechanism. J.R. Coase has conducted a more detailed analysis of costs and divided them into 3 groups: costs of discovering the relevant price, costs of negotiating and costs of contracts as a result. O.E. Williamson (1990) links (in his book) the transaction costs to technical term of friction as he distinguishes between ex-ante and ex-post transaction costs. Ex-ante costs are mainly related to the preparation, negotiation and conclusion of more or fewer comprehensive treaties (by eventual situations that may arise). Ex-post costs arise from the need of control, implementation, or failure of contractual relations. As mentioned in the introduction, we encounter with the problem of the quantification of transaction costs. On the microeconomic level, we can track business processes. At the macroeconomic level qualitative indexes of the business environment are used. Among the best known indexes of the business environment (Ferenčíková, 2013) are World Competitiveness Yearbook of the Institute for Management Development, Global Competitiveness Report from the World Economic Forum, publications of Business Environment Risk Intelligence, S.A., Country Credit Rating Index published in Institutional Investor Magazine, private evaluations of Coface S.A. and of course the agencies Standard & Poor's, Moody's, Fitch. There is no doubt that these are constructed with high professional competence, based on rich data base and have explanatory ability. However, as we have learned from the crisis development, economic changes continually accelerate and businesses face the problem of lack of information for their decision. We assume that the immediate source of information may be provided by financial market products and that only human, in our case the investor (not currently available computer algorithm) is able to process the entire width of the economic complex.

1.2. The theory of efficient markets and CDS. The effectiveness of our way of expressing the quality of the institutional environment is based on the assumption that belongs to the theoretical portfolio of the efficient market theory. Efficient market is market with a high proportion of speculative activities. According to P. Musílek (2011), the price of financial instruments on the financial market is influenced by the price-setting information (expected profits, dividends, risk, financial panic), but it must satisfy five requirements: (1) numerous market players who rationally assess the available information; (2) the availability of information roughly at the same time; (3) prompt reaction of investors to the new information; (4) the existence of low transaction costs in that market; (5) investors act in accordance with the requirements of ethics and morality. Some of these requirements are in conflict with the

institutional economic theory, but the author of article assumes that financial markets theory is applicable for our purposes (nature, especially the large number of well-informed market participants and ensuring rapid execution of trades). Investors receive information from the media. For this reason, we have to decide to verify our measure by tracking information about formal institution – peace – from the newspaper Frankfurter Allgemeine Zeitung in an online-version. On the other hand, there are objections again to the validity of the efficient market theory. N.N. Taleb (2013) highlights attention to the stagnation of the journalism profession quality. This stagnation stems from the dividing of information on crystallized and raw information, mostly in electronic form, which can cause noise. "The problem is that the prevailing media practice consists of mindless noise submitting able to attract attention and there is no way to sever these two separate poles" (Taleb, 2013). Classical economic textbook Economics from authors P.A. Samuelson and W.D. Nordhaus (1992) reports that speculative markets do not allow the generation of long-term extra profits because the market absorbs immediately and effectively all relevant information. Effectiveness in this case is understood, how is achieved the maximum output, but the promptly processing of information. Further, the authors argue that the response time is in some cases up to 30 seconds of the availability of new, binding information. "You cannot profit from an old information or diagrams about price changes based on the past development" (Samuelson – Nordhaus, 1992). This means that our way of quality measuring of the institutional environment by financial markets may be in exaggerated case available in 30 seconds from the last known change.

According to P. Markovič two parties meet on the market – the seller and the buyer of risk. The object of this contract is CDS: "Seller of CDS pays a defined amount of money, which is determined in basis points of the nominal value of the hedged loan and gives a guarantee of the protection in the event of the occurrence of a credit event (Markovič, 2007)". J. Jílek (2010) defines CDS as an OTC credit option (this product has the characteristics of an option, although is known as swap), in which the seller pays premium to the buyer in accordance to the involved in the investment. This is called as a premium. In the case of specified credit events of underlying asset or basket of assets received from risk buyer the sum of cash settlement.

According to V. Demjan (Chovancová et al., 2014) the price of other financial derivatives correlates with the price of the underlying asset. In the case of CDS, the value of this instrument depends on the credit event occurrence probability. Such events may be for example (Jilek, 2010) bankruptcy of reference unit, obligation acceleration (one or more obligations are payable before the moment when they are normal), restructuring (for example reduction of interest or principal payments, currency and others), etc.

CDS, like credit derivative has been used in analytical publications in various forms. A. Kliber (2014) has used a CDS for the purpose to quantify volatility spillovers, contagion and interdependence of the financial crisis on selected Central European countries. She came to the relatively positive conclusion that investors appreciate the regional risk based more on fundamentals than on the basis of the weakest countries in the region. This result supports the use of CDS for our purposes.

The authors Sangwon Suh, Inwon Jang and Misun Ahn (2013) have used CDS to measure systemic risk through econometric methods. In contrast, our solution can be regarded as easier, faster and more accessible to a wider range of users. We cannot forbear to emphasize a certain degree of controversy, which is connected with the term CDS. From a theoretical perspective, it is important to mention the risk of increase of moral hazard. Moral hazard is engaged in institutional economic theory in the possibility of opportunistic behavior and lack of effective control (Liška et al., 2011). R.M. Stulz (2009) argues that the CDS allows dividing social costs as well as benefits. This allows the distribution of risk between the parties, which are better prepared to bear the risk. He further claims that criticism of CDS is associated with three areas: (1) financial derivatives allowed credit boom. (2) CDS created systemic risk. Some financial institutions as the risk holders were actually bailed-out from public budgets. For example AIG. (3) CDS allows the manipulation of information about financial health of the economics subjects. In his paper R.M. Stulz concludes that the financial problems of multinational financial houses are not caused by the financial derivatives. Earlier he believed just the possibility that financial derivatives contribute to improving public welfare through risk sharing. This means a reduction of social costs in whole society.

Numerous articles analyze the CDS liquidity premium. This premium, according to J. Makúch (1994), represents the difference between profitability for a variety of liquid securities or financial instruments. Profitability of securities shall be equivalent if it is equal to their internal characteristics and the degree of liquidity, i.e. the ability to replace these tools to more liquid forms, or directly cash. Profitability of these instruments is different at the moment when one of these tools

becomes less liquid. Usually less liquid instruments carry a higher yield. F.A. Longstaff et al. (2005) published a paper, in which authors used credit default swaps to identification of the size of the default and nondefault components in corporate spreads. "Corporate bond yield spreads will always be calculated as the yield on a corporate bond minus the yield on a riskless bond with the identical coupon rate and maturity date". As shown by Duffie (1999), the credit default swap premium should equal the spread between corporate and riskless floating-rate notes (Longstaff et al., 2005). The result of this paper was observation that the default component represents the majority of corporate spreads. J. Hibbert et al. introduced a methodology for measuring Liquidity Premium. There are three methods: (1) Measurement by CDS basis (CDS basis is the difference between the CDS premium and corporate bond spread. Then Liquidity Premium is negative value of CDS basis). (2) Structural model and (3) Covered bond spreads. J. Ammer and F. Cai (2011) analyzed the relationship between the premium of CDS and bond yield spreads for emerging markets countries. The authors worked with the results of the nine emerging countries for a period of four years. "For most countries in our sample, we find that sovereign CDS premiums and bond spreads are linked by a stable linear long-run equilibrium relation. The two prices of credit risk, however, often diverge from the equilibrium in the short run, with these temporary deviations typically dissipating at a rate of 5-13 percent per day. This gradual convergence in prices implies that there is some predictability of relative price changes between the two markets, which is sustained by some combination of illiquidity in at least one of the two markets and risk that arises from the imperfections in the underlying arbitrage relation (Ammer, Cai, 2011). Our approach in comparison with the above literature, evaluates the quality of the institutional environment − in line with the new institutional economic theory and the existence of non-zero transaction costs. In our paper we deal with only one financial instrument (CDS to any underlying assets) and especially we calculate with the dynamics of CDS changes (as well as the negative value of the CDS basis − this represents a liquidity premium).

2. Methodology

For achieving the aim of this paper theoretical, empirical and statistical methods (Grančay, 2013) of scientific research were used − to prove the relevance of measurement of the quality of the institutional environment through the prices development of credit derivatives − on theoretical background of the new institutional economic theory and the theory of efficient financial markets. Quality development characteristics of the institutional environment can be described by using descriptive statistics obtained through the program Excel and evaluated on the basis of the statistical literature from author Pacáková (2009). Correlation and regression analysis were calculated by using of programs Excel, Statgraphics Centurion and Gretl in order to prove the relevance of own institutional environment indicator by defining of the formal institution – peace and for the graphic and algebraic determination of the regression polynomial line (trend) of the second degree. This formal institution was quantified through composite indicator from the archive of the Frankfurter Allgemeine Zeitung including the number of suitable articles (in the selection of articles has been applied subjectivism of author) about conflict in Ukraine and the subjective evaluation of the tense security situation (on a scale from 1 to 10, where 10 is high voltage). These two recorded values have been counted. While articles on Ukraine have not been published every day and the indicator may be inaccurate due to errors and subjectivity, but such a combined approach is, in our view, appropriate to monitor the formal institutions of peace (territorially limited to Ukraine) for the purposes of our research. Financial market entities receive primarily information from media and transform theme sensitively into their investment decisions.

The construction of the actual dynamic indicator of the institutional environment and its status reflects the guiding principles − simplicity of calculation and speed of ratings. Thus, the benchmark becomes potentially useful for businesses. Moreover, compared to other commonly used index of environmental quality, our benchmark is applicable without the need to compare a wide set of subjects, most national economies. It expresses the dynamics of changes in the institutional environment and the short-term outlook. Nevertheless, we are able to compare economies or private entities to each other, because the default value stems from the level of valid prices at the time of measurement beginning. For the calculation of the institutional environment quality indicator by using CDS price developments are necessary time series of relevant CDS-kind on a daily basis. In our case the Bloomberg database was used. A basic set of data contains information about CDS prices from 2013 January 1 to 2015 May 11 for the Ukrainian respectively to 2015 June 25 for the Slovak CDS on 10-year government bonds. Data were used from 2013 January 2 to 2015 May 30. Therefore correlation and regression analysis have not been performed between these two types of financial derivatives. The indicator is based on the first derivative of the CDS price development function.

We faced the problem of interrupting the series of CDS prices from the financial database Bloomberg. For those days it was used the last value of the index on that was available. Higher value of measurement means higher quality of the institutional environment.

Relationship of calculation of the indicator for first, second and others records:

$$Q_{t0} = -P\ CDS_{t0}. \quad (1)$$

$$Q_{t+1} = Q_{t0} + (P\ CDS_{t0} - P\ CDS_{t+1}). \quad (2)$$

$$Q_{t+n} = Q_{t(n\text{-}1)} + (P\ CDS_{t(n\text{-}1)} - P\ CDS_{t+n}). \quad (3)$$

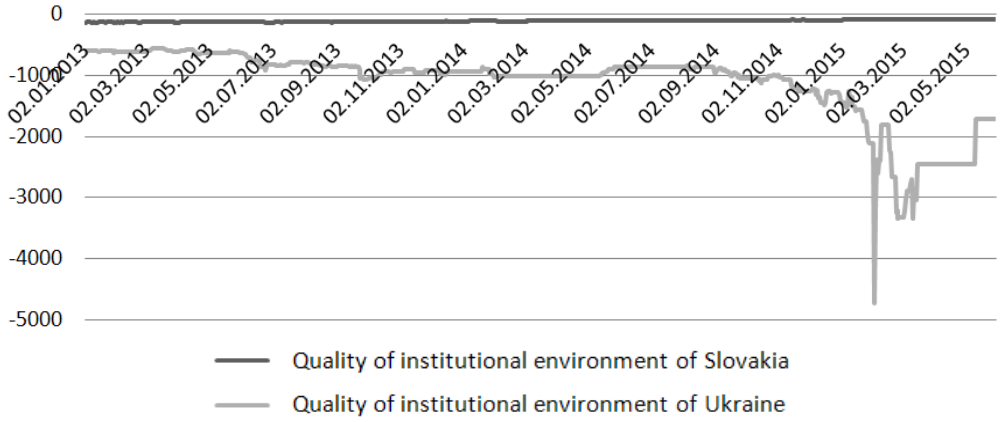
Explanation of symbols:

Q_{t0} – The result of institutional environment status indicator at the time of first record. Q_{t+1} – The result of institutional environment status indicator at the time of second record. Q_{t+n} – The result of institutional environment status indicator at the time of other records. $P\ CDS_{t0}$ – Price of *CDS* at the time of first record. $P\ CDS_{t+1}$ – Price of *CDS* at the time of second record. $P\ CDS_{t+n}$ – Price of *CDS* at the time of the other record. $P\ CDS_{t\,(n-1)}$ – Price of *CDS* at the time of previous record.

3. Measurement of the quality of the institutional environment through the development of prices of credit derivatives

The internal mechanism of our indicator is derived from the idea that credit derivatives calculate with a degree of risk. These calculations are the result of market operator's considerations which both reflect past development and anticipate future development. Lower risk means lower estimate of economic friction, transaction costs, i.e. better institutions setting.

Figure 1 shows the quality of the institutional environment measured by the price development of Slovak and Ukrainian credit derivatives (CDS) for the period 2013 January 02 to 2015 May 30. We can conclude significant differences in institutional quality of Slovakia and Ukraine by visual comparison of the results of Slovakia and Ukraine.



Source: Own calculation based on database Bloomberg (2015).

Fig. 1. Quality of institutional environment of Slovakia and Ukraine

Both monitored countries show a different course and level of the measure. The nature of this course can be described using descriptive statistics (Table 1). Already the average values suggest that Ukraine is struggling with more serious institutional problems compared with the Slovak Republic. This statement is confirmed by the values of Standard Deviations, which in the case of Ukraine are much higher. This means that the variation of measurement values is high. In this case, the Slovak Republic seems much more stable. The values of the measuring instrument of quality the institutional environment in the Slovak Republic is positive (right sided) asymmetrical, i.e. in most cases the value of this measuring instrument was smaller than average. In the case of Ukraine it was the opposite.

Table 1. Descriptive statistics of the quality of the institutional environment

Indicator	Quality of institutional environment of Slovakia	Quality of institutional environment of Ukraine
Mean	-114.17	-1 128.84
Standard error	0.50	19.90
Median	-115.05	-944.47
Mode	-111.47	-1 020.74
Standard deviation	14.81	589.91
Sample variance	219.46	347 997.76
Kurtosis	-0.76	4.21
Skewness	0.37	-2.07
Range	59.39	4 147.68
Minimum	-145.93	-4 719.10
Maximum	-86.54	-571.42
Sum	-100 353.30	-992 252.66
Count	879	879

Source: Own calculation.

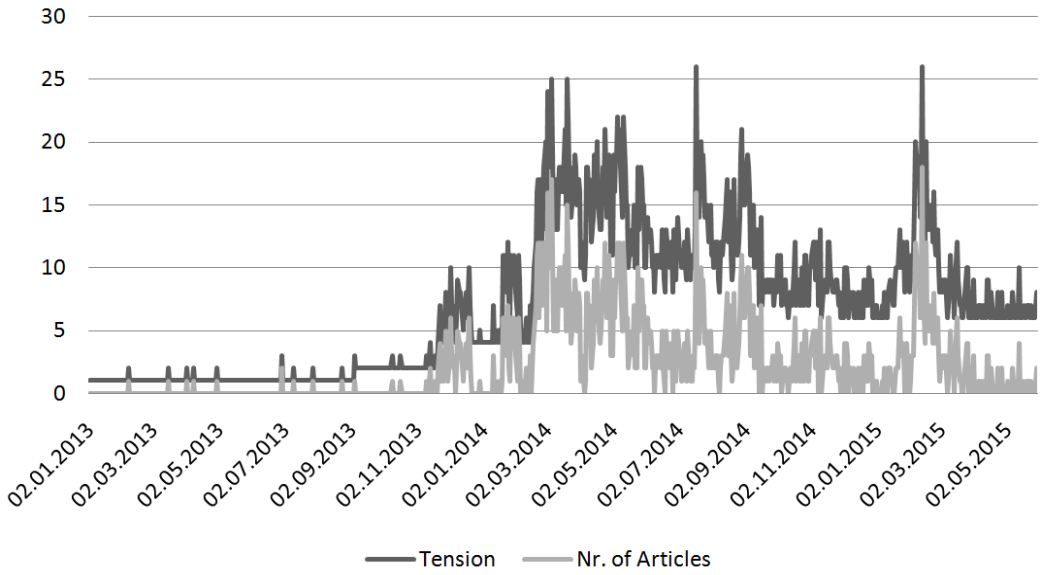
The current situation in Ukraine is the result of development during several decades, however it accelerated in late 2013. As it is generally known, the armed conflict in eastern Ukraine was preceded by protests against the refusal of closer integration with the European Union. This article does not intend to undertake in-depth probe into the motives and consequences of the conflict. It only examines the internal mechanism of measuring the quality of the institutional environment. Further information can be obtained from example from the article "Prospects of Foreign Mutual Trade Cooperation between the EU and Ukraine" by E. Kašťáková (2014). We decided to measure the effect of tension or peace by articles in the daily press, namely from the archives of the German newspaper Frankfurter Allgemeine Zeitung in an online version. The titles of selected articles during the reported period (2013 to May 2015), are recorded in Table 2.

Table 2. Titles of selected articles about Ukraine between 2013 and May 2015

Date	Original title	English translation
2013 November 21	Kiew stoppt Vorbereitung für EU-Abkommen	Kiev stops preparation for EU agreements
2013 November 22	Proteste gegen Stopp der Verhandlungen mit der EU	Protests against the stop of negotiations with the EU
2014 January 20	Schwere Ausschreitungen in Kiew	Heavy riots in Kiev
2014 January 22	Janukowitsch verschwindet aus Kiew	Yanukovych disappears from Kiev
2014 March 27	UN-Vollversammlung verurteilt Annexion der Krim	UN General Assembly condemns the annexation of the Crimea
2014 April 12	Ukraine beginnt "Anti-Terror-Ansatz" gegen Separatisten	Ukraine begins counter terrorism campaign against separatists
2014 July 18	Schreckensbild an der Unglückstelle von Flug MH17	Horror picture at the disaster scene of Flight MH17
2014 August 22	Russischer Hilfskonvoi rollt über die Grenze	Russian aid convoy rolled across the border
2015 February 14	Vor geplanter Waffenruhe: „Die Rebellen zerstören Debalzewe"	Before planned ceasefire: "The rebels destroy Debaltseve"
2015 March 01	Separatisten: Haben schwere Waffen abgezogen	Separatists: Have heavy weapons withdrawn

Source: Online Archive FAZ.org, 2015.

Figure 2 shows the status of tension, in other words peace, as our newly defined formal institutions. Quantification of this institution, which was described in the chapter Methodology, allowed us to apply correlation and regression analysis. Independent variable was identified component Tension (*X*) and the dependent variable was the Quality of the Institutional Environment (*Y*). The result of these analyses is summarized in Table 3.



Source: Own analysis based on Online Archive FAZ.org.

Fig. 2. Tension (level of peace) in points and Nr. of articles about Ukraine

The result of the simple correlation analysis showed a weak, indirect dependency between variables (-0.266). This result says that if the level of Tension in the country increase, the value of the quality of the institutional environment decreases. Linear regression line has the following equation:

Quality UA (*Y*) = -934.28 – 27.7902 × *Tension* (*X*).

This means that if the value of the indicator Tension achieves 0, the Quality of the Institutional Environment achieves -934.28 points. However, the application of Simple Regression is small, even negligible for our use. The model explains only a 7.06% variable (*R*-Squared). It was therefore necessary to apply polynomial regression, which represented 21.49% of variables. If the value of

Tension is 0, the indicator reaches -647.62 points. Regression polynomial equations can be written in the form:

$$Quality\ UA\ (Y) = -647.62 - 141.273 \times Tension\ (X) + 6.28465 \times Tension\ (X)^2.$$

Table 3. Simple and polynomial regressions – quality of inst. Env. UA and tension

Simple regression	Value (estimate)	Polynomial regression	Value (estimate)
Intercept	-934.28	Constant	-647.62
Slope	-27.7902	Tension (X)	-141.273
Correlation coeff.	-0.265771	Tension (X)^2	6.28465
R-squared (%)	7.06343	R-squared (%)	21.4891

Source: Own analysis.

Conclusion

Currently one of the most serious problems of economic practice is to overcome information asymmetry. Just through quick, timely and relevant information an entity is able to apply adequate economic strategy. In the process of globalization and increasing security threats – the demand for useful information has become an issue of enormous importance. This situation means an increase in transaction costs that fall within the theoretical portfolio of the new institutional economics. The new institutional economic theory developed mainly optimum institutions setting that contribute to the reduction of transaction costs frictional force. Enlightened recent events in Ukraine, we tried to define a new formal institution of peace and on the basis of this institution to verify the functionality of our internal indicator.

The level of transaction costs can be quantified at the microeconomic level through business process analysis. However, at the macroeconomic level we encounter the problem of accurate and timely measurement of these costs. Qualitative indexes are used, but these are mostly evaluated on an annual basis. In our opinion another weakness of these indicators is a matter of subjectivity. Therefore, we tried to design indicator whose internal mechanism can be explained by the theory of efficient markets. We measure the quality of the institutional environment through the development of CDS prices. It can be compiled on almost a daily basis as it evolves according to the decisions of millions of financial market entities. We based on the very nature of derivatives Credit Default Swaps. These contain in itself a risk calculation of market entities on the basis of available information, but also anticipating future development. If the risk outlook is better, we measure lower transaction costs. It means that it is better to set up an institutional framework. Further development can be measured between any time points. Thus prepared device can be used especially for economic practice, but also as a variable for the theoretical analysis in economic research.

We investigated a bond and the relationship between the formal institutions of peace and the institutional environment quality indicator expressed for Ukraine. We confirmed the weak indirect dependency between variables, but predictive value of linear model was low (*R*-squared only 7.06%). We achieved more relevant results by polynomial regression. In particular, polynomial regression analysis of second degree proved our assumption that the deterioration rate was significantly reflected in the deteriorated status of the institutional environment. This conclusion is supported by the descriptive statistics result in comparison with the Slovak Republic.

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