

Factors impacting sustainable growth of country's financial system and causal relationships among them

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Abstract On the basis of correlation-regression analysis, factors making the greatest impact on country's financial system and sustainable growth are aimed to find and comprehensive valuation of them is carried out in this paper. The relevance and the problem of the research are confirmed by recently in the scientific literature increasingly occurring manifestations of financial systems sustainability concepts but specific quantitative researches executed by analyzing sustainable growth of financial system are lacking. Author of the paper emphasizes a new approach to a sustainable growth measurement of financial system, a selection importance of the greatest impact on system's growth making factors and a determination of relationships among them for the final valuation of country's financial system. According to the above-mentioned valuation methods which cause a different impact on the examined object, a problem of sustainable growth of country's financial system is analyzed. Final result of these valuation methods is the determination of sustainable growth level of country's financial system.

Index terms: country's financial system, sustainable growth, factors impacting sustainable growth of financial system, method of correlation-regression analysis, causal relationships among impacting factors.

JEL: E1, G2

I. INTRODUCTION

Analysis of sustainable growth of country's financial system is one of the most innovative and one of the least analyzed objects in economics which is becoming one of the most important attraction centers of practical application of holistic knowledge. The most important idea of this scientific research is to select and survey factors impacting sustainable growth of country's financial system, considering operational principles of the government and Central bank's economic aspect in the country.

Such selection will benefit researchers in the future while creating strategic conceptual model of guaranteed sustainable growth of financial system which helps to find solutions on how to improve the current situation for many interested countries with debt and crediting problems. Appropriate valuation of factors and the following related decisions might decrease noticeably grown geopolitical tension in Europe's East and effects of sharp decline in oil prices for stable development of analyzed country. Another important advantage is a credit risk reduction for the analyzed subject. While Europe's Central Bank in 2014 still decreases main interest rate and Europe's banks have liquid asset surplus, sustainable development of financial systems would stabilize expansionary policy consequences of Central banks.

Currently governments of the main countries unanimously claim that one of the main tasks is to ensure stable and effective development of country's economy. Painful examples of United States in 2008 and unstable financial situation in Greece in 2015 demonstrate that global financial system is at the initial stage of sustainable system.

In this paper instruments are applied to solve the problem of the research object and to assess quantitatively factors impacting sustainable growth of country's financial system and causal relationships among them.

For example, incompatibility of different qualitative and quantitative research results or different nature of object impacting factors, or abstract and clear numerical expression having sustainable growth data absence is nowadays widely discussed problem among the researchers. However there is no doubt that researches aiming to assess, group and find out probably common sustainable growth denominators, can help to make better decisions not only for financial sector specialists but benefit marketing, IT in data processing and analysis also.

The sustained tension in financial sector and the origins of the sustainable development concept led the author of the paper lay the foundations for further conceptual model preparation of guaranteed sustainable growth strategy of global financial system in his work.

Paper consists of three main parts. In first, theoretical part, a new approach to the concept of sustainable growth of financial system is discussed. What is more, calculation and valuation methods of factors impacting financial sustainability are analyzed. In second, based on scientific literature analysis, a method is chosen, described and justified selection of factors and calculation methods of causal relationships among them. In third, analytical part of the paper, with help of correlation-regression analysis selected factors are assessed.

II. A NEW CONCEPTION OF SUSTAINABLE GROWTH OF COUNTRY'S FINANCIAL SYSTEM DEFINITION

Emerging concept of sustainable development requires to look back at flaws of financial system, to pay attention to origins of economic growth (Ravichandran, 2007; Stiglitz, 2009; Alfonso, 2012; Goodchild, 2012; Sharma, 2011). Often development of sustainable financial system are limited by examination of the problem from economic aspect only but attention is not draw to what has the greatest impact for that. In fact, to talk about the social and ecological aspect of the same financial system is extremely difficult. Perhaps one may go back to the origins of the sustainability concept and name the most important works prepared on this topic because up to now this concept is not fully dis-

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cussed (Louche, Lydenberg, 2010; Viederman, 2011; Zadek, 2008; UN, 1992; Gallopin et al., 2001; Kates et al., 2001; Sun, Louche & Perez, 2011). In short author would like to define on what will be discussed further in this work. Financial system widely speaking will be equated to financial sector. Banking sector based system will be talked. Value growth will be mentioned in further text which will be understood as positive change of created asset by financial system.

Sustainable growth of country's financial system – continuous process while sustainability of country's financial system – intended state of government and central bank of the country. "Value" created by the system in the long-term in not decreasing with time. In the short-term shocks sources of created "value" has to be saved which should return growth of the financial system to the point of equilibrium.

Based on the main guidelines of this concept: common enlargement of today's sustainable growth level, risk minimization, economic stability, effective distribution of resources (capital), competitive and balanced environment, the author of the paper proposed sustainable growth factors selection principles of global financial system.

III. SELECTION OF GLOBAL FINANCIAL SYSTEM IMPACTING FACTORS

Creating strategic conceptual model of guaranteed sustainable growth of global financial system in the future, one of the first stages – selection of factors impacting financial system. The author of this paper pays special attention to valuation of financial system impacting factors.

Selecting suitable indicators for sustainability valuation falls into one of the most important stages in order to assess sustainable level of any system (Mayer, 2007; Singhal et al., 2009). Data limitations for sustainable growth level assessment is often a big obstacle for creating a big collection of indicators (Graymore et al., 2008). With this obstacle researchers of much less analyzed problem of sustainability valuation of financial system face as well. To most of the sustainability valuations either directly selected quantitative indicators, or selected and ranged data by qualitative analysis are currently included. Often in the literature it is found that it is oriented only into exact sphere of sustainability and indicators are selected according to economic or environmental aspect, others highlight social aspect (Baxter et al., 2004; Bent, 2005), one more approach is to pay attention to less analyzed social and ecological aspects (Bebbington, 2005). However, in order to value the level of financial system sustainability, different or common combinations of indicators should be used in order to maintain the all three aspects of sustainability indicators (Singh et al., 2009). Nevertheless, there are opinions that

even in this way processing analysis might not indicate the right result and a complex reflection of socioeconomic environment. It is important during the research have limits and do not try to cover all fields of sustainability (Mayer, 2007; Singhal et al, 2009). In this case indicators were selected with help of a detailed literature analysis, trying to distinguish none of the spheres and choosing the most scientifically analyzed indicators. Finally, ability to value data with quality and availability of indicators was an important selection criteria as well.

Because sustainable growth guarantee of country's financial system – a concept understandable in the long-term perspective, from these groups of indicators it is a must to select such factors which have a great meaning to the growth of financial system both today and in the future. According to before mentioned conceptual valuation approaches of country's financial system, it is important to mention that different stages at certain time are equally important in the whole research process, and as it was mentioned before if future factors selection and their weighs as well as breakdown in ratios is carried out without quality, a wanted final result will not be achieved. Based on World Bank analytics, in 2009 a detailed analysis of factors impacting financial system in the long-term indicated that particular attention should be paid to economic side of this occurrence. In Table I it can be seen a summarized analysis of the greatest impact on sustainable growth of financial system having indicators.

Research results provided in Table I.

From the data in Table I, it can be seen that 12 groups of factors and 42 the greatest impact on the financial system in the long-term making factors were valued. Very important role in the selection plays historical data and uncertainty which goes along with it. The author notes that for the further analysis different factors and their vast of impact for the sustainable growth of country's financial system must be valued. In order to proceed with this researchers use various methods of econometrics and statistics.

IV. PROBLEM OF SUSTAINABLE GROWTH OF FINANCIAL SYSTEM VALUATION

In order to continue the topic of causal relationships' valuation methods, the author of the paper draws attention to methodology opportunities of correlation-regression analysis application for sustainable growth of global financial system researches. On the basis of this theory author will have an opportunity to directly use research ideology of complex systems (Rutkauskas, 2012; Innes, Booher, 1999).

TABLE I.

LITERATURE ANALYSIS OF FACTORS IMPACTING FINANCIAL SYSTEM IN THE FUTURE THE MOST (COMPOSED BY THE AUTHOR)

	Ambar, Alper; 2011	Ayadiir kt.; 2008	Yarcey, 2008	Demirgüç-Kunt; 2012	Naceur, ir k t.; 2010	Beck ir kt.; 2008	Castren et al.; 2009	Hammersley A. Et al.; 2011	William F. Bassett et al.; 2010	Zeman, Jurča; 2008	Hoggarth, Loagn; 2005	Babouček; 2005	Quagliariello; 2003	Shu; 2002	Blaschke, Jones; 2001	Arpa et al.; 2001	Gamberra; 2000	Diana Bonfirm; 2008	Denaut, Kirillouk, Segers, 2015	
Business cycles																				
Unemployment																				
Regulation																				
Credits not for business clients																				
Household consumption																				
Public sector consumption																				
Export																				
Import																				
GDP (change)																				
Inflation (consumer price index change)																				
Interest rate																				
State bond issue																				
Household income																				
Number of bankruptcies																				
Credits for business clients																				
Real estate inflation																				
Exchange rates																				
Share price																				
M2																				
M1																				
Production																				
Commodity prices																				
TUI																				

As a separate challenge analyzing problems of sustainable development in the context of complex systems methodology raises an issue of separate factors and causal relationships standardize metrics among them...

So, correlation analyses (more than 2800 completed): calculated coefficients of correlations, determined their importance levels. Checking the importance of correlation coefficient it is transformed into value z, which is normally distributed (z-transformation). Then normalized distribution is calculated while integrating received standard normal distribution, importance (or reliability) level is obtained. Regression analysis is performed in case of significant correlation, coefficients are calculated, determined their reliability level. Based on regression analyses of one dependent and two independent variables where independent variable – asset of financial system, formed multivariable regression dependency between asset of country's financial system and various factors impacting its growth – results are provided in Table II.

In the first stage of the research, as it was mentioned before, 4 the greatest impact on the financial system in the long-term making factors were selected.

Suppose that these factors really have the greatest opportunity to impact the development of finance.

For the empirical approbation historical data from 2008 to 2014 was selected, data bases of ECB, Eurostat, World bank etc. was used, examined and processed more than 22000 primal data. Research covers macroeconomics indicators, no data from separate businesses (microeconomic level).

19 countries from Euro zone participated in the research, they were investigated separately, in order to avoid autocorrelation effect.

Factors having the greatest impact on asset of financial system were analyzed in the empirical research, aimed to find out, what factors and what values of theirs have the greatest probability to keep the sustainable development of financial system.

In countries where dominates banking sector based financial system, greater impact on asset growth of financial system has the development of crediting system. This is proved by calculated correlation between the asset of financial system and the ratio of provided credit to private sector. Correlation coefficient by data of 2009 is equal to 0.99, therefore t statistics is equal to 0.74 and its reliability level p is equal to 0.001.

That means that correlation coefficient is reliable with probability of 99.9%. Determination coefficient is equal to 0.94 which means that 94% of the asset of financial system change can be explained by the impact of crediting to private sector. Regression coefficient β which is equal to 0.94 shows that 1 percentage point change in crediting to private sector proportion leads to an increase of 0.94 percentage point in asset of financial system; p value is equal to 0.005 which means that coefficient is reliable with a probability of 99.5%. Free variable of the regression α is equal to 93.01. A summary of correlation-regression analysis results can be seen in Fig. (1) and Table II:

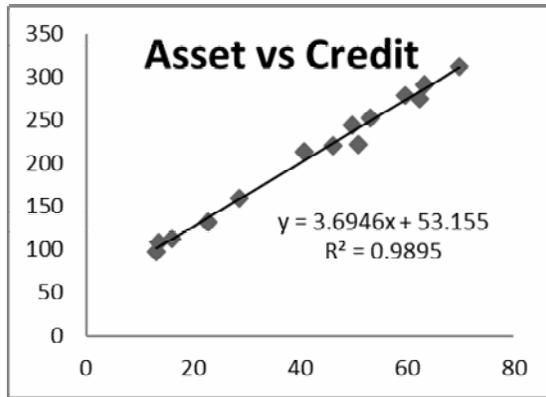


Fig. 1. Graphic reflection of assets and credit correlation (composed by the author).

In the Fig. (1) one of the most important factors, impacting the asset growth of country’s financial system, can be seen. Due to limitations regarding the number of pages, the author will not provide graphic characteristics of other factors. Generalized results and the most important indicators of correlation-regressions analysis are provided in the following table.

TABLE II.
FACTORS IMPACTING FINANCIAL SYSTEM IN THE FUTURE THE MOST (COMPOSED BY THE AUTHOR).

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.998189
R Square	0.996381
Adjusted R Square	0.994773
Standard Error	5.315608
Observations	14

ANOVA					
	df	SS	MS	F	Significance F
Regression	4	70017.71	17504.43	619.501	5.66E-11
Residual	9	254.3012	28.25569		
Total	13	70272.01			

	Coefficients	Standard Error	t Stat	P-value
Intercept	93.93175	14.36466	6.539086	0.000107
Domestic credit to private sector by banks (% of GDP)	0.940166	1.26458	0.743462	0.476161
Net domestic credit (current LCU)	0.905587	0.407099	2.224491	0.053173
Broad money (% of GDP)	0.75012	0.445702	1.683008	0.126665
GDP deflator (base year varies by country)	-0.73814	0.180535	-4.08862	0.002723

In order to summarize obtained results, a set of regression equations could be made where independent variable would be the asset of financial system and dependent – already defined factors that had statistically significant dependency from mentioned independent variables, grouped by dependency from exact independent variable. In this way regression equations were formed. Calculated regression dependencies can be written in a form of regression Eq. (1):

$$Financial\ asset = 93.93 + 0.94Dc + 0.905Nd + 0.75Bm - 0.738GDPd \quad (1)$$

Where:

- Dc – credit for private sector;
- Nd – whole credit without public debt;
- Bm – amount of money (cash);
- GDPd – GDP deflator.

V. CONCLUSION

Sustainable growth of country’s financial system – continuous process while sustainability of country’s financial system – intended state of government and central bank of the country. “Value” created by the system is the asset of financial system. In the concept of the author asset in the long-term should not decrease with time while in the short-term shocks sources of created “value” has to be saved which should return growth of the financial system to the point of equilibrium.

Based on the main guidelines of this concept - common enlargement of today’s sustainable growth level, risk minimization, economic stability, effective distribution of resources (capital), competitive and balanced environment was tried to assess quantitatively.

The sustainable growth concept of the country’s financial system in the country extended with the correlation-regression analysis helped to find numeric characteristics and causal relationships among factors in the research. Based on the conclusion of the research, a multivariate regression dependency between the asset of financial system and factors impacting it was formed. Statistically significant positive dependency from the asset of financial system showed: credit provided for private sector, whole credit minus without debt, amount of money (cash), GDP deflator.

Empirical aprobaton highlighted a great impact of analyzed factors. Analysis showed that, it is easy to apply in practice the correlation-regression analysis method for determining the financial system for the sustainable growth of the biggest factors affecting the causal relations and their impact on the size. This method can be used when having a big amount of criteria and due to that the results of the analysis and valuation accuracy are not harmed.

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