“Financial instability, institutional development and economic crisis in Eastern Europe”

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FINANCIAL INSTABILITY, INSTITUTIONAL DEVELOPMENT AND ECONOMIC CRISIS IN EASTERN EUROPE

Abstract

This paper sheds light on the financial crisis of 2008–2010 in eleven emerging Eastern European economies (EE11): Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Kazakhstan, the Kyrgyz Republic, Moldova, Romania, Tajikistan and Ukraine. The aim is twofold. In the first place it seeks to find out if the financial instability hypothesis, as put forward by Minsky and Kindleberger, is a valid explanatory factor for the crisis. Secondly, it tries to map if general institutional frameworks of these countries were developed in order to stand against the factors leading into the financial crisis.

To answer these research problems the paper maps cycles of three parameters representing the real economy, i.e. gross domestic product, manufacturing output and unemployment and four parameters representing the financial markets, i.e. money supply, credit volumes, inflation and government debt. The cycle approach is carried out with the help of a structural time series analysis to isolate cycles in time series. The paper concludes that there were substantial positive financial cycles previous to the financial crisis mirrored by similar cycles in the real economy.

Similarly, the results show negative cycles in the same parameters during the years of crisis. It seems that an uncontrolled increase in money and credit caused the economy to overheat and thereafter contract into financial and real economy crises.

Also, the paper compiles twelve different indices of institutional development. These are standardized and presented in an institutional development matrix, showing that the general institutional framework for the eleven economies was weak previous to and under the meltdown of the economies.

The construction of an integrated institutional development index on the basis of the same twelve parameters confirms institutional shortcomings, which may have made the economies less able to guard themselves from a crisis initiated by both domestically and internationally financial instability.

Keywords financial crisis, financial instability hypothesis, institutional development, crisis anatomy

JEL Classification E32, E44, E51, E52, G15

INTRODUCTION

The international financial crises, which started with shrinking house prices during the second half of 2007, also hit Eastern European economies. Conventional wisdom seems to be that the crisis transmitted from Western Europe by international financial markets, causing liquidity crises and thereafter capital crisis, ending up in busts in the real economy (Bracke & Martin, 2012; Jungmann & Sagemann, 2011; Åslund, 2018). In addition, fragile political and economic institutions seem to have been unable to set up a stronghold against the evolvement of the crisis.

1. RESEARCH PROBLEM

This paper investigates the financial crisis of 2008–2010 using two approaches. The first departures in the financial instability hypothesis as set up by Minsky (1982, pp. 13-39) and Kindleberger (1996). The hypothesis is also in line with the argument of the two Nobel Prize winners Finn Kydland and Edward Prescott. Drawing on empirical research they argue expansion and contraction in money and credit be decisive for business cycles (Kydland, 1990, pp. 3-18). The second approach is to investigate institutional stability: was there a framework within the economies capable of both preventing and reducing the scale of financial crisis?

The research problem is to find out if a Minsky-Kindleberger approach can shed light on domestic financial instability as a major force for the development of the Eastern European branch of the international financial crisis. This is seen in light of important institutional development indicators for these economies.

The paper studies the financial crisis in eleven emerging Eastern European economies (EE11), i.e. Armenia, Azerbaijan, Belarus, Bulgaria, Georgia, Kazakhstan, the Kyrgyz Republic, Moldova, Romania, Tajikistan and Ukraine. It maps their trend and cycle components of production by using a Hodrick-Prescott filter. Significant positive cycle values indicate financial overheating, which thereafter caused significant downturns.

If booms and busts follow the pattern of financial key indicators as money and credit volumes, we conclude that huge swings in the economies to a large extent can be explained by a financial instability approach.

2. OUTLINE

The outline of the paper is as follows:

It first discusses the theoretical framework of the financial instability hypothesis to explain the evolvement of financial crises.

Secondly, it investigates the general institutional framework of the EE11 by looking at institutional development indicators in order to elaborate on their modernization, integration into the global economy, and their ability to serve as defence for financial crisis.

Thirdly, if macroeconomic financial instability follows the pattern of the crisis, it reveals booms and busts in financial indicators in line with the Minsky-Kindleberger approach. In addition, the level of institutional development contributes to understanding to what extent these economies were able to handle the situation.

3. DEFINITIONS

Before presenting a theoretical framework the understanding of financial crises is clarified. The paper defines financial crises as situations where financial institutions or assets lose significant values and the markets are not able to provide necessary means of payment. Goldsmith (1982) defines financial crises as: "sharp, brief, ultra-cyclical deterioration of almost all financial indicators, short-term interest rates, asset prices, commercial insolvencies and failure of financial institutions".

Financial crises were considered almost equivalent to credit crunches and bank panics until the mid 1900s. A modern understanding would also include asset crashes and currency and sovereign defaults.

Claessens and Kose (2013) highlight that financial crises are multidimensional, often associated with four phenomena: significant fall in credit volumes and prices of assets, disruption of external financing and financial intermediation, negative asset balance and need of huge support from governments. We define financial crises as negative shocks in financial markets, causing lack of credit to the economy.

4. THEORETICAL FRAMEWORK AND DATA

According to Minsky and Kindleberger, financial crises commonly start with financial instability, where financial markets are exposed to disturbances ending in lost sustainable equilibriums (Minsky, 1982, 1986). This approach is often char-

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acterized as the instability hypothesis. According to Kindleberger (1996), this might typically happen through significant exogenous macroeconomic shocks, causing the economy to run faster by drawing on extended credits.

Minsky pays attention to endogenous factors, i.e. shortcomings within the system in dealing with disturbances in financial markets. System errors make financial instability evolve in times of mismatch between short- and long-term sustainable equilibriums.

4.1. Theory

Both agree that positive expectations and lack of stability may cause demand for credit to over expand and positive credit bubbles arise. Markets become overheated due too money surplus and asset bubbles arise. Speculation in continuous growth in asset prices cause bubbles to increase further. This will go on until markets turn due to negative shifts in expectations, often called the "Minsky Moment". Expected losses make markets fall deeper facing credit crunches, crashes and recessions (Kindleberger & Aliber, 2015, pp. 33-76).

Minsky's model can be described in five phases. Displacement is when a market looses its natural growth pattern due to a positive shift in demand. If one expects this to be permanent, the market moves into its next phase, Overtrading, with surplus activity compared to sustainable equilibriums. Overtrading promotes the third phase, Monetary Expansion, due to increase in demand for credits and willingness to grant such.

Minsky emphasizes a three-step financial taxonomy. This implies the most common way to finance investments during periods of stability is hedge financing, basically drawing on business surpluses and normal borrowing. In times of rapid expansion and credit growth, speculative finance, drawing on future increase in asset prices, is more common. Finally, Ponzi finance becomes important when capital emissions are necessary for further growth.

Monetary Expansion brings a market to a maximum with an over heated economy and asset bubbles. When market expectations turn, markets and asset prices fall. Hence, one has reached the new phase, Revulsion. Negative expectations will dominate and a period of crisis, Discredit, will follow.

Kindleberger gives an exogenous neo-classical model, but still substantially inspired by Minsky. He starts with an exogenous shock, leading to monetary expansion, which the financial markets are not able to deal with in a controlled manner. This leads to the first phase, Manias, implying the creation of bubbles. This is followed by Panic. Both evolve due to loss of financial stability. The markets then turn into a third phase, Crashes, when asset prices fall steeply. This leads to credit crunch and Crises, which is the fourth phase. If the crisis lasts it will infect other markets, which implies the fifth phase, Diffusion.

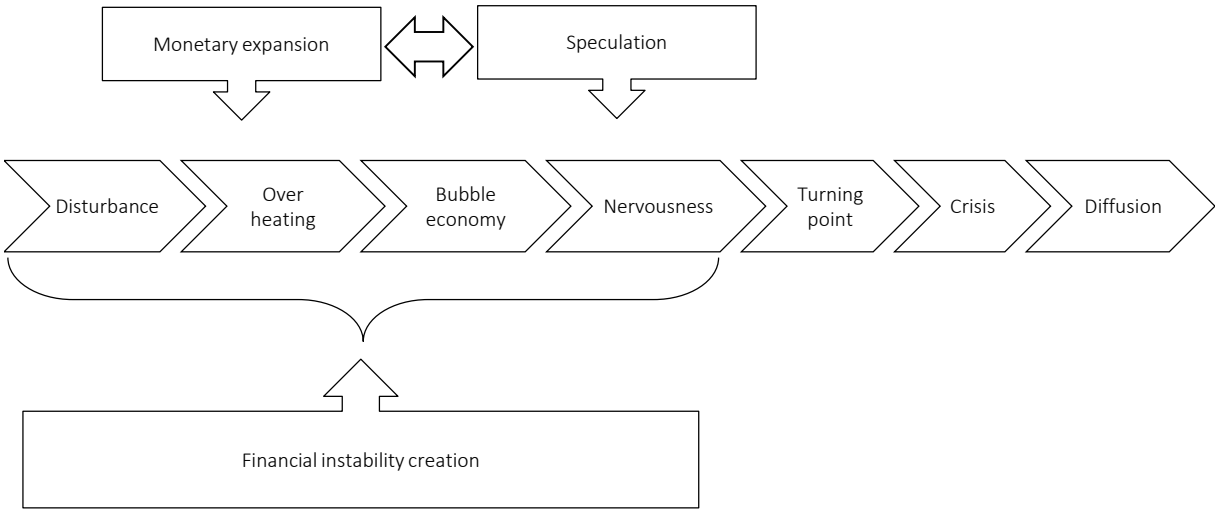

Figure 1. Seven-step dynamic model for financial crisis

Kindleberger also puts attention to the impact of hegemonial powers, which due to their size, standing and role are able to influence markets significantly. Thus, they are decisive for financial stability and the development of financial crises.

Empirical studies by Tornell and Westermann (2005) conclude that a financial instability approach can be applied for the vast majority of financial crises. They argue that financial liberalization tends to cause boom-bust cycles. Eichengreen (1990) argues that financial instability may cause illusive stability, i.e. temporary stability mismatching long-term sustainable stability. A similar argument is found with Reinhart and Roghoff (2009).

Combining Minsky's and Kindleberger's theories with empirical research ended up with a formal seven phases dynamic model for the development of financial crises (Grytten & Hunnes, 2016, pp. 45-52), described as in Figure 1.

4.2. Methodology

To map booms and busts the paper seeks to measure cycles within time series. It uses a structural time series analysis separating an observed time series (x_t) into a trend component (g_t), a cycle component (c_t) a seasonal component (s_t) and an irregular component (i_t):

$$x_t = f(g_t, c_t, s_t, i_t). \tag{1}$$

An arithmetic approach to this function gives the following relationship:

$$x_t = g_t + c_t + s_t + i_t, \tag{2}$$

where it is natural to consider it as the residual:

$$i_t = x_t - (g_t + c_t + s_t). \tag{3}$$

In this analysis both i_t and s_t can be seen as part of both c_t. This implies a reduced form of equation (2) as:

$$x_t = g_t + c_t. \tag{4}$$

It is feasible using a Hodrick-Prescott filter to identify the components. The HP filter minimize the variance of c_t subject to a penalty for variation in the second difference of g_t:

$$\min_{g_t} \sum_{t=1}^{T} (x_t - g_t)^2 + \\ +\lambda \sum_{t=2}^{T-1} \left[(g_{t+1} - g_t) - (g_t - g_{t-1}) \right]^2, \tag{5}$$

where $(x_t - g_t)$ denotes the cycle component and $\left[(g_{t+1} - g_t) - (g_t - g_{t-1}) \right]$ is the difference in the trend growth rate from period t until $t+1$, where as λ controls the smoothness of the growth component.

This implies that a smoothing parameter equal to zero means that all changes in the observed series should be explained by trend developments. A high smoothing parameter implies that the cycle is an important component in the time series. One can calculate the cycle component by deducting the trend component from the observed series:

$$c_t = x_t - g_t. \tag{6}$$

High smoothing parameters give trends with minor fluctuations, and significant cycles, when low smoothing parameters give trends with large fluctuations and minor cycles. Rules of thumb suggest a smoothing parameter with $\lambda = 100$ for annual figures, $\lambda = 1,600$ for quarterly figure, and $\lambda = 14,400$ for monthly figures.

4.3. Data

Key macroeconomic indicators serve as the most important source of data in this work. They are basically taken from the World Bank database on macro indicators[1]. They were first assembled and calculated by national statistical authorities and then processed according to common standards by the World Bank.

It would have been preferable to use quarterly or even monthly data for the analysis, and to include additional parameters such as interest rates and asset prices. However, lack of valid and reliable series does not allow that. Hence, we use annual data

1 https://data.worldbank.org/

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for the EE11. Since these are summing up the annual development in macroeconomic and financial indicators, they still serve as valid variables for the purpose of this paper.

Nevertheless, the data series might be somewhat biased, in particular towards the beginning of the series. This is due to noise during the transition period from communism to market based economies and lack of reliable data. In order to avoid this noise, the analysis starts in 1996, when the markets more or less were stabilized. The data collection basically stops with 2017, which makes it possible to include the aftermaths of the crisis[2].

5. INSTITUTIONAL FRAMEWORK

The institutional framework of economies is imperative for their development and ability to handle crises (Riaz, 2009, pp. 26-35). It decides their level of integration and modernization into a global economy. Until the 1990s the EE11 had similar socialist economic systems and mechanisms, and thereafter started transformation of their systems towards market economies (Harris, 1999, pp. 125-158).

5.1. Development of eastern emerging economies

Transformation to market-oriented economies demanded economic integration (Moghadam, 2014, pp. 8-13). However, the levels of integration are dissimilar. Bulgaria and Romania are already members of the EU, when most of the others are looking for ways of cooperation within the Commonwealth of Independent States (CIS) and the EU.

Important decisions on strengthening the integration remain on paper or are being implemented at different paces (Cerqueira, 2018, pp. 329-333). In the first place, it is a consequence of the deep decline of their economies, the breakdown of economic ties between the states of the former USSR and the difficulties of the transition to market economy. Secondly, this situation is also due to lack of political will.

Thirdly, shortsighted policies of governments trying to gain benefits at the expense of other states causes delay in the integration and modernization process. Despite declarations on the need to reduce customs barriers, governments operate in the opposite direction. The economies have become unstable, dependent on external factors and resource-intensive.

5.2. Reorganization and privatization

It was assumed that the transfer of enterprises to private ownership would increase their efficiency, competitiveness and lead to the entering of international markets. In practice, old principles of regulation were maintained, which led to inefficient use of growth potentials.

There was a sharp decline in production during the transition period in the 1990s as GDP dropped around 50 percent. At the initial stage of privatization, new owners of enterprises were not ready to manage the market principles, strategic development planning and business activities. Thus, they directed their efforts to obtain "fast" profits from privatized property leading to inefficiency, excessive exploitation of natural resources and environmental pollution (Roaf, 2014, pp. 10-28). The transition is still not completed.

5.3. Liberalization

The transition to free prices under a regime of higher demand than supply led to rapid inflation and low investment activity, and export of savings (Njemcevic, 2017, pp. 15-22). Imported goods dominate in high-tech and high-skilled markets. Thus, the EE11 have been even more dependent on traditional industries, like mining and manufacturing, when in order to buy modern consumption goods the countries run trade deficits, giving way to further exports of capital. This has been fuelled by foreign credits with high interest rates to consumers in order to buy foreign goods.

5.4. Institutional changes

Legislative reform and institutional changes also played an important role for the failures of market

2 Some alterations had to be made for Azerbaijan, Kyrgyz Republic and Tajikistan.

economy implementation. The ill-conceived liberalization of the economy led to dominant shadow economies, with increase in crime and corruption. As a result, risks in business increased. The legal system was not ready for the changes and necessary reforms have been hold back by agents benefiting from the mismatch (Turk, 2014, pp. 199-208).

Hence, institutional shortcomings seem to be an important obstacle for economic growth and a fragile framework for integration, economic growth and financial crisis management.

6. CYCLE ANALYSIS

By using structural time series analysis in order to separate trend and cycle components one can find out if financial stability indicators possibly paved way for the financial crisis. Rapid increase in money and credits could have caused demand driven booms and overheated economy. This can be seen in positive deviations from trend, i.e. positive cycles.

6.1. Booms and busts

By using World Bank data presented by the Federal Reserve Bank of St Louis, we trace such developments (FRED, 2019)[3]. The paper looks at seven key macroeconomic indicators. Firstly, productive measures: domestic product, manufacturing output and unemployment. How did these behave before and during the crises? Secondly, financial indicators: money, credits, government debt and inflation.

Using the HP-filter as described in equation (1) – (3) one is able to map cycles from trend:

$$\min_{g_t} \sum_{t=1}^{T} \left(x_t - g_t\right)^2 = \\ = x_t - \lambda \sum_{t=2}^{T-1} \left[\left(g_{t+1} - g_t\right) - \left(g_t - g_{t-1}\right)\right]^2, \quad (7)$$

where the cycle component

$$\min_{g_t} \sum_{t=1}^{T} \left(x_t - g_t\right)^2$$

is the residual, which gives this relationship:

$$c_t = x_t - \lambda \sum_{t=2}^{T-1} \left[\left(g_{t+1} - g_t\right) - \left(g_t - g_{t-1}\right)\right]^2. \quad (8)$$

Cycles are found by deducting smoothed parameters from their respective observed series. All parameters, except unemployment and government debt are supposed to be pro-cyclical. As for those two, they should move counter-cyclically, contracting in good times and expanding in bad times.

The peak values of the cycles previous to the financial crisis for the parameters are reported in Table 1 and the troughs or minimums in Table 2, where the numeric results are presented as natural logarithms, to express percentage deviations from trends:

$$\log\left(c_t\right) = \log\left(x_t\right) - \log\left(g_t\right). \quad (9)$$

Precise parameters can be listed as follows:

- *Y* – gross domestic product in fixed prices, national currencies;
- *MP* – manufacturing production in fixed prices, national currencies;
- *U* – unemployment rate;
- *M3* – money supply as broad definition in current prices, national currencies;
- *C* – domestic credits;
- *P* – inflation rates, measured by increase in consumer price indices;
- *GD* – government debt as percentages of gross domestic product in current prices, national currencies.

Furthermore, *p* denotes peak moment during a boom, when *t* denotes trough, as the bottom of a burst or recession.

Table 1 reveals that all the EE11 GDP peaked in 2007 or 2008, when the picture is very similar

3 https://fred.stlouisfed.org/

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Table 1. Cycle peaks before financial crises of 2008–2010 as natural logarithms

Country	Real economy indicators			Financial indicators			
	Y_p	MP_p	U_p	$M3_p$	C_p	P_p	GD_p
Armenia	0.159	0.233	ID	0.213	0.356	0.694	–0.580
	(2008)	(2008)	ID	(2007)	(2008)	(2008)	(2008)
Azerbaijan	0.120	0.158	–0.060	0.023	0.200	1.010	–0.577
	(2007)	(2007)	(2008)	(2008)	(2008)	2008	(2008)
Bulgaria	0.086	0.116	–0.587	0.175	0.215	0.876	–0.328
	(2008)	(2008)	(2008)	(2008)	(2008)	2008	(2005)
Belarus	0.058	0.068	–0.026	0.138	0.241	0.996	–0.311
	(2008)	(2008)	(2005)	(2008)	(2008)	2011	(2008)
Georgia	0.073	0.043	–0.070	0.097	0.209	0.646	–0.430
	(2007)	(2007)	(2007)	(2008)	(2008)	2008	(2007)
Kazakhstan	0.059	0.063	–0.011	0.187	0.103	0.763	–0.483
	(2007)	(2007)	(2007)	(2008)	(2008)	2008	(2007)
Kyrgyz Republic	0.043	0.035	–0.082	0.118	0.185	1.048	–0.284
	(2008)	(2008)	(2007)	(2007)	(2008)	2008	(2008)
Moldova	0.056	0.062	–0.435	0.342	0.345	0.363	–0.464
	(2008)	(2008)	(2008)	(2008)	(2008)	2008	(2008)
Romania	0.121	0.185	–0.189	0.118	0.209	0.348	–0.572
	(2008)	(2008)	(2008)	(2008)	(2008)	2008	(2008)
Tajikistan	0.019	0.147	–0.008	0.149	0.122	0.681	–0.250
	(2008)	(2006)	(2008)	(2007)	(2008)	2008	(2008)
Ukraine	0.109	0.150	–0.210	0.372	0.348	0.917	–0.780
	(2008)	(2007)	(2007)	(2008)	(2008)	(2008)	(2007)

Note: ID – indecisive.

for manufacturing output and unemployment, i.e. manufacturing peaked almost simultaneously, when unemployment was at a temporary minimum.

As for the financial indicators, we find that money supply peaked in 2007–2008 for all eleven countries, when credits peaked in 2008. The same did inflation, apart from in Belarus. Public debt also reached a minimum in the years leading up to and including 2008.

Table 2 reports troughs during the financial crisis. The pace and the depth of the contraction were far less uniform than the upswing before the crisis. However, most real value indicators reached the bottom during 2009 and 2010, with some latecomers. Looking at the financial indicators, both money and credit tend to reach their minimum before or simultaneously with the real economy indicators, when inflation and government debt seem to lag compared to the other variables. The latter confirms that government debt was a mean of symptom relief during the financial crisis.

The calculations reveal considerable expansion in money and credits for all EE11 countries previous to the financial crisis. For all, but Azerbaijan, the positive cycle value reached between 9.7 (Georgia) and 37.2 (Ukraine) percent. The credit cycle peaked between 12.2 (Armenia) and 35.6 (Azerbaijan). This shows that domestic monetary expansion came prior to the crisis, and it happened after attempts of cautious monetary policy in most of these countries. Money and credit expansion made the inflation cycle step up to between 34.8 (Romania) and 104.8 (Kyrgyz Republic) over the smoothed line, and the economies lost financial stability.

In consequence of overheating, the financial crisis hit hard. Ukraine's and Armenia's annual GDP fell by 14.4 and 13.4 percent, respectively, against 7.2 and 5.9 percent in Romania and Moldova. Manufacturing output contracted even more, while unemployment increased.

Table 2. Cycle troughs during financial crises of 2008 as natural logarithms

Country	Real economy indicators			Financial indicators			
	Y_t	MP_t	U_t	$M3_t$	C_t	P_t	GD_t
Armenia	−0.047	−0.125	0.064	−0.054	−0.020	−0.300	0.213
	(2010)	(2009)	(2010)	(2010)	(2009)	(2009)	(2009)
Azerbaijan	−0.042	−0.042	0.030	−0.128	−0.020	−1.666	0.304
	(2012)	(2011)	(2011)	(2008)	(2009)	(2009)	(2016)
Bulgaria	−0.033	−0.031	0.323	−0.010	0.022	−0.509	0.454
	(2014)	(2010)	(2013)	(2008)	(2010)	(2009)	(2011)
Belarus	−0.011	0.009	0.380	−0.077	−0.052	−0.003	0.253
	(2009)	(2009)	(2010)	(2009)	(2009)	(2013)	(2014)
Georgia	−0.043	−0.062	0.144	−0.105	−0.054	−1.051	0.159
	(2009)	(2009)	(2009)	(2009)	(2010)	(2009)	(2010)
Kazakhstan	−0.038	−0.022	0.060	0.037	−0.161	−0.086	0.020
	(2009)	(2009)	(2009)	(2009)	(2009)	(2009)	(2009)
Kyrgyz Republic	−0.045	−0.182	0.046	−0.034	−0.082	−0.223	0.047
	(2010)	(2012)	(2010)	(2009)	(2010)	(2009)	(2010)
Moldova	−0.047	−0.170	0.263	−0.411	−0.024	−0.063*	0.015
	(2009)	(2009)	(2010)	(2010)	(2010)	(2009)	(2012)
Romania	−0.039	−0.117	0.053	0.005	−0.100	−0.288**	0.179
	(2012)	(2012)	(2011)	(2009)	(2010)	(2009)	(2012)
Tajikistan	−0.057	−0.159	0.055	−0.081	−0.340	−0.384	0.086
	(2010)	(2010)	(2010)	(2010)	(2009)	(2009)	(2011)
Ukraine	−0.064	−0.118	0.137	−0.145	−0.135	−0.239*	0.149
	(2009)	(2009)	(2009)	(2009)	(2008)	(2013)	(2010)

Note: * – deflation rate, ** – fall in inflation rate.

6.2. Crisis anatomy

After the transition crisis from communist to market liberalism in the 1990s, most Eastern European economies gained economic growth prior to the crisis. This went on for almost a decade and lasted more or less until autumn 2008. During this period of growth emerging economies benefited from underutilized capital. Additionally, they took part in the international boom from the early 2000s.

The growth was not sustainable. The countries ran huge current account deficits and developed high foreign debts along with dubious currency exchange rates. Belarus, Bulgaria and Ukraine had fixed rates, which attracted massive inflows of short-term credits, fuelling monetary expansion, loans and high inflation.

Foreign credit institutions granted Ukrainian citizens consumer credits to interest rates of amazing 50 percent (Stroe, 2011, pp. 47-52). Thus, foreign exchange inflows accelerated imports and balance of payments deficits rocketed. It became impossible to maintain fixed exchange rates. Thus, they had to give up the policy and exchange rates fell drastically, paving way for imports of even more inflation and lack of trust (Åslund, 2010).

During spring and summer 2008, it became evident that these economies were overheated. Real estate prices were out of control due to high demand caused by monetary expansion and low supply. Wages had increased dramatically for skilled workers and the booming stock markets begun to fall down.

After the bank crises hit the US during the early fall 2008 liquidity became extremely scarce. During a few weeks Eastern Europe saw rapid decline in international finance and a liquidity crisis evolved rapidly, soon revealing a solidity crisis in the private sector due to the high gearing with foreign and domestic capital. Financial panic made capital flee the Eastern economies rapidly, and their currencies were sold for gold, dollars, euros, pounds and Swiss francs (Mihalijek, 2010) making them diving further and even more dubious means of foreign investment.

A fundamental problem for the crisis was excessive inflows of short-term bank credits, enticed by

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fixed exchange rates. Hence, foreign private debt rocketed. Public finances, however, seemed to be under control, with an exception for Romania and Hungary. However, public debt increased during the crisis due to reduced tax income and need for government counter cyclical efforts (Dudas, 2013, pp. 184-193).

Thus, the analysis confirms that the financial instability hypothesis contributes significantly to understand the financial crisis of the EE11. The financial crisis of emerging Eastern European economies doesn't seem very different from traditional financial crises.

7. INSTITUTIONAL DEVELOPMENT

It is of importance to present the institutional development of the EE11 under investigation here. This might help us to the possible strengths of institutions in order to defend the economy from financial crises. The paper offers both an institutional development matrix (IDM) and an integrated institutional development index (IIDI).

7.1. Institutional development matrix

The matrix is made up of six categories each containing two parameters or variables. The indicators reflect different aspects of institutional development of each country. These would be of importance when it comes to institutional framework related to the handling of crises. Each category has two parameters presented as sub-indices. The indices rest on different sources[4]:

1. Fragility and instability:

- *Fragile States Index (FSI).* This is done by the Fund for Peace (FFP). It identifies normal pressures, and when pressures are outweighing the capacity to balance states. Daily, FFP collects global information on social, economic and political pressures faced in 178 countries. It uses 12 parameters, graded on a scale from 0 to 10, and then an index constructed on a 0-120 scale (Fund for Peace, 2018).

- *Political Stability Index (PSI).* The index reflects the possibility of conflict situations and violence in the region. It uses –2.5 as the weakest measure, and 2.5 as the strongest (The Global Economy, 2017).

2. Environment:

- *Environmental Performance Index (EPI).* This presents issues covering environmental health and ecosystem vitality for 180 countries, based on 24 parameters, on a scale of 0 to 100. The last years EPI give weights of approximately 40 percent to environmental health and 60 percent to ecosystem vitality (Yale Centre for Environmental Law and Policy, 2018).

- *Environmental Health Index (EHI).* This reflects economic growth and prosperity. The index is constructed on a 0-100 point scale. Approximately 65 percent is attributable to air quality, 30 percent to water and sanitation, and five percent to lead exposure (Yale Centre for Environmental Law and Policy, 2018).

3. Freedoms and rights:

- *Index of Human Freedom (IHF).* This provides snapshots of the human freedom, based on civil, personal, and economic indicators. The parameters are expressed into 79 indices in 12 areas on a scale of 0 to 10, where 10 represents freedom (Cato Institute, 2018).

4 https://fragilestatesindex.org/
https://www.theglobaleconomy.com/rankings/wb_political_stability/
https://epi.envirocenter.yale.edu/2018/report/category/hlt
https://epi.envirocenter.yale.edu/epi-topline
https://www.cato.org/human-freedom-index-new
https://www.heritage.org/index/
http://www.doingbusiness.org/content/dam/doingBusiness/media/Annual-Reports/English/DB2018-Full-Report.pdf
http://hdr.undp.org/en/composite/trends
http://www3.weforum.org/docs/WEF_GGGR_2018.pdf
http://hdr.undp.org/en/composite/GII
https://pages.eiu.com/rs/753-RIQ-438/images/Democracy_Index_2017.pdf
https://www.transparency.org/news/feature/corruption_perceptions_index_2017

- *Index of Economic Freedom (IEF).* This index is published by the Heritage Foundation and ranking is based on 12 parameters – from property rights to financial freedom. Each parameter is measured on a 0-100 scale for 186 countries (The Heritage Foundation, 2018).

4. Socio-economics:

- *Doing Business Index (DBI).* The World Bank Group Flagship gives annual reports on regulations constraining business activities (including parameters of protection of the property rights and indicators of business regulation). 190 countries are ranged from 1 to 190, where 1 represents the best performance (A World Bank Group Flagship, 2018).

- *Human Development Index (HDI).* This reflects development of countries in three aspects, standard of leaving, access to education and life expectancy. It ranges from 0 to 1, where 1 means the highest level of development (United Nations Development Programme, 2017).

5. Gender:

- *Global Gender Gap Index (GGI).* The World Economic Forum first introduced this in 2006 as a framework for mapping gender-based disparities. GGI ranks 149 countries on a scale from 0 (disparity) to 1 (parity) across four thematic dimensions (The World Economic Forum, 2018).

- *Gender Inequality Index (GII).* This index is a summary measure of gender disadvantage, based on three dimension. The indicators are expressed into indices on a scale of 0 to 1, where less values means fare equality between genders (United Nations Development Programme, 2017).

6. Governance:

- *Democracy Index (DI).* This index demonstrates the democracy situation in each country. It is based on five political categories in 167 states, and ranked on a scale of 0 to 10, based on 60 indicators (The Economist Intelligence Unit, 2017).

- *Corruption Perceptions Index (CPI).* Transparency International presents this index for 180 countries as a measurement of public sector corruption. It applies a scale from 0 (corrupt) to 100 (clean) (Transparency International, 2017).

The series are made comparable by moderation. This is done by transforming scores into indices where the scores of each nations parameter, a_i, are placed in the interval $0 < a_i < 1$. Thus, one arrives at an IDM, as shown in Figure 2.

The EE11 present a mixed picture. However, the very important parameters of fragile state, political stability democracy and corruption perception score alarmingly badly. Figure 3 reports the eleven economies scores according to the twelve different indices.

It proves huge difference in development within the EE11, despite of similar initial conditions at the beginning of independence. Thus, there is a significant need to analyze the financial crisis in these countries in light of institutional integration.

7.2. Integrated institutional development index

It is now possible to construct an integrated institutional development index (IIDI). In line with the Human Development Index by the United Nations, this paper offers a geometric approach. The departure can be explained by a general equation:

$$\left(\prod_{i=1}^{n} a_i\right)^{\frac{1}{n}} = \sqrt[n]{a_i \cdot a_{i+1} \cdot a_{i+2} \cdot a_{i+3} \cdot \ldots \cdot a_n}, \qquad (10)$$

where Π is the geometric average of different parameters, a, numbered from i to n. In our case these parameters are taken from the structural development matrix:

- *FSI* – Fragile States Index;
- *PSI* – Political Stability Index;
- *EPI* – Environmental Performance Index;
- *EHI* – Environmental Health Index;
- *IHF* – Index of Human Freedom;
- *IEF* – Index of Economic Freedom;
- *DBI* – Doing Business Index;

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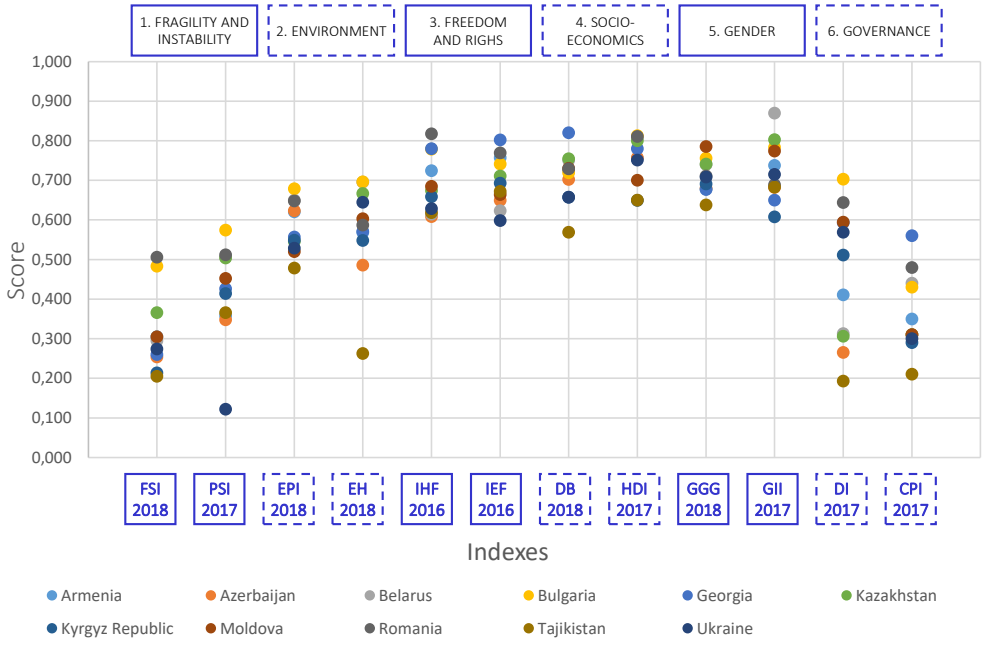
Source: See footnote 1.



Note: FSI – Fragile States Index, PSI – Political Stability Index, EPI – Environmental Performance Index, EHI – Environmental Health Index, IHF – Index of Human Freedom, IEF – Index of Economic Freedom, DB – Doing Business Index; HDI – Human Development Index; GGG – Global Gender Gap Index, GII – Gender Inequality Index, DMI – Democracy Index, CPI – Corruption Perceptions Index.

Figure 2. Institutional development matrix

Source: See footnote 1.

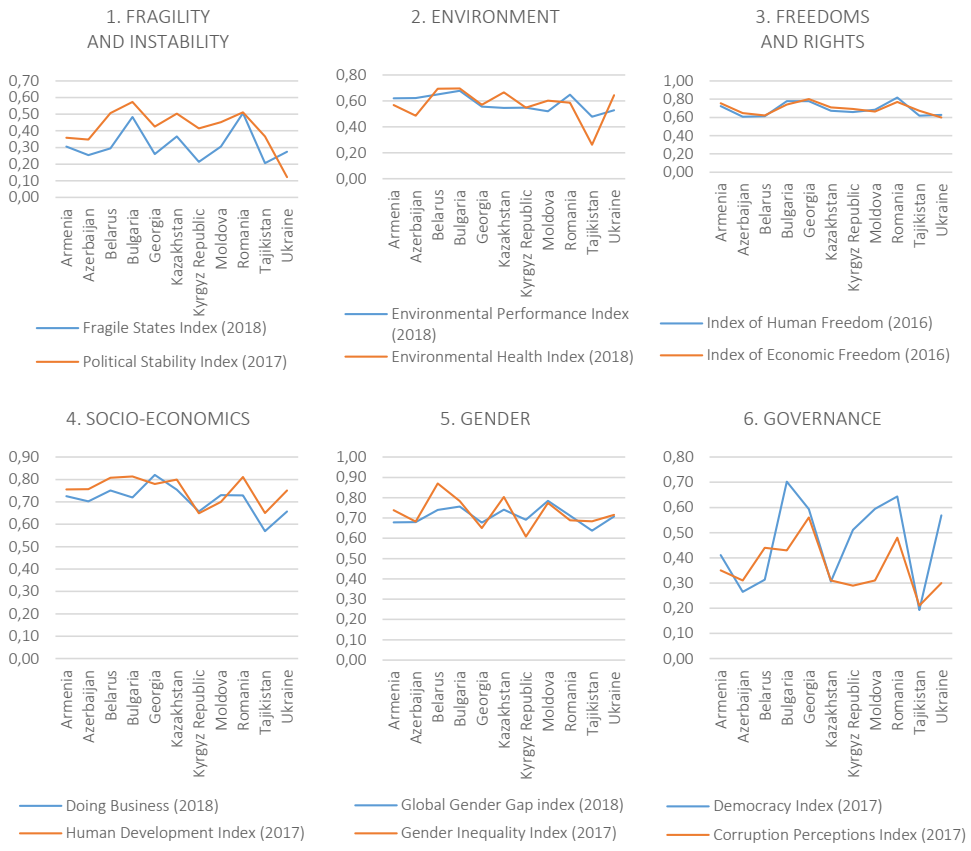


Figure 3. Institutional development charts

- *HDI* – Human Development Index;
- *GGG* – Global Gender Gap Index;
- *GII* – Gender Inequality Index;
- *DMI* – Democracy Index;
- *CPI* – Corruption Perceptions Index.

By applying these parameters in equation (10) one arrives at a more specified equation:

$$IIDI = \left(\prod_{i=1}^{n} a_i \right)^{\frac{1}{n}} = \sqrt[12]{FSI \cdot PSI \cdot EPI \cdot EHI} \times \times \sqrt[12]{IHF \cdot IEF \cdot DBI \cdot HDI \cdot GGG \cdot GII} \times \times \sqrt[12]{DMI \cdot CPI} \quad (11)$$

In order to compare with other states, the chart also presents EU numbers (Roth & Jonung, 2019). The first group is the PIIGS countries, i.e. Portugal, Ireland, Italy, Greece Spain, which experienced a severe contraction of 2008–2010. The second group is EU10, which experienced a moderate crisis, i.e. Austria, Belgium, Denmark, Finland, France, Germany, Luxembourg, Netherlands, Sweden and the United Kingdom.

Table 1 shows huge differences between the EE11 countries, with Bulgaria and Romania at the top and Tajikistan at the bottom of the list. One also finds that they score significantly lower than both the PIIGS countries and the EU10. Moreover, the standard deviations of the institutional development parameters are highest for the EE11 group, followed by the PIIGS countries, and lowest among the EU10. This gives evidence of institutional stability as tool for financial stability.

Figure 4 clearly illustrates the lack of institutional development in the EE11 countries. Even the best of them score significantly lower than the EU countries with the worst crises and lowest institutional development.

Combining the troughs of the cycles in Table 2 and the IIDI from Table 3 it is possible to draw a plot diagram indicating between the two parameters, as done in Figure 5. Here we also include PIIGS and EU10. The estimated regression line indicates that weak institutional development was correlated with significant contraction of the business cycle during the financial

Table 3. Integrated institutional development index

Country	Fragility and instability		Environment		Freedoms and rights		Socio-economics		Gender		Governance		IIDI
	FSI	PSI	EPI	EHI	IHF	IEF	DBI	HDI	GGI	GII	DMI	CPI	
Armenia	0.305	0.358	0.621	0.569	0.724	0.757	0.725	0.755	0.678	0.738	0.411	0.350	0.554
Azerbaijan	0.254	0.348	0.623	0.486	0.608	0.649	0.702	0.757	0.680	0.682	0.265	0.310	0.494
Belarus	0.295	0.506	0.650	0.696	0.614	0.623	0.751	0.808	0.740	0.870	0.313	0.440	0.578
Bulgaria	0.483	0.574	0.679	0.696	0.778	0.741	0.719	0.813	0.756	0.783	0.703	0.430	0.668
Georgia	0.260	0.426	0.557	0.571	0.780	0.802	0.820	0.780	0.677	0.650	0.593	0.560	0.597
Kazakhstan	0.366	0.504	0.546	0.667	0.674	0.711	0.754	0.800	0.741	0.803	0.306	0.310	0.567
Kyrgyz Republic	0.214	0.414	0.549	0.548	0.659	0.693	0.657	0.649	0.691	0.608	0.511	0.290	0.512
Moldova	0.305	0.452	0.520	0.603	0.685	0.664	0.730	0.700	0.785	0.774	0.594	0.310	0.568
Romania	0.506	0.512	0.648	0.587	0.817	0.769	0.729	0.811	0.711	0.689	0.644	0.480	0.649
Tajikistan	0.205	0.366	0.479	0.263	0.619	0.672	0.569	0.650	0.638	0.683	0.193	0.210	0.414
Ukraine	0.274	0.122	0.529	0.644	0.628	0.598	0.658	0.751	0.708	0.715	0.569	0.300	0.488
EE!!	0.315	0.417	0.582	0.575	0.690	0.698	0.710	0.752	0.710	0.727	0.464	0.363	0.561
Stdev	0.099	0.122	0.065	0.122	0.075	0.064	0.065	0.061	0.043	0.076	0.173	0.102	0.073
PIIGS	0.623	0.599	0.759	0.915	0.802	0.737	0.748	0.885	0.735	0.903	0.807	0.584	0.749
Stdev	0.138	0.106	0.030	0.039	0.050	0.059	0.045	0.034	0.039	0.017	0.068	0.105	0.058
EU10	0.746	0.654	0.794	0.935	0.839	0.760	0.780	0.920	0.767	0.932	0.863	0.804	0.811
Stdev	0.055	0.076	0.023	0.043	0.018	0.022	0.048	0.013	0.038	0.027	0.052	0.054	0.026

Note: FSI – Fragile States Index, PSI – Political Stability Index, EPI – Environmental Performance Index, EHI – Environmental Health Index, IHF – Index of Human Freedom, IEF – Index of Economic Freedom, DBI – Doing Business Index, HDI – Human Development Index, GGG – Global Gender Gap Index, GII – Gender Inequality Index, DMI – Democracy Index, CPI – Corruption Perceptions Index.

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Source: See footnote 1.

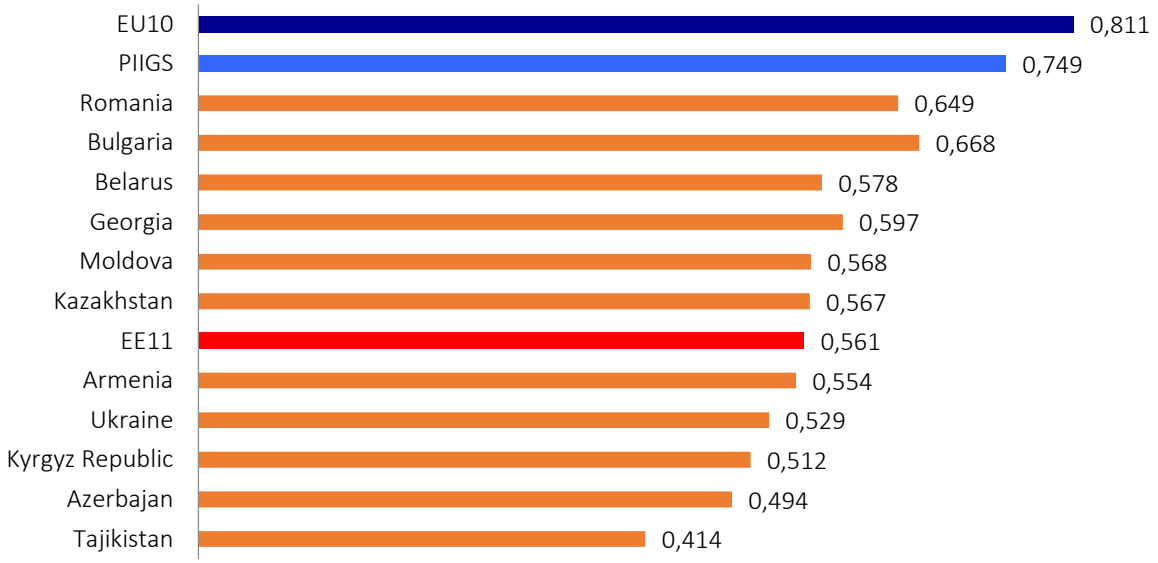

Figure 4. Integrated institutional development index

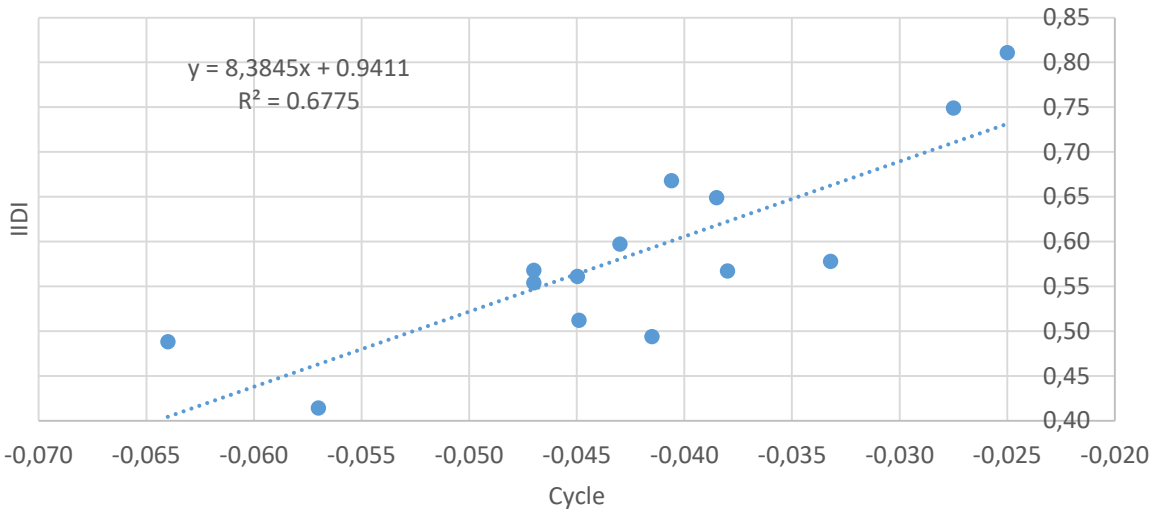

Figure 5. Plot diagram IIDI and GDP contraction during financial crisis

crisis, with satisfactory explanatory degree (R^2 = 67.7%).

In sum, institutional developments of the EE11 under investigation seem fragile, meaning that modernization and integration into the global economy is limited. Thus, these economies frameworks were not the best for meeting a financial crisis.

CONCLUSION

The present paper investigates the financial crisis of 2008–2010 in eleven emerging Eastern European economies with departure in the financial instability hypothesis and institutional development. The research follows three key time series for the real economy and four for financial markets in eleven countries.

Using a structural time series analyzes the paper isolates cycles from other time series components. The analysis reveals substantial overheating in the economy mirrored in huge expansion in financial and real economy indicators prior to the crisis, when the same variables contracted correspondingly during the crisis. Thus, it is reasonable to conclude that loss of financial stability was an important element in the foreplay of the crisis.

By constructing an institutional development matrix and an integrated institutional development index, one finds that the economies under investigation did not have institutional strength to withstand the crisis.

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