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REAL OUTPUT COSTS OF FINANCIAL CRISIS ON CEE COUNTRIES

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Abstract *Countries from CEE countries (Bulgaria, Croatia, Czech Republic, Estonia, Germany, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia) experienced systemic banking crisis during the recent turbulence on financial markets. Financial crisis can be very costly due to output losses during and after the crash. This article reviews the methodology for estimating the output losses for this particular group of countries recently affected by adverse economic and financial conditions. This study extend the analyses in two directions: first applying a Hodrick-Prescott filter for various lengths e.g. 10 years, 15 years and 20 years and then using the method proposed by Abiad et al (2009) and establishing the counterfactual trend, ignoring the past 3 years before the beginning of the crisis.*

Key words:
Financial crisis, costs of financial crisis, Hodrick-Prescott filter
JEL Codes:
C20, G01, G21

1. Introduction

Episodes like the Latin American debt crisis in the 80's, the 1987 Black Monday, the 1992-1993 ERM crisis, the 1994-1995 Tequila crisis, the 1997-1998 South East Asian meltdown, the 1998-1999 Brazilian and Russian crisis, the 2000-2001 Turkish crisis, the 2001 Argentine crisis and the 2007-2009 global financial crisis all resemble disaster events (*Kapp, D., and Vega, M. (2012)*). Over the past quarter century there have been many banking crisis in entire world and there is a substantial research on the cause of banking crisis (*Bell, J. and Pain, Dd., 2000)* and fewer research on measurment of the potential costs of financial crisis instability. This article considers the output costs of banking crisis on the broader economy and present estimates of these costs.

During the recent banking crisis CEE countries (Bulgaria, Croatia, Czech Republic, Estonia, Germany, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia) experienced financial and negative economic growth. This particular group of countries was strongly affected by unfavorable financial conditions (*Filip, A.M. Pochea, M.M., (2014)*). It is generally concluded that a financial crisis can caused high economic and social costs (*Andries, A.M., S. Mutu, S.G. Ursu (2014)).* This study re-evaluates the methods used on previous studies.

The economic costs of a banking crisis can be defined as the loss of present and future discounted consumption possibilities for the economic agents in a particular country. To measure this directly is difficult, because we do not know exactly how banks influence economic growth in the real sector. An approximation used in many studies is therefore to measure the cumulative output losses between actual and a potential GDP during a banking crisis and link these losses to the banking crisis. Economic costs reflect direct and indirect negative effects of a banking crisis on the whole economic activity by measuring the decline in gross domestic product.

2. The identification of a financial crisis

In order to estimate the costs of a banking crisis it is necessary to identify them. Obviously differences in crisis definition can result in different cost estimates. Therefore, we present a short review of banking crisis definition. *IMF (1998)* characterizes a banking crisis as a "situation in which actual or potential bank runs or failures induce banks to suspend the internal convertibility of their liabilities or which compels the government to intervene to prevent this by extending assistance on a large scale". *Demirgüç-Kunt, A. and E. Detragiache (1998)* define a banking crisis if at least one of the following conditions is accomplished: 1)The ratio of non-performing assets to total assets in the banking system exceeded 10 percent.2)The cost of the rescue operation was at least 2 percent of GDP.3)Banking sector problems resulted in a large scale nationalization of banks.4)Extensive banks rusn place or emergency measures such as deposit freezes, prolonged bank holidays, or generalized deposit guarantees were enacted by the government in response to the crisis. *Goldsyein, M. (1996)* suggests that a banking crisis is characterized by "… a sharp, brief, ultra-cyclical deterioration of all or most of a group of financial indicators: Short term interest rates, asset prices, (stock, real estate, land) prices, commercial insolvencies and failures of financial institutions". *Caprio and Klingebiel (1996, 1999, and 2003)* have provided the most widely used definition of a systemic banking crisis, as a situation when much or all of bank

capital is exhausted. *Cipollini, A., and Fiordelisi, F. (2012)* define a shareholder value ratio proxy bank financial distress which is a binary variable having value equal to one when we observe values of the SHVR falling below either the 25th percentile or the 20th or the 15th percentile. Shareholder Value Ratio (SHVR), i.e. the ratio between Economic Value Added (EVA) and the shareholder capital invested at time t - 1. EVA is determinate as difference between ['economic measure' of the bank net operating profits at t-1], and [K is capital invested at t-1 * estimated cost of capital invested]. Recently Betz*, F., Oprică, S., Peltonen, T.A., & Sarlin, P. (2014)* suggest that there is a crisis if on the financial markets are different distress events categories, e.g. direct failure (bankruptcy, liquidation, defaulted by Moody's, defaulted by Fitch), distressed mergers (merger with state intervention, merger with coverage ratio <0)), state intervention (capital injection, asset protection, asset guarantee).

3. Data analysis and methodology

In measuring banking costs crisis it is necessary to establish the observed output variable, the counterfactual, the zero point for measuring the loss in economic output and the duration of the banking crisis.

3.1. Determining the observed output variable

We use logarithm of GDP per capita as the observed output variable. This is also used by *Abiad, A., R. Balakrishnan, (2009). Boyd, J.H., S. Kwak, (2005),* and *Smith A. (2012)*. GDP per capita variable is taken from World Bank Database (http://data.world bank.org/indicator/NY.GDP.PCAP.CD).

3.2. Determining the counterfactual

In determining the counterfactual it is necessary to take into account some aspects of a banking crisis. For example, if the banking crisis has been precede by a boom the past 3 or 4 years of GDP may have been over-estimated and will have a hazy impact of banking crisis costs. To mitigate against this we consider two methods: the first is proposed by Abiad *et al*. (2009) who use the seven years t= -10 to t= -4 to establish the counterfactual trend, ignoring the past 3 years and Hodrick-Prescott filter, to filter the data for various lengths e.g. 10 years, 15 years and 20 years.

In this way we calculated output losses as the cumulative sum of the difference between actual and trend real GDP over the period [2008,2013] expressed as a percentage of trend real GDP, with T=2008 the starting year of crisis. Trend real GDP is computed in two ways: first by applying an Hodrick-Prescott filter (with λ =100) to the log of real GDP series over [T-20, T-1] , [T-15, T-1], [T-10, T-1] and [T-10, T-1] –but ignoring the past three years .Real GDP is extrapolated using the trend growth rate over the same period.

3.3. Determining the zero point

The most recent financial crisis compilation widely used in economic research stems from Laeven, L.A., & Valencia, F.V. (2012). Authors comprise banking, currency and debt crisis over the period 1970-2011. The start of the crisis corresponds with the update version of Laeven and Valencia (2008, 2010).

Table 1. Starting and ending of the banking crisis

Country	Start	End
Portugal	2008	...
Ireland	2008	...
Italy	2008	...
Greece	2008	...
Spain	2008	....

***Source**:* Laeven, L. a., & Valencia, F. V.: 2012:26.

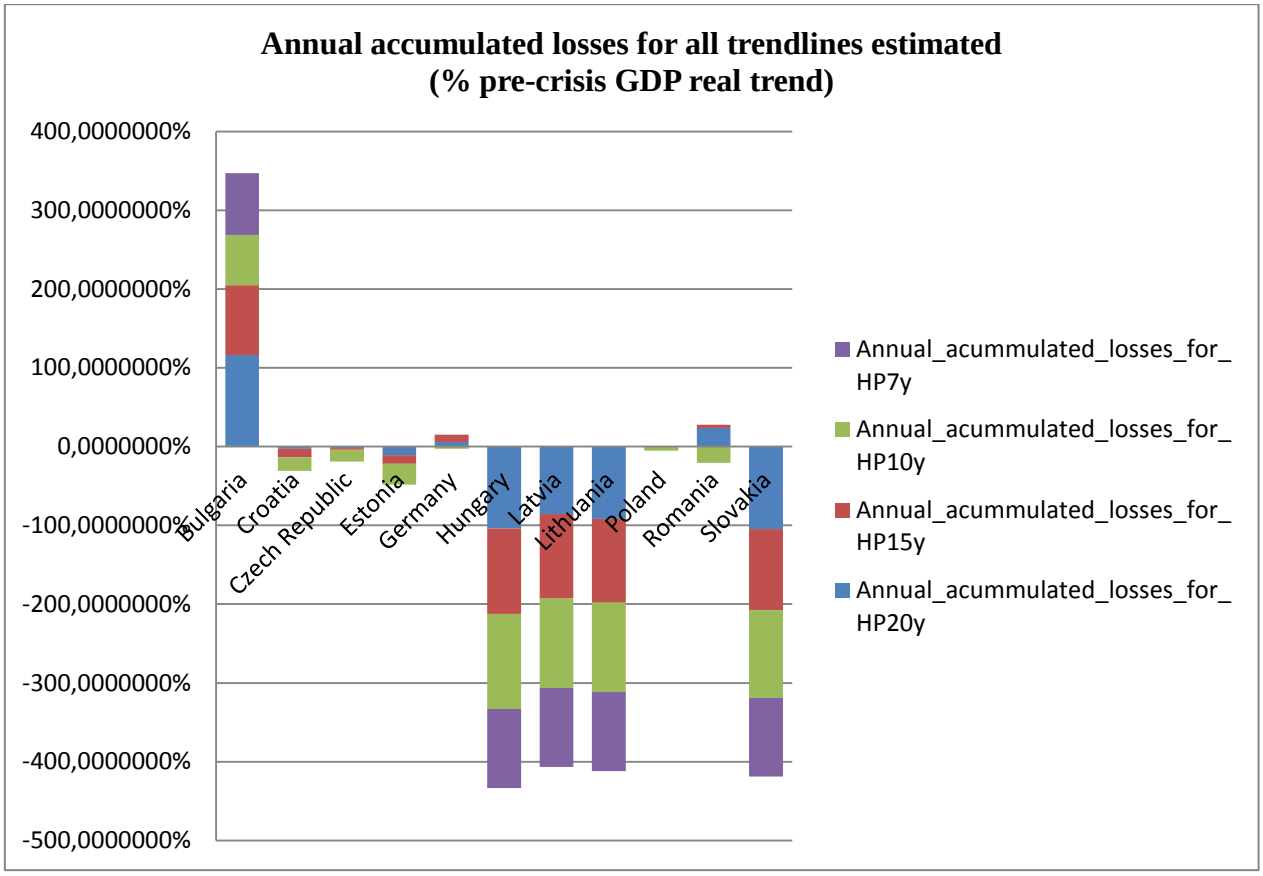
3.4. Determining the duration of the banking crisis

There is no broad consensus in the literature on how to measure the length of time for which the impact of a crisis should be measured. The IMF (1998) defined the end as when GDP growth rate returned to its pre-crisis level. However, one could argue that this point represents simply the end of the onset of a crisis: if GDP was originally 100 and growing at 3%, but subsequently falls to 70 before it starts growing at 3% again, it is difficult to imagine that the crisis has been resolved at this point. (Smith, A. 2012:3). Boyd et al (2005) use the most comprehensive definition achievable: for them, the length of a crisis is the time taken for GDP to return to the counterfactual level assuming the crisis never occurred, so they estimate the difference between the level of actual output and its trend during the crisis period. Below we show estimates of losses based on accumulating losses in the level output; we estimate the difference between the level of actual output and its trend during the crisis period.

4. Results

As we can see from the figure below (See figure 1) Bulgaria is the only country that not registered output losses in the analyzed period. Hungary is the CEE country with biggest output costs, followed by Latvia, Lithuania, Slovakia, Estonia, Romania, Poland and Germany. The economic cost of Hungary determinate with HP filter [T-10, T-1] is 120.66%. Latvia registered 113.57% economic costs while output costs' of Lithuania is 113.31% and of Germany is about 2.98%. Whatever method we used (HP filter [T-20, T-1], [T-15,

T-1], [T-10, T-1] and [T-10, T-1] but ignoring the past three years) the rang of economic losses for CEE countries is approximately the same. However we can see differences between the estimated trend lines. Generally with HP filer [T-10, T-1] but ignoring the past three years we estimate the lowest economic costs and with HP filer [T-10, T-1] we estimate the biggest economic costs. The boom registered before the beginning of the crisis affect the trend line of real GDP and therefore the economic costs' results.



Note: We determine output losses as the cumulative sum of the difference between actual and trend real GDP over the period [2008, 2013] expressed as a percentage of trend real GDP, with T=2008 the starting year of crisis. Trend real GDP is computed in two ways: first by applying an Hodrick-Prescott filter (with λ =100) to the log of real GDP series over [T-20, T-1] , [T-15, T-1], [T-10, T-1] and [T-10, T-1] –but ignoring the past three years .Real GDP is extrapolated using the trend growth rate over the same period.

Source: *Authors' calculation*

Figure 1. Annual accumulated losses for all trend lines estimated (% pre-crisis GDP real trend)*

The table below (See table 2) summarizes the annual and accumulated results for [T-10, T-1] and [T-10, T-1] –but ignoring the past three years. The first column summarize Hodrick-Prescott filter for log of GDP per capita series over [T-10, T-1] and the last one summarize Hodrick-Prescott filter over [T-10, T-1] –but ignoring the past three years before the beginning of the crisis.

Bulgaria registered output economic increase in entire period. The biggest increase is in 2008 period (Hodrick-Prescott filter over [T-10, T-1]: 16.35%, Hodrick-Prescott filter over [T-10, T-1] –but ignoring the past three years before the beginning of the crisis-14,00%). The other countries from the panel registered economic increase especially in 2008, and then the financial crisis had affected macroeconomic conditions and variables. This situation had changed when we apply the method proposed by Abiad *et al*. (2009). The analyzed countries registered a boom before the beginning of the crisis and there is little variation between the actual GDP and its counterfactual.

Table 2. Output annual loss and output accumulated losses (% pre-crisis GDP real trend)

Country	Counterfactual length		10y	7y
Bulgaria		2008	16.3540345%	14.0048339%
Bulgaria		2009	13.5237210%	13.9182470%
Bulgaria		2010	11.3621260%	13.7994015%
Bulgaria		2011	9.9592595%	12.6938061%
Bulgaria		2012	6.9796871%	11.9158388%
Bulgaria		2013	5.7091832%	11.9000923%
Accumulated losses/gains			**63.8880113%**	**78.2322196%**
Croatia		2008	1.2679406%	-0.0000048%
Croatia		2009	-1.1026830%	0.0000000%
Croatia		2010	-2.8169861%	-0.0000024%
Croatia		2011	-3.1968270%	0.0000048%
Croatia		2012	-5.2042929%	0.0000049%
Croatia		2013	-6.0193038%	0.0000000%
Accumulated losses/gains			**-17.0721522%**	**0.0000025%**
Czech Republic		2008	1.6794357%	0.0000023%
Czech Republic		2009	-1.0542991%	0.0000000%
Czech Republic		2010	-2.2962289%	**0.0000047%**
Czech Republic		2011	-2.7325753%	0.0000000%
Czech Republic		2012	-4.8917215%	0.0000047%
Czech Republic		2013	-5.9878855%	0.0000023%
Accumulated losses/gains			**-15.2832746%**	**0.0000140%**
Estonia		2008	0.4762342%	-0.0000024%
Estonia		2009	-3.2455013%	-0.0000024%
Estonia		2010	-5.0152012%	0.0000000%
Estonia		2011	-4.8777370%	0.0000000%
Estonia		2012	-6.4540315%	0.0000000%
Estonia		2013	-7.0759657%	-0.0000047%
Accumulated losses/gains			**-26.1922025%**	**-0.0000094%**
Germany		2008	1.1096384%	-0.0000022%
Germany		2009	-0.2835273%	0.0000000%
Germany		2010	-0.7733376%	-0.0000022%
Germany		2011	-0.4227619%	-0.0000043%
Germany		2012	-1.3126634%	0.0000043%
Germany		2013	-1.2986398%	0.0000043%
Accumulated losses/gains			**-2.9812916%**	**0.0000000%**
Hungary		2008	-0.0597395%	-0.0000024%
Hungary		2009	-3.4390134%	-0.0000024%
Hungary		2010	-4.6613864%	0.0000049%
Hungary		2011	-5.1661457%	0.0000000%
Hungary		2012	-7.3356188%	0.0000000%
Hungary		2013	-100.0000000%	-100.0000000%
Accumulated losses/gains			**-120.6619038%**	**-100.0000000%**
Latvia		2008	2.2776367%	-0.0000024%
Latvia		2009	-2.0679061%	0.0000000%
Latvia		2010	-4.2914835%	0.0000000%
Latvia		2011	-3.9934553%	0.0000024%
Latvia		2012	-5.4914552%	-0.0000048%
Latvia		2013	-100.0000000%	-100.0000000%
Accumulated losses/gains			**-113.5666634%**	**-100.0000048%**
Lithuania		2008	1.7587275%	0.0000024%
Lithuania		2009	-2.4137215%	0.0000025%
Lithuania		2010	-3.9491261%	0.0000049%
Lithuania		2011	-3.5932812%	0.0000000%
Lithuania		2012	-5.1129012%	-0.0000024%
Lithuania		2013	-100.0000000%	-100.0000000%
Accumulated losses/gains			**-113.3103025%**	**-99.9999926%**
Poland		2008	2.7504909%	0.0000000%
Poland		2009	-0.5963756%	0.0000049%
Poland		2010	-0.7922566%	-0.0000049%
Poland		2011	-0.9975387%	0.0000048%
Poland		2012	-2.5907530%	0.0000049%
Poland		2013	-3.0767214%	0.0000000%
Accumulated losses/gains			**-5.3031543%**	**0.0000098%**
Romania		2008	2.6785273%	-0.0000025%
Romania		2009	-1.6526787%	-0.0000026%
Romania		2010	-3.4768576%	0.0000026%
Romania		2011	-4.1911905%	0.0000025%
Romania		2012	-6.7272120%	0.0000025%
Romania		2013	-7.2443841%	0.0000000%
Accumulated losses/gains			**-20.6137956%**	**0.0000026%**
Slovakia		2008	1.0137607%	0.0000023%
Slovakia		2009	-1.5067035%	-0.0000048%
Slovakia		2010	-2.8192464%	0.0000000%
Slovakia		2011	-3.1298533%	-0.0000047%
Slovakia		2012	-4.8504571%	-0.0000047%
Slovakia		2013	-100.0000000%	-100.0000000%
Accumulated losses/gains			**-111.2924995%**	**-100.0000118%**

Source: Authors' calculation

5. Conclusion

The aim of this paper was to determine the output costs of banking crisis in CEE area. We compare output costs over CEE countries (Bulgaria, Croatia, Czech Republic, Estonia, Germany, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia). We found that Bulgaria is the only country that not registered losses in the analyzed period. Hungary is the CEE country with biggest output costs, followed by Latvia, Lithuania, Slovakia, Estonia, Romania, Poland and Germany.

First, we have applyed a Hodrick-Prescott filter for various lengths eg 10 years, 15 years and 20 years and then we use the method proposed by Abiad *et al.* (2009) and we establish the counterfactual trend, ignoring the past 3 years before the beginning of the crisis. As we expected if we analyses the results for each method we obtain the lowest economic losses with Hodrick-Prescott filter over [T-10, T-1] –but ignoring the past three years and the biggest losses with Hodrick-Prescott filter over [T-10, T-1]. In conclusion there was a boom in the last three years before the beginning of the crisis and this is reflected in estimated results.

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