Formation of countercyclical capital buffer in the European developing countries

The purpose of this paper is to analyse countercyclical capital buffer formation peculiarities in the European developing countries. The question arises, whether long term credit-to-GDP trend for sustainable credit to private sector growth, calculated using HP filter and proposed by Basel III capital regulation requirements is suitable for the developing countries? Results of the research are compared with the results obtained using OOS method, proposed by recent research studies. Research results showed that neither of the two methods is suitable for all the developing European countries and that Basel Committee should discuss implementation of other alternative countercyclical capital buffer formation methods.

Keywords: countercyclical capital buffer, HP filter, OOS method, Basel III capital requirements, European developing countries.

Theoretical and empirical findings show, that due to the countercyclical buffer formation features in Eastern and Western European countries, the question whether countercyclical capital buffer will be effective arises.

Introduction

This paper analyses Basel III capital estimation tool – countercyclical capital buffer – formation features in European developing countries. Authors analyse theoretical literature on the formation of countercyclical capital buffer and conclude, that due to the countercyclical buffer formation features in Eastern and Western European countries, the question whether countercyclical capital buffer will be effective arises.

JEL Classifications: G18/G21.
show, that the countercyclical capital buffer formation sequence, supported by the credit to GDP gap that is offered by the Basel Committee, might not be suitable for the developing countries, as there might be a sudden credit growth, due to catching up with developed countries effect and conditional short data line. Therefore the authors of the paper analyse the problem – what should be countercyclical buffer formation procedure in the European developing countries?

The aim of the research is to evaluate, whether HP filter method for the formation of countercyclical capital buffer, proposed by Basel III regulations, is suitable for the European developing countries. In order to achieve this, 3 tasks are set:

- analyse empirical studies and consultative documents about formation of countercyclical capital buffer in different countries and summarise results;
- introduce methodologies used to calculate the sustainable credit to private sector growth;
- examine formation of countercyclical capital buffer for European developing countries.

In the research 9 developing European countries are analysed – Belarus, Bulgaria, Lithuania, Latvia, Moldova, Romania, Russia, Ukraine and Macedonia. Assumption was made that all of these countries already apply Basel III requirements or are going to apply them in the nearest future. Two different methods of sustainable credit growth calculation are used in this research to form countercyclical capital buffer. First method is proposed by Basel Committee on Banking Supervision. Second method used in the research is out of sample (OOS) method.

For the estimation of countercyclical capital buffer formation timing and size data on credit to private sector and GDP are used for HP filter method, OOS method includes other economic fundamentals which effect credit-to-GDP ratio, such as GDP per capita, credit-to-private sector, credit-to-public sector, aggregate household consumption, inflation variables measured by GDP deflator and CPI index and short-term interest rates. Data were taken from IMF database and with the exceptions cover period from 2000 to 2012.

**Literature review**

Procyclicality in the banking sector, which is based on misleading risk assessment during different economic cycle phases, indulges cyclical movements. During the pikes of the economy banks under-valuate risk and simplify credit granting process. This kind of tendency impacts growth of the economy. While during the economic downturns, risk is overvalued and issuing of new loans is limited or stopped. These tendencies influence that banking sector becomes a mechanism, which causes cyclical variations and is an obstacle of the effective distribution of resources in the economy. Procyclicality not only becomes an obstacle for effective allocation of resources, but also decreases reliability of the banks.

On the procyclicality aspect, Basel III introduces a countercyclical capital buffer. The buffer is accumulated during periods of excessive credit growth and it is released in an economic downturn. The level of this buffer is set by each Member State and ranges between 0 % and 2.5 % of risk-weighted assets. The designated authority that is responsible for setting the buffer should calculate a buffer guide based on a deviation of the ratio of credit-to-GDP from its long-
term trend on a quarterly basis. The trend value is calculated using Hodrick-Prescott (HP) filter (Basel Committee, 2010).

So, it is important to evaluate how to determine whether the observed level of private sector credit is excessive. Excessive credit growth is often considered to be an indicator of future problems in the financial sector. C. Cottarelli et al. (2003) identify three country groups:

- the seven “early birds” – Bulgaria, Croatia, Estonia, Hungary, Latvia, Poland, and Slovenia. In all of them, the BCPS ratio (bank credit to the private sector to GDP) has been rising for at least five years at an annual average rate exceeding 1.5 percentage point of GDP;
- the three “late risers” – Bosnia and Herzegovina, Lithuania, and Serbia and Montenegro. These countries have experienced only recently a rise in the BCPS ratio exceeding 1.5 percentage points of GDP per year;
- the five “sleeping beauties” – Albania, Czech Republic, the Former Yugoslav Republic of Macedonia, Romania, and Slovakia. In these countries the BCPS ratio, after an initial decline has, in recent years, broadly stabilized.

They use random effects panel regression and evaluate the experience of non-transition countries. The paper concludes that BCPS ratios in almost all Central and Eastern European and Balkan countries are still significantly undersized.

B. Egert et al. (2006) analyse the equilibrium level of private credit to GDP in 11 Central and Eastern European countries: the Baltic countries – Estonia, Latvia and Lithuania; the CEE-5 – the Czech Republic, Hungary, Poland, Slovakia and Slovenia; and South Eastern Europe (SEE-3) – Bulgaria, Croatia and Romania. They use three alternative estimation techniques: a) fixed-effects ordinary least squares; b) panel dynamic ordinary least squares estimates and c) the mean group estimator. The sample begins between 1990 and 1996 and ends in 2004. The authors review the determinants of credit demand and credit supply. B. Egert et al. (2006) indicate that mass of the estimated countries was still located mostly on the undershooting side in 2004. They find that only Estonia, Latvia, Bulgaria and Croatia may have come close to equilibrium.

A. Zdzienicka (2009) analyses the recent credit development in 11 Central and Eastern European countries and estimates the credit-to-GDP ratio equilibrium level using filtering methods and dynamic panel estimations. As first step, the predicted credit ratio is compared to the actual one taking into account the size of each country’s banking sector (relative deviation) and financial development (absolute deviation). Then A. Zdzienicka (2009) estimates the long-term relationship between the credit-to-GDP ratio and the different groups of explanatory variables, using the pooled mean group estimations. Estimation results reported that in 2002, only one country, Latvia, could be classified as “excessive”, i.e., superior to the lower bound of the threshold range. In 2004, credit growth in Bulgaria pushed this country over the “credit boom” limit. In 2007, five countries, i.e., the Czech Republic, Estonia, Lithuania, Romania and Slovenia had credit growth well above the upper bound of the threshold range.

A. Geršl and J. Seidler (2011) analyse the historical experience of the Central and Eastern European countries with credit expansion and determine how suitable the Basel Committee’s proposed counter-cyclical capital buffer is for these countries. A major problem is determining what level
of credit is excessive. They employ two methods: the statistical Hodrick-Prescott filter and pooled mean group estimation method. The analysis shows that the Hodrick-Prescott filter calculation proposed by the Basel Committee is not necessarily a suitable indicator of excessive credit growth for developing countries.

Analyzing the empirical research on countercyclical capital buffer, it can be seen that there is no clear opinion about it. Some market participants consider that the countercyclical capital buffer is not an adequate instrument in the fight against problems in the financial sector (PriceWaterhouse-Coopers, 2010; WSBI-ESBG, 2010; Standard Chartered, 2010); others (World Bank, 2010; Austrian Federal Ministry of Finance, 2010; Central Credit Committee, 2010) see the countercyclical capital buffer as a measure for protection of private households and investors against over-indebtedness. On the developing economies aspect, there are identified a number of issues with the proposed countercyclical capital buffer:

- the definition of “excessive credit growth” varies between mature and developing economies. For developing economies, starting at a low level of bank lending, one would expect to see much higher credit growth rates relative to GDP than in a developed economy;
- credit growth rates relative to GDP are low;
- the operational difficulties in collating the necessary data;
- the Hodrick-Prescott filter proposed by the Basel Committee is not necessarily a suitable indicator of excessive credit growth;
- the credit-to-GDP is not necessarily suitable for creating a countercyclical capital buffer;
- there is no clear long-term trend.

Literature review shows that the Hodrick-Prescott filter-based calculation of the excessive credit indicator is not necessarily appropriate in certain cases. For the developing countries in particular, rapid credit expansion may simply mean convergence to values typical of the developed countries, and not excessive borrowing.

For calculation of the countercyclical capital buffer of developing countries, the authors of the analysed studies propose to use methods involving estimation of the additional variables that better reflect the evolution of a country’s economic fundamentals.

Research methods

Formation of countercyclical capital buffer is based on identification of excessive credit growth periods. In order to identify these time periods, it is important first to determine the sustainable credit growth to private sector, which does not make any threat to banking sector stability. In order to achieve this, two different methods of sustainable credit growth calculation will be used in this research to form countercyclical capital buffer (CCB).

First method is proposed by Basel Committee on Banking Supervision. An alternative method used in this research is Out of Sample method, which determines equilibrium credit growth. All other conditions of CCB formation will be the same in both cases as they are outlined in Basel Committee proposal: CCB will be started to form at minimum percentage if credit-to-GDP ratio exceeds its sustainable level by 2 % and gradually increase to its maximum percentage when credit-to-GDP ratio exceeds its sustainable level by 10 %.
Using the first method, Basel Committee suggests using long term credit-to-GDP trend for sustainable credit to private sector growth. The trend value is calculated using Hodrick-Prescott (HP) filter. It is used to obtain a smoothed-curve which is more sensitive to long-term than to short-term fluctuations. So, HP filter calculates trend value which minimizes the following sum for a given value of λ:

$$\min \sum_{t=1}^{T}(y_t - g_t)^2 + \lambda \sum_{t=1}^{T-1}[(g_{t+1} - g_t) - (g_t - g_{t-1})]^2$$ (1)

where $y_t$ is time series, $g_t$ – trend component and $\lambda$ is smoothing parameter.

The first term is the sum of the squared deviations of $y_t$ from the trend. And the second term – the sum of squared second differences in the trend, is a penalty for changes in the trend’s growth rate.

This method is quite often used in macroeconomic studies (Cottarelli et al., 2003; Égert, Zumer, 2006; Zdzienicka, 2009; Geršl, Seidler, 2011) and is simple to apply to every country, but it has some questionable aspects when implementing it to developing countries. Analysing developing countries questions arise, whether do developing countries have long enough time series? Is it correct to observe only two variables? Does excessive credit growth indicates possible future problems in banking system of developing countries? Is suggested $\lambda$ value (400000) suitable?

Second method used in the research is OOS method. It allows analysing different developed countries and applies estimated elasticity for the countries where credit-to-GDP equilibrium is being calculated. Although in this kind of estimation it is possible to employ a lot of econometric models, pooled mean group estimation (PMG) method for panel estimations, introduced by M. H. Pesaran et al. (1999) was used in this study.

The PMG estimator is an error correction form of the autoregressive distributive lag (ARDL) model, where depended variable in its first differences is explained by the lagged independent and dependent variables in both levels and first differences (Geršl and Seidler, 2011). So, this method can be used to estimate the long-run relationship between the credit-to-GDP ratio and other variables, which are identical for all countries, whereas the short-run adjustment to this long-run relationship can differ across countries (Geršl and Seidler, 2011). PMG method allows heterogeneity among different countries in short-run. However, the long-run relationship of the cointegrated variables is common to all countries in the sample.

The equation of PMG model is presented in Equation 2.

$$\Delta y_{ij} = \gamma_{ij,0} + \gamma_{ij,1} y_{ij,t-1} - \sum_{k=1}^{r} \alpha_{i,jh} x_{i,jh,t} + \sum_{j=1}^{p} \beta_{ij} \Delta y_{ij,t-j} + \sum_{h=1}^{q} \sum_{j=0}^{g} \gamma_{ij,h,j} \Delta x_{ij,h,j} + \epsilon_{ij,t}$$ (2)

In 2nd Equation $y$ is dependent variable, $x$ is independent variable, $\alpha$, $\beta$ and $\rho$ are estimated coefficients. Parameter $\rho$ is the country specific error correction term. Coefficient $\alpha$ represents the long-term relationship, which is the same for all countries.

A. Geršl and J. Seidler (2011) suggest using out-of-sample panel estimation, i.e., estimating the model on a different sample of countries (“in-sample countries”) and applying the elasticity obtained to the date for the countries for which the equilibrium credit level is being estimated (“out-of sample countries”). So, according to the second method used in this study, coefficients estimated by PMG model for
in sample countries (developed countries) will be applied to out of sample countries (developing countries).

**Research data and period**

In this study, 9 developing European countries were analysed (World Bank countries classification, 2012), out of which eight countries are Eastern Europe countries – Belarus, Bulgaria, Lithuania, Latvia, Moldova, Romania, Russia and Ukraine and 1 Southern Europe country – Macedonia. Assumption was made that all of these countries already apply Basel III requirements or are going to apply them in the nearest future.

Usually authors, applying OOS method, use the sample of developed EU member-countries or high income OECD member-countries (Cottarelli et al., 2003; Égert, Zumer, 2006; Zdzienicka, 2009; Geršlir, Seidler, 2011). The latter were analysed in this study (World Bank countries classification, 2012). So, countries used to determine credit-to-GDP equilibrium level using OOS method in this research were Denmark, Sweden, Norway, Switzerland, Japan, S. Korea, Israel, Australia, Canada and USA.

Using OOS method developed countries were analysed for the period from 1980 to 2008. Calculated elasticity was applied to developing countries for the period from 2000 to 2012. Since HP filter does not require developed countries analysis, it was applied directly to developing countries for the period from 1995 to 2012. Due to lack of data some countries were analysed for shorter period: Romania for the years 1997 - 2012, Ukraine – 2000 - 2012, Macedonia – 2003 - 2012. The analysis periods of developing countries were not unified because of recommendation of Basel Committee to use as long time periods as possible when applying HP filter to get more reliable trend results.

**Variables selection**

As it was mentioned before, only two variables are used in HP method – credit to private sector and GDP. Meanwhile PMG model includes other economic fundamentals which effect credit-to-GDP ratio. In this research GDP per capita, credit-to-

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abbreviation</th>
<th>Explanation of variable</th>
<th>A relationship between variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>credit-to-private-sector-GDP</td>
<td>CR/GDPt</td>
<td>Dependent variable</td>
<td>-</td>
</tr>
<tr>
<td>credit-to-public-sector-to-GDP</td>
<td>CRP/GDPt</td>
<td>Independent variable</td>
<td>inverse relationship</td>
</tr>
<tr>
<td>GDP per capita, $ 1000</td>
<td>GDPPCt</td>
<td>Independent variable</td>
<td>direct relationship</td>
</tr>
<tr>
<td>Aggregate household consumption to GDP</td>
<td>CON/GDPt</td>
<td>Independent variable</td>
<td>direct relationship</td>
</tr>
<tr>
<td>Δ CPI</td>
<td>CPIt</td>
<td>Independent variable</td>
<td>inverse relationship</td>
</tr>
<tr>
<td>BVP deflator, yearly exchange</td>
<td>DEFt</td>
<td>Independent variable</td>
<td>inverse relationship</td>
</tr>
<tr>
<td>Δ short-time interest rates</td>
<td>INTt</td>
<td>Independent variable</td>
<td>inverse relationship</td>
</tr>
</tbody>
</table>

*Note: compiled by authors.*
private sector, credit-to-public sector, aggregate household consumption, inflation variables measured by GDP deflator and CPI index and short-term interest rates were used. Variable description is presented in Table 1. All data employed in this study are used from IMF database.

The variables are pre-tested for the presence of unit roots applying traditional four panel unit tests: Levin, Lin and Chu, Breitung, Im, Pesaran and Shin, and Fisher-type tests. The results of these tests have showed that only two of all used variables were non-stationary. Non-stationary variables were GDPPC and CON/GDP. These two variables have long-term effects to credit-to-GDP equilibrium level. However, cointegration tests were not executed since the error correction terms from the pooled mean group (PMG) estimations were used for this purpose. Indeed, if the variables are cointegrated, the coefficient associated to the error term should have a negative statistically significant sign in cases of all countries.

Equation 3 gives the final estimation of the coefficients of the long-run relationship which are common for all countries and short run relationships which are presented below as the mean of all the estimates for the countries.

Equation 3 shows (as it was expected), that long-time relationship between credit-to-GDP ratio and GDP per capita is direct. This means, that with increasing wealth of economy credit-to-GDP ratio increases as well. Inverse relationship link noticed among credit-to-GDP ratio and credit-to-public-sector and GDP ratio. This relationship can be explained by the fact that banks direct their funds to public sector, so apparently funds for private sector decrease. Analysing short-run adjustment it is seen, that credit-to-public-sector also has negative relationship with credit-to-GDP ratio, whereas increase in aggregate household consumption determine increase in dependent variable.

**Research results**

As it was mentioned in the description of research methods, there are two different methods used to determine sustainable credit to private sector and GDP growth:

- HP filter, recommended by Basel Committee enables to find long time trend of credit-to-GDP in every country;
- PMG model allows determining the equilibrium credit-to-GDP level, which is appropriate for analysed developed countries: in our case high income OECD members-countries.

In the research countercyclical capital buffer was calculated using both methods and results were compared. Analysis was made in two steps:

\[
\Delta(CR / GDP)_t =
-0.0618(CR / GDP)_t = (4.3008 GDPPC_t - 1.176 CR / GDP_t) + \} \text{long-run relationship}
\]

\[
2.6238 CON / GDP_{t-1} - 0.8169 CR / GDP_{t-1} + 0.3515 \} \text{short-run adjustment}
\]

**Note:** *, ** and *** represent significance of the estimated coefficient at the 10 %, 5 % and 1 % confidence levels respectively.
• first of all, the timeliness of countercyclical capital buffer formation was examined. It was considered which method enables banks to accumulate additional capital requirements in time, i.e., 1-3 years before the need for additional funds arise. The need was defined by decrease in GDP no less than two quarters;

• second aspect analysed was – which of applied methods enable to form countercyclical capital buffer gradually? The gradual formation of countercyclical capital buffer is proposed by Basel Committee and this kind of CCB formation assures the effectiveness of this capital adequacy requirement.

Using two different methods to determine sustainable credit-to-GDP ratio, in some countries analysed authors received contradictory results. The results of the research are presented in Figure 1.

Analysing given results in more detail, six different cases of timeliness of countercyclical capital buffer formation can be determined. Firstly, in Belarus neither of applied methods enabled to start accumulate countercyclical capital buffer on time. Both HP filter and OOS model have signalized about the need to start accumulate additional capital too late – when less than one year remained. In that case, none of methods applied are suitable to Belarus. Second, opposite situation was noticed in Bulgaria and Russia. In these countries both methods appeared to be suitable and enabled to accumulate funds on time. Both methods gave longer than 2 years period to form countercyclical capital buffer. Third, OOS model have signalized about possible future problems in banking sectors earlier than HP filter in Latvia. But in general both methods used are proper to start to accumulate capital in banks. Fourth, in three countries only HP filter proposed by Basel Committee allows to accumulate countercyclical buffer on time. These countries are Lithuania, Moldova and Macedonia. In all these countries OOS method did not signalize about the need to start accumulate additional capital at all. So in this case alternative method suggested did not allow preparing for possible future problems in banking sector and countercyclical capital buffer as additional capital adequacy requirement appeared to be not effective. In Ukraine only OOS method signalized about the need for the formation of countercyclical capital buffer formation, but funds would not had be accumulated till financial crises appeared. Finally, in Romania HP filter identified requirement to increase capital, while OOS method did not, but considering the fact that there was no period when 2 or more quarters GDP decreased, OOS method is more proper in this country case. A. Geršl and J. Seidler (2011) noticed the same tendencies in Latvia, where OOS method signalised about the need of countercyclical buffer earlier that HP filter; in Lithuania, where OOS method wasn’t suitable for CCB formation, in Bulgaria, where both applied methods was suitable. To sum up the research results, one may conclude, that none of the methods applied would be suitable for all of the developing countries.

In the research the size of countercyclical capital buffer was analysed at the point when the need of CCB formation arises. The countercyclical capital buffer and the size of deviation from sustainable credit-to-GDP growth (in both used methods) are presented in Table 2.

As it is seen in Table 2, in Belarus, Bulgaria and Latvia both methods applied determine that countercyclical capital buffer was started to be accumulated at maximum value (2.5 % of risk weighted assets) when the need of countercyclical capital
Formation of Counter Cyclical Capital Buffer in the European Developing Countries

Fig. 1. Comparison of credit-to-GDP ratio for HP filter and OOS method

Note: y axis represent credit-to-GDP gap for various calculation methods, and x axis represent time series, quarters.
Source: authors’ calculation.

Table 2
Comparison of the CCB size applying different methods at the point when the need of CCB formation arises

<table>
<thead>
<tr>
<th>Country</th>
<th>CCB formation using HP filter</th>
<th>CCB formation using OOS method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Credit-to-GDP gap from his long run trend</td>
<td>The size of CCB</td>
</tr>
<tr>
<td>Belarus</td>
<td>9.50 %</td>
<td>2.38 %</td>
</tr>
<tr>
<td>Bulgaria</td>
<td>17 %</td>
<td>2.50 %</td>
</tr>
<tr>
<td>Latvia</td>
<td>10.50 %</td>
<td>2.50 %</td>
</tr>
<tr>
<td>Lithuania</td>
<td>17 %</td>
<td>2.50 %</td>
</tr>
<tr>
<td>Macedonia</td>
<td>3.50 %</td>
<td>0.88 %</td>
</tr>
<tr>
<td>Moldova</td>
<td>24 %</td>
<td>2.50 %</td>
</tr>
<tr>
<td>Romania</td>
<td>12.60 %</td>
<td>2.50 %</td>
</tr>
<tr>
<td>Russia</td>
<td>3.60 %</td>
<td>0.90 %</td>
</tr>
<tr>
<td>Ukraine</td>
<td>2 %</td>
<td>0.50 %</td>
</tr>
</tbody>
</table>

Note: based on authors' calculations.
accumulation arose. Maximum value of additional capital requirement is noticed in Lithuania, Moldova, and Romania in case of HP filter calculation. But, OOS method in these countries did not identify any need for countercyclical capital buffer. In Macedonia HP filter enabled accumulation of funds gradually while OOS method has not shown any need to raise the capital. Only in two countries – in Russia and Ukraine – both applied methods allowed to accumulate countercyclical capital buffer gradually.

Conclusions

On the procyclicality aspect, Basel III introduces a countercyclical capital buffer. The buffer is required during periods of excessive credit growth and it is released in an economic downturn. The credit-to-GDP gap has a significant role in the Basel Committee’s framework for a countercyclical capital buffer under Basel III. The Committee uses a Hodrick-Prescott filter to calculate the trend of credit-to-GDP.

Literature review shows that the Hodrick-Prescott filter proposed by the Basel Committee is not necessarily a suitable indicator of excessive credit growth for developing countries. For the developing countries in particular, rapid credit expansion may simply mean convergence to values typical of the developed countries, and not excessive borrowing.

In this research two different methods of sustainable credit growth calculation are used to form countercyclical capital buffer. First of the methods is proposed by Basel Committee. Second method used in the research is OOS method based on estimates for advanced countries which are subsequently used to evaluate the equilibrium credit levels of the developing countries.

Research results showed that neither of the two methods is suitable for all the developing European countries and that Basel Committee should discuss implementation of other alternative countercyclical capital buffer formation methods. A broader set of indicators and methods should be employed to identify the problem of excessive credit in developing countries.

References

FORMATION OF COUNTERCYCLICAL CAPITAL BUFFER IN THE EUROPEAN DEVELOPING COUNTRIES

Dalia KAUPELYTĖ, Asta BENDORAITYTĖ

ANTICKLINĖS KAPITALO ATSARGOS FORMAVIMAS BESIVYSTANČIOSE EUROPOS ŠALYSE

Santrauka

Šiame straipsnyje yra analizuojamas bankų kapitalo pakankamumo reguliavimo gairės Bazelis III įgyvendinimas ir įgyvendinti įrankio – anticiklinių kapitalo atsargų – forma vimas besivystančiose Europos šalyse. Ši straipsnė tyrinėja kapitalo pakankamumo reglamentavimo įrankio galimybes ir aptarienių įvairumą, kurioje bankas veikia. Ši estrategija privalo būti sudaryta tokia, kad ji adekvatiai atitiktų ir makro–finansinę aplinką, kurioje bankas veikia. Šią atsargą reikia išsaugoti nuo gilesnės finansinės krizės, taip pat sudaryti tokia kapitalo atsargų struktūra, kurios būtų tinkamos užtikrinti vienodo kreditų kredituojamų sektorių augimą. Tuo tarpu ilgalaikės kreditų ir BVP santykio tendencijos, rėmiantis Bazelio Komiteto rekomendacijomis, bus įvertinamos naudojant Hodrick-Prescott filtrus. Šis įrankis leidžia atlikti atitinkamą augimą, o Bazelio Komiteto tikslas – užtikrinti augimą įvairių nacionalinių sektorių. Ši straipsnio rezultatai rodo, kad įvairios modeliai yra tinkami naudoti besivystančiose šalyse.