THE UNIVERSITY OF CHICAGO

Macroeconomic Policies and Economic Activity Around the Booms of Private Credit in the Developing World

By

Ekaterina Vashkinskaya

August 2021

Faculty Advisor: Yoosoon Chang

Preceptor: Kanit Kuevibulvanich

Abstract:

Credit to the private sector has been growing dramatically in both developed and developing countries for more than six consecutive decades, and since the developing world differs in the effects of private debt accumulation, it requires particular policies adjusted to the level of local financial development. This paper discusses the way policymakers in the EMDEs can distinguish «unhealthy» build-ups using real economic data and ex-post empirical analysis and economic measures that are proven to be efficient in containing them. First, this paper summarises the economic activity around the booms of private debt, connecting macroeconomic processes and general levels of financial development to the booms' quality. Then, by analysing an unbalanced dataset for more than 50 developing countries, it discusses which macroeconomic policies and economic reforms have the strongest connection and predictive power over the «unhealthy» booms. This research documents evidence that policymakers in EMDEs have tools to distinguish bad and good booms in the early stages of their accumulation, and that specific policy interventions in the domain of financial liberalisation and macroprudential supervision are crucial for the subsequent private credit build-ups' developments.

I. Introduction

Private debt hadn't been considered a major threat to economic stability and was overlooked for the sake of public debt and its importance. Private debt booms, or episodes of rapid growth and expansion of credit to households and non-financial corporations, had been underestimated as a source of economic turbulence even though eight of the past ten recessions were preceded by substantial problems in housing and consumer durables (Leamer 2007, 2009) and that household leverage was an *early* and *powerful* predictor of the 2008-9 recession (Mian and Sufi, 2010). Moreover, the effects of the private debt accumulation on the developing countries are still understudied: it was mainly analysed in accordance and comparison with the advanced economies, while its connection with policy measures was not evident (Meng and Gonzalez, 2016). While some of the booms can be considered «healthy» as they are connected to financial deepening, others might be connected to financial fragility and be harmful to the economy. While policymakers in the developing world have tools to tell boom apart, it is not quite studied what measures are implemented around the booms and what economic consequences they provoke. The effects of these interventions are understudied: a one-fits-it-all approach towards resolving the booms might be dangerous, so it is important to study the experience of the developing world separately.

If the private debt can be «bad» and policymakers can spot such booms and intervene, it can be the case that the measures implemented around the booms can serve as catalysts and exacerbate the consequences of the booms. The developing world differs in the effects of private debt accumulation and requires particular policies adjusted to the level of local financial depth and development. For example, developing countries are forced to tighter borrowing constraints that limit their fiscal interventions' power to stabilise the economy, as they normally don't have any fiscal buffer that would have outweighed the retrenchment of private and public sector borrowing during the recessions (Bernardini and Forni, 2017) or have limited monetary transmission mechanisms (IMF, 2016). That's why since the developing world's policy-makers mostly base their response to the private debt build-up issues on the advanced economies' experience, it can lack efficacy, be not suitable, and even be harmful for their economies. This paper is aimed at discussing whether policymakers can efficiently intervene and alter the potential quality of the boom or if some policies are systemically exacerbating the consequences of the booms in the developing world.

Unlike the pre-Global Financial Crisis of 2008 times, today sharp increases in credit provision are seen as a key predictor of financial or banking crises (Gourinchas and Obstfeld, 2012;

Jorda et al., 2013) and higher long-run unemployment, conditional on the exchange rate regime (Mian, Sufi, and Verner, 2017), and thus start to be associated with the term of "financial fragility". Authors claim that longer recessions in the developed world were preceded by the high-paced credit accumulation (Jordà, Schularick, and Taylor, 2013), along with the fact that stronger and longer credit growth predicts deeper recession (Dell'Ariccia et al., 2016; Bernardini and Forni, 2017). Countries that were prone to larger credit booms in the run-up to the 2008 collapse experienced more sluggish recovery afterward (Jorda et al., 2013), while booms that started at a higher level of financial depth and which were associated with banking crises were more likely to last longer (Dell'Ariccia et al., 2012).

Economists try to identify whether booms of private credit tend to coincide with any booms or anomalies in different macroeconomic variables. For some economic indicators as real exchange rate, asset prices, or capital inflows, their behaviour during the credit boom is pro-cyclical (Mendoza and Terrones, 2012), while some variables, as domestic interest rate changes, deterioration of the current account (Gourinchas, Valdes, and Landerretche, 2001) or high financial openness (Arena et al., 2015; BIS, 2012) can serve as predictors for the credit expansion and even trigger the booms. For both industrial and emerging economies, credit booms often follow surges in TFP gains, financial reforms (Mendoza and Terrones, 2012; IMF, 2011), and loose macroeconomic policy stances, especially regarding monetary policy (Elekdag and Wu, 2013).

However, not all the booms of private credit can be seen as a predecessor to a crisis or be associated with financial fragility: economists agree that booms can be classified as «good» if they were not associated with subsequent economic distress (which is often proxied by a banking crisis occurrence) and as «bad» if they were (Gorton and Ordonez, 2016; Dell'Ariccia et al., 2012; Richter, Schularick, and Wachtel, 2018). Not only do these two types of booms differ in their economic consequences but also in the macroeconomic and financial processes that coincide with them. Section II starts by defining the procedure for spotting and localising the booms of private debt, and then describes the procedure for distinguishing good and bad build-ups using the ex-post empirical analysis.

Macroeconomic processes and general economic conditions that coincide with the booms are important to study for policymakers to be able to tell the booms apart and apply measures only to those which are potentially dangerous. Moreover, it is crucial to spot the «bad» boom at the very beginning of its build-up, so that the consequences are less severe and the effects are better mitigated. Working towards that goal, Richter, Schularick, and Wachtel (2018) find that for the advanced economies, «credit booms that are accompanied by house price booms and a rising loan-

to-deposit-ratio are much more likely to end in a systemic banking crisis». Dell'Ariccia et al. (2012) propose that «larger current account deficits, higher inflation, lower quality banking supervision, and faster-growing asset prices may help predict "bad" booms». Section II continues by introducing different sets of variables that can be important while classifying the booms of private debt. They include financial development indicators, together with general macroeconomic variables and financial sector indicators.

Developing countries and emerging market economies differ in their responses to the booms of private credit along with the overall economic performance that coincides with the booms. This paper concentrates its attention on the emerging market and developing economies (EMDEs) sample and proceeds by studying the differences between «good» and «bad» build-ups of private credit. Section III draws a connection between «unhealthy» credit accumulation and economic processes, whose dynamics can serve as early-warning predictors for the policy-makers. Besides, it connects booms and their quality to the level of financial development in the studied countries.

The empirical analysis shows that higher levels of financial development are indeed connected to a bigger number of credit build-ups, however, the probability of these build-ups to turn out well and be connected to financial depending also rises with the country's financial development. Specifically, the access and efficiency of the financial institutions in a country are crucial for determining the quality of the local private-debt build-ups. By analysing the behaviour of stock price volatility, current account balance, and loans-to-deposits ratio, that precedes the beginning of a private credit boom, policymakers can understand the quality of the future boom. Moreover, they can start to guess the way the boom will turn out just by looking at its initial size: not as powerful as the rest, it still allows to predict the quality with better than a «coin-toss» probability (AUC=0.65).

After classifying the booms and showing that policymakers can distinguish between healthy and unhealthy build-ups, it is important to analyse policy interventions enacted around the booms in order to see whether they can exacerbate the quality of the booms. A big debate develops around the issues of debt relief, where authors propose to either carefully deflate the credit boom while working on improving credit efficiency (Chen and Kang, 2018) or to use tight preventive macroprudential and supervisory policies, and never allow credit to expand too fast (Sirtaine and Skamnelos, 2007). However, not many authors study the direct effects of the macroeconomic measures and economic reforms implemented before or during the boom episode and the way they affect its quality. Besides, even those papers where this connection is unraveled, struggle to find any

significant connection between the policies and the booms (or do find one but only for a small group of countries) (Meng and Gonzalez, 2016; Dell'Ariccia et al., 2012).

To study the way implemented economic policies enter the debate on the quality of the boom, this paper starts by outlining the types of policies, their timing, and the way they can be measured. Section II concludes by describing three groups of interventions: financial reforms, macroprudential policies, and monetary policy. Each group includes several different measures that can be implemented during the boom to carb it or before the boom to stop it from building up (or to promote its expansion).

Financial reforms are included in the analysis as financial liberalisation and other reforms happening before the start of the boom can incite its occurrence along with affecting its quality (Mendoza and Terrones, 2012; IMF, 2011). Monetary policy and conditions are analysed as they can serve both as a proxy for the general macroeconomic stability and as an important immediate response to the booms. Macroprudential tools are added as they are considered to be one of the most efficient types of macroeconomic interventions concerning private debt overhang. They are associated with reduced volatility (OECD Economic Outlook, 2017), «lower credit growth, especially for small firms with limited non-bank financing» (BIS Papers No 91), and «at times, proven effective in containing booms» (Dell'Ariccia et al., 2012).

Section IV analyses the effects variables from each of the above-mentioned policy groups have on the quality of the private debt booms together with the probability of them occurring at all. This paper finds that while higher levels of financial liberalisation tend to increase the number of the booms in the economy, higher efficiency of the funds allocation and the financial sector as a whole that comes with the financial liberalisation reforms tend to decrease the bad booms occurrence probability. However, this tendency stops with the Global Financial Crisis, and after 2008, financial liberalisation has no further explanatory power over the private credit build-ups in the EMDEs.

When it comes to the macroprudential policies effect on the booms' quality, this paper finds that the overall loosening of the macroprudential policy can be detrimental to the quality of the booms, while tightening is not significant for predicting any of the build-ups, which shows that the effects are asymmetric and that tight preventive macroprudential and supervisory policies might not be strong enough to alter the quality of the boom. Lastly, monetary conditions can also signify the quality of the upcoming boom through the lending rates values, while general monetary policy stance effects are inconclusive. Section V concludes by summarising the major contributions of the paper.

II. Data and Variables Creation

This section provides the data description and sources used in the empirical parts of the paper along with the methodological framework for creating the variables that are not taken directly from the existing publicly available sources. There are several steps this paper uses in order to answer its main research question, thus there are several bundles of data and data sources used. First, the overall setting and sample is going to be described. Second, the data and procedure for creating the main variables of interest would be presented, followed by a summary of data sources and statistics for the explanatory variables used in the subsequent empirical analysis.

A. Setting

This study is dedicated to assessing economic activity and macroeconomic policies around the booms of private debt in the EMDEs globally. The full sample consists of 89 EMDEs and covers the time span from 1991 to 2017, however throughout the analysis the number of countries varies due to data imitations issues. Thus, the paper deals with an unbalanced data sample, and details on its construction are provided in the upcoming sections. While the set of variables listed below and tested for a potential connection with the booms is not exhaustive by its nature, the variables included in it are chosen for the sake of preserving the maximum data coverage. The data limitations issues become especially salient when studying the developing countries and emerging market economies, and since booms of private debt are particularly rare by design, one of the aims of the data selection process is to maximise the data coverage for the studied economies. Thus, even though this paper follows the literature in its methodological and data selection approaches, there are some caveats caused by data underreporting, sporadic data, mismatches between the countries and years covered for different datasets used. For that, the rule of thumb is to concentrate on the variables that are both correctly and fully reported and which span over the periods that exhibit the biggest number of booms, as this variable is the major one of interest.

B. Booms and their inherent features

«Booms» of private debt are the episodes of a rapid growth and expansion of credit to households and non-financial firms. In order to spot and localise these episodes, Hamilton procedure or Hamilton filer is used (Hamilton, 2017) to detrend and extract the cyclical component

of the the Debt-to-GDP series, provided by the IMF in a form of *Global Debt Database.* The time-series for the studies sample of countries is defined as «total stock of loans and debt securities issued by households and non-financial corporations as a share of GDP», and is taken as the best proxy for the private sector debt indicator. While other methodologies for locating the booms can be seen in the earlier papers on this topic, neither HP filter (Mendoza and Terrones, 2008), nor switching regression is considered suitable today. While switching regression in the panel framework produces skewed results due to inability to adequately define one threshold for the variable of interest, after exceeding which it becomes «booming», the HP filter is criticised severely for «producing series with spurious dynamic relations that have no basis in the underlying data-generating process» and giving biased filleted values that differ significantly depending on their place in the time-series (Hamilton, 2017). Thus, this paper follows the latest developments in the literature (Mendoza and Terrones, 2012; Richter, Schularick, and Wachtel, 2018), and adapts Hamilton filter for spotting the booms.

Hamilton procedure is employed to analyse the Debt-to-GDP series by dividing it into the trend and the cyclical components: while the trend can be predicted based on the values observed in the past, the cyclical component can be calculated as the difference between the actual values of the variable and its forecasted value, based on the historical data analysis. Hamilton offers the following formal econometric model in a from of an OLS regression for the observed non-stationary Debt-to-GDP series (denoted d_t) at the moment $t + h$, which is predicted based upon a constant and four most recent values as of date t:

$$d_{t+h} = \alpha_0 + \beta_1 \ d_t + \beta_2 \ d_{t-1} + \beta_3 \ d_{t-2} + \beta_4 \ d_{t-3} + v_{t+h}$$

Where the cyclical component is derived from the residuals estimation:

$$\hat{v}_{t+h} = d_{t+h} - \hat{\alpha}_0 + \hat{\beta}_1 d_t + \hat{\beta}_2 d_{t-1} + \hat{\beta}_3 d_{t-2} + \hat{\beta}_4 d_{t-3}$$

In the case of yearly data and specifically for analysing debt cycles, Hamilton suggests to use $h = 5$ and $p = 4$, which denotes the horizon of 5 years (Hamilton, 2017), because «fundamental interest could be in shocks whose effects last substantially longer than two years[1] but are nevertheless still transient». So the amount of debt in the period $t + 5$ that is predicted at the time t is based on the values of debt from the four consecutive periods, ending at t.

---

[1] two years as a prediction horizon ($h = 2$) is advised for the papers that want to follow business cycle fluctuations (Hamilton, 2017)

The value of the cyclical component (denoted c_{it} in a country i at the year t) is later normalised and analysed on whether it surpasses a certain threshold. This paper employs Mendoza and Terrones (2012) approach, which considered a credit boom to be present in a particular country during those years when the normalised cyclical component of the Debt-to-GDP series exceeds the standard deviation of this variable throughout the analysed period (denoted $\sigma(c_i)$). Thus the boom variable is created using the following definition: $Boom_{it} = I(c_{it} > \sigma(c_i))$. Using it with the three different thresholds gains three dummy-variables for the analysis: for the threshold of $1 \, s.d.$ there are 304 booms identified, the threshold of $0.75 \, s.d.$ gains 459 booms for the whole sample, while the $1.25 \, s.d.$ one produces 195 booms. The procedure is displayed in detail in Appendix II.B.1.

Such a method for booms' identification is stated to be efficient due to several reasons: first, the threshold is not unified and therefore allows to consider country-specific effects and private debt dynamics, spotting only those episodes that are unnatural for a particular country and its economic environment. Secondly, it can be easily checked for the threshold robustness, and while mainly applying the $0.75 \, s.d.$ threshold for the analysis as a baseline specification, this paper also presents the results for $1 \, s.d.$ and $1.25 \, s.d.$ where it is possible (due to data limitations, in some cases it is not). The summary statistics for the booms during the studies period for three different thresholds is presented in Appendix II.B.2.

After locating the boom episodes, it is also important to spot their intrinsic traits: some authors claim that just the size and the duration of the boom can serve as good predictors for its quality (Chen and Kang, 2018; Dell'Ariccia et al., 2016). Particularly, they claim that «the longer and sharper the credit expansion, the greater the likelihood of a disruptive adjustment, such as a financial crisis, a severe growth contraction, or both». So the features inherent to the booms are included into this analysis in a form of duration of the boom episodes (the number of consecutive years for which the boom condition is satisfied), duration to peak (the number of years, for which the booms was building up, i.e. years up to the peak value of the deviation from the mean) and the average size of the boom (the average value of the deviation from the mean). While duration and duration to peak are mostly highly correlated, they differ in the policy-response representation[2], so both of them are included in the empirical analysis.

---

[2] Some authors are interested in the duration to peak indicator only, since they claim that all the boom years after the peak are subject to some policy measures from the authorities, so they are less of a value for pure booms analysis

C. «Bad» Booms

This paper uses the following definition for an «unhealthy» boom: if an episode of rapid accumulation of private debt in a period t is followed by a systemic banking crisis within three years (so if the banking crisis dummy equals to 1 at least once in the interval of t to $t + 3$), such a boom is considered «bad» or «unhealthy», meaning that it was not just statistically associated with financial distress, but rather precedes it and in some sense can be accountable for it. Indeed, making such a connection is justified based on the fact that there is positive and statistically significant relation between the booms of private debt in a country and a subsequent banking crisis: the probability of a banking crisis is higher when proceeded by a private debt boom, controlling for country-fixed effects and taking into consideration all three values for the Hamilton procedure threshold (Table 1). While it is not proven that the rest of the booms were «healthy» for the general economic performance and major economic indicators, by the opposition, since other booms were not directly associated with the financial distress proxied by a banking crisis dummy, they are considered to be good in the framework of this paper.

Table 1: "Models with banking crisis as dependent variable with FE"

banking crisis	1	2	3
Credit boom dummy (1 s.d.)	0.646** (0.247)		
Credit boom dummy (0.75 s.d.)		0.577* (0.224)	
Credit boom dummy (1.25 s.d.)			0.746** (0.282)
Observations	801	801	801

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

In order to spot such booms, three dummy variables for the booms are recalculated with a newly imposed condition. Following the procedure above, the dummy-variable equals to 1 if the «bad» boom condition is satisfied, and to 0 otherwise, which is denoted as $badboom_{ib}$: if a boom b in a country i is followed by a banking crisis, it's considered to be bad. The data for that is taken from the previous calculations (boom episodes) and compiled with the IMF's *Global Financial Development* Database. It provides the indicator for banking crises which equals to 1 if there are «signs of major financial distress in the banking sector and significant banking policy intervention

measures in response to significant losses in the banking system» (Laeven and Valencia, 2018). Over the studied period, 80 country-year observations are marked with a banking crisis.

Out of 304 booms for the 1 standard deviation threshold, 53 booms (or almost 20%) meet the requirements of being «unhealthy»; out of 459 booms resulted from the threshold of 0.75 standard deviation, 67 (or almost 15%) are redefined as «unhealthy», while the strictest in terms of booms spotting threshold of 1.25 standard deviation, gaining 195 booms, gives the amount of 35 «unhealthy» booms (or almost 20%). The frequency of the bad booms occurrence is close to the ones reported in the literature on the topic (Dell'Ariccia et al., 2016; Richter et al., 2018), but the distribution between countries is far from being unanimous: while some countries experience multitude «unhealthy» boom episodes, a big part of the sample (more than a half for each of three specifications) experiences none[3]. While statistically it can be challenging, such preliminary statistics can still serve as a proof that despite the fact that the effects from private credit accumulation do not always serve the goals of «financial deepening», 80% of the booms (or even more for some specifications) are not associated with economic distress, or «financial fragility» in the upcoming years. The year by year cumulative distribution of the bad booms is presented in the Appendix II.C.

D. Financial Development

The general financial development of a country is considered to be vital for determining whether the booms of private credit would turn out badly and whether they would be connected with «financial deepening» or «financial fragility» (Sahay et al., 2015). In part, it is also a perspective venue of analysis because financial development is one of the factors that is strikingly different for the EMDEs, compared to the advanced economies, which can have policy implications for the local policymakers (Appendix II.D.2). While financial development used to be measures through the Private Credit-to-GDP ratio in the past (Rajan and Zingales, 1998; Demirguc-Kunt and Detragiache, 1998), today it is considered to be a more complex phenomenon. Since the financial sector has evolved dramatically, especially for the last several decades, today it's especially important to approach financial development as a multi-dimensional process that involves many actors. While banks are no longer considered to be the most important players on the market, today

---

[3] While it is not essential for the quality of the analysed booms, it can affect the possibility of using the country fixed-effect regressions for analysing bad booms, since for a big part of the sample the explanatory variable could be perfectly described by a constant.

the whole range of different entities participate in the financial system. Their existence and activity must be accounted for when assessing financial development.

Thus, to spot the level of financial development, the composite broad-base index created by the IMF is used (Svirydzenka, 2016). It consists of several groups of normalised components and is presented in a form of nine indices that «assess at varying levels of abstraction how developed financial systems are across countries» and its updated version spans from 1980 to 2018. Each out of nine indices is normalised to lie within the interval from 0 to 1, where moving along the number line means increasing the level of financial development. One major index of Financial Development (FD) is divided into Financial Institutions (FI) and Financial Markets (FM) sub-indices, where institutions are represented by the national «banks, insurance companies, mutual and pension funds» and markets are the stock and bond ones. Each of the two sub-indices consists of three narrower indicators of Depth, Access and Efficiency for Financial Institutions and Financial Markets respectively. Broadly, these categories are summarised by the author as follows: depth is the «size and liquidity» of the institutes, access – the «ability of individuals and companies to access financial services» and efficiency – the «ability of institutions to provide financial services at low cost and with sustainable revenues, and the level of activity of capital markets» (Svirydzenka, 2016). A more detailed composition of the indices is presented in Appendix II.D.2.

E. General Macroeconomic and Financial Variables

Besides general financial development, there are several groups of Macroeconomic and Financial Variables studied in connection to private credit excessive accumulation. The first bundle of variables are those associated with the real economy. These macroeconomic variables are mostly responsible for the overall economic outlook of the country, that can play a definitive role in the way credit booms affect the financial stability: for example, it is known that higher rates of inflation tend to worsen the outcomes of a debt boom and that the level of current account deficit can reflect the quality of the subsequent credit boom. At the same time, some variables, responsible for the health of the economy and its sustainable development, can be positively associated with how well credit booms are going to turn out. This set includes log of GDP per capita, investment and final consumption as a portion of GDP, trade openness and foreign direct investment (FDI) ratio, population and income growth, and current account balance. The data for the real economy variables are extracted from the IMF and World Bank open data sources.

The second set of variables is reflecting the quality of the financial and banking systems of a given country, since the initial conditions are crucial for understanding the existing connection between credit booms and banking crises and can be used to eliminate the probable common denominator, causing problems in both private credit quality and banking system stability. This bundle includes the following indicators: loans-to-deposits ratio, bank capital-to-total assets as a measure of stability, non-performing loans as a percent of all the loans in the economy, and stock price volatility index. The data for the real financial variables are extracted from the World Bank 's *Global Financial Development* Database.

The proper description of each variable from this subsection is presented in Appendix II.E, complimented by the intrinsic characteristics of the booms variables described in the subsection B. Moreover, the summary statistics for the variables is presented, which shows the mean, standard deviation, range, and frequency as variables are divided into two categories, filtered by a «bad» boom presence.

F.   Macroeconomic Policies and Financial Reforms

The main goal of this paper is to answer the question on the role of economic policies and reforms in determining the quality of the booms. It is important to understand if policymakers can exacerbate the consequences of the booms with their interventions or if some of the measures implemented around the booms can actually be useful for taming those that can turn out badly. For that reason, economic interventions are broadly divided into three main groups that are considered important in the context of the private debt build-ups: macroeconomic policy stances, especially regarding monetary policy (Elekdag and Wu, 2013), financial reforms (Mendoza and Terrones, 2012; IMF, 2011) and macroprudential policies (Dell'Ariccia et al., 2012).

Even though in theory fiscal measures can serve as powerful stabilisers for the economy and create incentives to either accumulate private debt (by altering the taxation that can incentivise borrowing) or reduce it (Claessens, Keen, and Pazarbasioglu, 2010), EMDEs normally don't have enough fiscal space and are forced to the tighter borrowing constraints that limit their fiscal interventions' power (Bernardini and Forni, 2017). Indeed, Meng and Gonzalez (2016) find no statistical significance, trying to connect private debt build-ups to the fiscal policy stance for their sample. Besides, the data on the budget rules and general government deficits are sporadic for the

EMDEs in the sample, thus fiscal interventions are excluded from the analysis in the framework of this paper.

The first set of policy-related variables analysed in connection with booms is the one with financial reforms indicators. The dataset for this paper is created through merging two datasets. The first one is the publicly available *Financial Reform Database* created by the IMF staff in 2008 for 91 countries (Abiad, Detragiache, and Tressel, 2008). This yearly dataset spans over the 1973–2005 period and includes five variables that are directly connected to the local baking sector (interest rate controls, credit controls, banking sector entry controls and supervision, privatisation of banks indicator) along with the measure controlling for capital account restrictions and the one capturing the security market regulation policy. The variables are constructed through answering standardised questions which have a set of answers, each quantified as a specific, discrete value. All of the dimensions combined constitute an index of financial liberalisation, where higher values mean a more liberalised economy, with the only exception for the banking sector supervision component, for which higher values indicate more regulation.

The second dataset employed for the financial reforms section is the one created by the OECD economists in 2017, which uses the same methodological framework as the IMF team does while creating the *Financial Reform Database* (Denk and Gomes, 2017). The authors expand the dataset, covering the missing years between 2005 and 2018, however their sample consists of 43 countries, which results in a reduction of the analysed sample of the EMDEs for those years. This paper uses an unbalanced *New Financial Reform Database,* that combines the data extracted from both sources. The data from the period of 1991-2005 from the Abiad, Detragiache, and Tressel (2008) study is complemented by the one from the Denk and Gomes (2017) research for the years 2005-2017. The summary statistics for the merged dataset with the seven indices and the additional cumulative one counting in all the reforms for a country during a particular year is presented in Appendix II.F.1. Additionally, the statistics is presented filtered by a boom and «bad» boom presence respectively. The indicators construction scheme is presented in Appendix IV.C.2.

The second set of policy-related variables analysed in connection with booms is the one exploring the macroprudential measures employed in the context of EMDEs. The dataset for this part of the paper is created from the IMF's *Integrated Macroprudential Policy (iMaPP) Database*, constructed by Alam et al. in 2019. The iMaPP database presents granular monthly data in a from of «dummy-type indicators of tightening and loosening actions of 17 macroprudential policy instruments and their subcategories» and statistics on Loan-to-Value limits and covers 134 countries from 1990 to 2018. This paper employs information on indicators of both tightening (which takes 1

if tightened and 0 otherwise), and loosening (which takes 1 if loosened and 0 otherwise) that include measures concerning capital, leverage, reserves, loans and liquidity requirements. In order to obtain the yearly data, the cumulative 12-month value of each monthly tracked indicator is calculated as a sum that results in the yearly-average data for 6 indicators used in the empirical analysis. The summary statistics and a proper description of the variables is presented in Appendix II.F.2.

The last set of policy variables used is the one connected to monetary policy. The monetary policy stance is usually analysed by either «calculating the deviations of the central bank policy rate from that implied by a Taylor rule» or by «the error terms obtained from a simple regression of policy rates on inflation and GDP growth»[4] (García and Salas, 2016; Meng and Gonzalez, 2016). However, the data limitations concerning policy rates in the EMDEs makes this methodological approach unfeasible: data on policy rates is either very limited or only available since the late 2000s, which cuts the sample dramatically. Even though in Milton Friedman's view, only the stance but not the nominal rates is the true measure for the monetary policy vector, the rates described below are tightly linked to both – real economy and monetary interventions – and thus can serve as an imperfect proxy for the stance too.

For that reason, this paper uses two variables that represent the monetary conditions and policy: the real interest rate[5], which is the «lending interest rate adjusted for inflation as measured by the GDP deflator» (WorldBank, 2021) and the lending rate[6] itself which is the «bank rate that usually meets the short- and medium-term financing needs of the private sector» (WorldBank, 2021). These indicators are chosen because for the countries that have imperfect financial markets (as EMDEs do), or where the statistics on the nominal rates is not representative of the effective rates in the economy, «it may be difficult to obtain data on interest rates that reflect actual market transactions. Lending rates are thus collected by the IMF as representative interest rates offered by banks to resident customers» (IMF's Monetary Financial Statistical Manual, 2000). The summary statistics for the variables is presented in Appendix II.F.3 and complimented by the tables filtered by a «bad» boom and boom presence.

---

[4] Might vary: another specification is «the error term by which the policy rate exceeds its predicted level based on a simple regression of policy rates on inflation and real GDP growth»

[5] The terms and conditions attached to lending rates differ by country, however, limiting their comparability

[6] This rate is normally differentiated according to creditworthiness of borrowers and objectives of financing. The terms and conditions attached to these rates differ by country, however, limiting their comparability.

III. «Unhealthy» booms and their features

A. Empirical Strategy

It is crucial to understand whether the «unhealthy» booms located in the previous section can be separated from the «good» ones not just by the ex-post analysis, but also by spotting and generalising some common characteristics, inherent to the unhealthy build-ups, and not significant or present for the good ones. If this is possible, then analysing the polices around the booms makes sense: if policymakers can spot the «bad» booms when they start to build up, they can intervene accordingly, and try to alter the quality of the booms. While the casual relationship between the implemented measures and booms' developments won't be definitively proven by that, such analysis can provide a mechanism of how the measures enter the picture and serve as a theoretical basis for further causality analysis.

In order to do so, this paper is aimed at analysing three sets of variables for connection to the bad boom episodes, described in the previous section, to spot the ones holding the biggest explanatory power. However, before that, the connection between financial development and the provability of a bad boom to occur would be established. This connection is important for the subsequent analysis for several reasons: first, the level of financial development in a country is directly connected to the overall macroeconomic stability and economic performance, thus it might provide the first insights into which particular general macroeconomic and financial variables might be important for spotting the booms. Second, it can show the link between the way EMDEs are affected by the booms and the measures aimed at the level of financial development policymakers can potentially implement in order to influence the booms' quality.

The main empirical model used for this section is the panel logistic regression that includes the country fixed effects and the variables of interest that can be responsible for the quality of the booms:

$$log\left(\frac{P[badboom_{i,b,t} = 1 \mid Z_{i,b,t-1}]}{P[badboom_{i,b,t} = 0 \mid Z_{i,b,t-1}]}\right) = \alpha_i + \beta Z_{i,b,t-1} + \epsilon_{i,t}$$

Where vector $Z_{i,b,t-1}$ includes the variables from the subsections D and E from the previous section (described in Appendix II.D.1 and Appendix Appendix II.E) and the $badboom_{i,b,t}$ dummy equals to 1 if a boom b in a country i in a year t is followed by a banking crisis. The

macroeconomic and financial variables are taken with a one-year lag in order to account for a potential endogeneity problem, that can arise from the effects credit booms and subsequent banking crises can have on both real economy and banking sector variables. The Financial Development variables are also taken with a lag, as the components of the index that account for financial depth and efficiency can be affected by the private debt developments. So the coefficients of interest are those presented by the vector β.

Due to the fact, that not all the countries out of 89 in the sample had experienced «unhealthy» booms (only 23 countries had experienced «bad» booms over the course of 30 years), the aforementioned specification of the logistic regression, which includes country-fixed effects[7] (denoted as α_i), decrease the number of observation available for analysis. While using country-fixed effects is essential in terms of accounting for the country-level heterogeneity, the sample size is important as well for having unbiased coefficients and to run tests, some of which are asymptotical. That's why for some of the specifications that result in a low number of observations, both full- and reduced-sample models are presented.

B. Booms and Financial Development

While financial development is claimed to be bidirectionally casual with economic growth (Al-Yousif, 2002), it's not entirely clear how it is connected with economic and financial stability. Faster and more efficient mobilisation and allocation of recourses can have a positive effect on the economy, however a large number of financial and banking crises during the last decades might be indicative of a reversed process. Laeven and Valencia (2013) find a positive relation between the enhanced financial development of last years and a higher probability of a banking crisis to occur. However, only a few dimensions of financial development are claimed to be significantly associated with the occurrence of banking crises (Mathonnat and Minea, 2018). Authors claim that «abundant liquidity and higher banks' indebtedness may be related to banking crises», each of which are a part of the financial development metrics used by this paper. Thus it is important to understand how exactly financial development is relevant for the studied issue of private debt build-ups that lead to financial distress in a form of banking crises.

Financial development may come with issues as increased volatility in capital flows or risk-seeking behaviour by the financial markets participants, however it brings a lot of benefits that can

---

[7] Since the explanatory variable is a dummy indicator and the point of the paper to see the difference between the years it equals to 1 and the rest, the year-fixed effects are not applicable

be specially relevant in the context of low- and middle-income countries, as higher capacity to absorb shocks and lower macroeconomic volatility via «reducing the amplification of cycles through the financial accelerator» (Bernanke, Gertler, and Gilchrist, 1999). From the one hand, the diversity of financial system makes it less prone to crises as it allows to hedge against both internal and external shocks, while maintaining higher rates of access and efficiency. From the other hand, the availability and liquidity of funds, accompanied by a multitude of financial instruments can create unnecessary volatility and fragility, so dangerous for the young EMDEs' financial markets.

Indeed, fragility prospects become especially notable when analysing the booms of private debt, since excessive credit accumulation might come with a cost in a form of «financial fragility». That is the reason why some economists claim that policymakers and international financial organisations that work with developing countries should be cautious when introducing the financial and economic reforms aimed at increasing the local levels of financial development (Bezemer et al., 2014). Increased credit provision, stock market expansion and turnover might bring new investments and increase economic activity, however there is no guarantee that financial deepening would be the only consequence.

Table 2 below helps to reconcile both above-mentioned opinions on the way financial development is connected to economic stability via its effect on private debt accumulation. The left part of the table is dedicated to assessing the effects lagged Financial Development indicator and its component have on a probability of a «bad» boom to occur, while the right part describes the relation between the Financial Development and all of the booms of private debt (both bad and good). The idea behind putting together and comparing two of these specification is to see how the effects from increased financial development differ when two groups of variables are compared against its counterparts. Does financial development determine the difference between the booms themselves and is the effect the same when comparing boom years to the periods with no excessive credit growth?

Financial Development, and in particular its component responsible for Financial Institutions that brings the most of the descriptive power, is negatively association with the probability of a country to experience a bad build-up. At the same time, both components of the Financial Development index seem to have a positive predictive power for determining the probability of any boom to occur, compared to the normal years. When disentangling the major differentiating index's component of Financial Institutions, Depth and Efficiency seem to be the factors that create the major difference.

Indeed, Efficiency, expressed through lending-deposit spread, net interest margin, and non-interest income (for which a higher value indicates a worse performance on efficiency within the indicator) is representative of the perceived risks in the economy, which in part can be responsible and connected to a banking crisis occurrence. Thus, the higher Efficiency values demonstrate the lower perceived level of risks, lower spread, higher trust between the economic agents, and, in turn, lower possibility for a boom in such environment to turn out badly. As for the Depth component, which is in turn only significant for comparing boom years with the rest of the sample, its subcomponents are directly linked to the size of Private Sector credit and other actors funds to GDP, which indeed can have explanatory power over the credit expansion. It is curious that there is no explanatory power of the size of Private Sector credit-to-GDP, which shows that the size alone might not matter that much for the quality of the developing boom.

Table 2: "Financial Development effect"

	bad booms			all booms		
FD	-10.06* (5.122)			8.150*** (1.579)		
FI		-21.44*** (5.400)			5.318*** (1.258)	
FM		8.524 (4.967)			2.875* (1.317)	
FID			9.306 (10.90)			20.91*** (2.678)
FIA			-17.03* (7.575)			-3.970** (1.220)
FIE			-6.419* (2.974)			0.488 (0.855)
FMD			-3.792 (5.415)			-1.354 (1.339)
FMA			22.04 (13.75)			-4.885** (1.686)
FME			3.886 (2.369)			2.220** (0.741)
Observations	151	151	151	1633	1633	1633
FE	YES	YES	YES	YES	YES	YES

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Since bad build-ups are the ones connected to the banking crises (which can't be said about all of the booms in the study), this finding overall corroborates the notion that while experiencing higher levels of financial development, it is more plausible to have a credit build-up, the chances are high this build-up won't be associated with a subsequent economic downturn, proxied by a banking crisis. It means that while the argument about the increased volatility and more rampant financial flows to the developing world caused by its higher level of financial development is true, there is no harm in that what so ever in terms of real outcomes, proxied by the absence of banking crises. This result is particularly interesting because it reconciles both camps of economists having a debate over the financial development effects in the context of EMDEs.

C. Economic Activity around the Booms of Private Credit

In order to establish the «quasi-casual» mechanism described in the Empirical Strategy subsection, several logistic regressions with different groups of variables are performed to see if they are connected to the higher probability of a bad boom to occur and thus can signal policymakers to take actions.

The preliminary comparison shows some distinctive differences in means for the variables from the list. On average, it is common for the bad booms in the sample to last less to their peaks, while having a bigger average size. Besides, the years with «unhealthy» booms are marked with significantly lower Investment spendings (21% of GDP vs 24.3% of GDP), lower Foreign Direct Investments inflows (2% of GDP vs 3.84% of GDP), less negative Current Account balance (-1.8% vs -5% of GDP) and lower Trade Openness (65% vs 70% of GDP). Also, the rates of population and income growth are notably lower for the «bad» boom years. At the same time, the Loans-to-Deposits indicator together with Stock Price volatility index are, on average, remarkably higher (by 30% and by 83% higher respectively) for the years with «unhealthy» credit build-ups.

While the preliminary analysis already gains some interesting insights on the «good» and «bad» booms differences that policymakers can use to distinguish them, it is important to asses the way variables from the three groups outlined in Appendix II.E are connected to the probability of a boom to turn out «badly». Table 3 presents the results for the analysis of the real variables combined with the baseline specification of the intrinsic characteristics only ($0.75\ s.d.$). The preliminary analysis conclusions are supported: even after controlling for the cross-country heterogeneity, and real macroeconomic variables, the number of years it takes to reach the peak and the size of the boom matters for its quality. The bigger the boom and the faster it peaks, the higher

the odds it is going to end up in a systemic banking crisis, or in other words to become «unhealthy» for the economy.

To interpret the macroeconomic variables, they are added one by one to the specification only containing the inherent booms' characteristics in order to see the pure effect of each of them on the probability of a bad boom to occur (the methodology is taken from Richter, Schularick, and Wachtel, 2018). Both full- and reduced-sample models give similar results and show that while most of the real macroeconomic variables do not add explanatory power in terms of predicting the «bad» booms occurrence, higher rates of per capita income together with higher rates of investment in the economy in a year prior to the credit build-up tend to be associated with lower chances for a boom to end up badly.

Table 3: "Models with real variables"

	1	2	3	4	5	6	7	8	9
bad boom									
Duration to peak (0,75 s.d.)	-0.968*	-1.277***	-1.102*	-1.296***	-1.320***	-1.327***	-1.413***	-1.311***	-1.263***
	(0.404)	(0.353)	(0.438)	(0.354)	(0.350)	(0.356)	(0.396)	(0.352)	(0.355)
Average size (0,75 s.d.)	5.558**	6.557***	6.978***	6.708***	6.750***	6.807***	7.250***	6.633***	6.523***
	(1.854)	(1.887)	(1.986)	(1.886)	(1.912)	(1.883)	(2.018)	(1.913)	(1.870)
log GDP per capita	-2.052**								
	(0.669)								
Current account balance		0.140*							
		(0.0674)							
Investment			-0.228**						
			(0.0750)						
Consumption				0.0408					
				(0.0723)					
Trade openness					0.00721				
					(0.0171)				
FDI						-0.0706			
						(0.0804)			
Population growth							1.282		
							(0.817)		
GDP growth								-0.0609	
								(0.0551)	
CPI inflation									0.00723
									(0.0136)
Observations	151	149	151	151	151	151	151	151	151
FE	YES	YES	YES	YES	YES	YES	YES	YES	YES

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

It is in part similar to those preliminary conclusions derived from the means comparison. Indeed, higher rates of investment can be associated with the process of «financial deepening», which is a feature of a good credit expansion. If people and companies borrow money with investment purposes, it can be seen as healthy borrowing. At the same time, a big credit expansion to the private sector, not accompanied by an increase in the investment spendings might show that the borrowed money is used either to cover consumption expenses (as in Russia in 2019, when non-investment credit to the public called «consumer debt» rose significantly and raised questions on its sustainability from the Ministry of Economic Development), or to refinance the existing debts, both of which are the signs of a weak economic performance.

At the same time, the Current Account balance is positively associated with the «bad» boom occurrence: «unhealthy» boom years tend to exhibit less negative CA balances, which implies that the lower the CA deficit during the boom years is, the higher the chances this boom will end up badly. In other words, having a current account deficit is better than having a surplus for a developing country experiencing a build-up in private debt. This relation differs from the one documented for the developed countries, where current account balance as a share of GDP is negatively associated with the following «bad» boom (Richter, Schularick, and Wachtel, 2018). The difference can arise from the fact that if there is a big inflow of money in a developing country's economy, «since current account deficit implies an excess of investment over savings, it could be pointing to a highly productive, growing economy» (IMF, 2020).

Table 4 presents the results for specification with banking and financial variables only, where each variable as before is added to the baseline specification sequentially. Column (2) indicates that higher loans-to-deposit ratio is associated with a higher probability of a boom to turn out badly, while the same is applicable to the index of stock price volatility. Column (4) shows that the bigger the stock market fluctuations are for a year prior to the credit boom occurrence, the higher the chances the boom will end up in a banking crisis. While this paper does not claim causality between these processes, it is clear that increase in both stock price volatility and loans-to-deposit ratio coincide with «unhealthy» build-ups of private credit.

While the conclusions on the nature of relationship between Loans-to-Deposits and «bad» booms are supported by previous research (Jorda` et al., 2017; Richter, Schularick, and Wachtel, 2018), the connection between Stock Price volatility and «unhealthy» booms is not studied by the aforementioned paper. Rather, all the papers written after the GFC concentrate their attention on housing durables and study their effects on the probability of banking crisis occurrence. Unfortunately, neither housing nor stock price indexes are available for most of the developing

countries in the world, so this paper is unable to account for their effect on the probability of «unhealthy» booms to occur.

Table 4: "Models with banking and financial variables"

	1	2	3	4	5
bad boom					
Duration to peak (0,75 s.d.)	-1.558**	-1.504**	-2.013*	-0.278	-1.299***
	(0.560)	(0.554)	(1.002)	(0.455)	(0.361)
Average size (0,75 s.d.)	8.314*	5.442**	6.620	2.594	6.064**
	(4.018)	(2.097)	(6.847)	(1.982)	(1.850)
Capital to assets	-0.434				
	(0.321)				
Loans to deposits		0.0439**			
		(0.0153)			
Nonperforming loans			-0.492		
			(0.320)		
Stock price volatility				0.145*	
				(0.0640)	
Credit to state companies					0.0309
					(0.0690)
Observations	51	142	32	58	142
FE	YES	YES	YES	YES	YES

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5 demonstrates the results of the full model, that combines all the individual variables that added the most explanatory value to the «bad» booms in the previous subsections: variables are again added to the baseline specification one by one, with the final result in the Columns (4). While both models gain similar results for the Columns 1-3, the reduced-sample specification with all the variables contains only 61 observation, which makes it weak from statistical perspective. However, the Column (3) and Column (4) results are compatible in terms of signs of the correlation between the variables and the booms. All in all, by analysing results from both full and reduced-samples, it is notable that the effects described above hold for all the variables but current account balance. The rest indicators show similar dynamics of association with «unhealthy» private credit build-ups as they did in three previous regressions, each dedicated to one set of variables.

Table 5: "Full model"

bad boom	1	2	3	4
Duration to peak (0,75 s.d.)	-1.138**	-0.948***	-0.970***	-0.155
	(0.416)	(0.286)	(0.292)	(0.347)
Average size (0,75 s.d.)	5.320*	5.225*	5.445*	3.604*
	(2.567)	(2.248)	(2.242)	(1.793)
log GDP per capita	-1.515*	-1.087"	-1.149*	-1.193
	(0.688)	(0.560)	(0.564)	(0.870)
Loans to deposits	0.0454	0.0326"	0.0302"	0.00832
	(0.0383)	(0.0176)	(0.0174)	(0.0104)
Investment		-0.0956	-0.0926	-0.195"
		(0.0632)	(0.0690)	(0.106)
Current account balance			0.0349	0.0474
			(0.0656)	(0.0897)
Stock price volatility				0.205**
				(0.0679)
Constant	-7.545	-5.139	-4.134	0.701
	(9.412)	(4.821)	(4.297)	(7.819)
Observations	451	451	446	190
FE	NO	NO	NO	NO

Standard errors in parentheses
" $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

bad boom	1	2	3	4
Duration to peak (0,75 s. d.)	-2.335**	-2.410**	-2.433**	-7.479
	(0.864)	(0.882)	(0.905)	(8.791)
Average size (0,75 s. d.)	9.003**	8.967**	9.059**	6.927
	(3.176)	(3.173)	(3.282)	(11.52)
log GDP per capita	-1.644*	-1.763*	-1.747*	-1.725
	(0.713)	(0.771)	(0.783)	(7.928)
Loans to deposits	0.0795***	0.0855**	0.0860**	0.402
	(0.0233)	(0.0273)	(0.0277)	(0.445)
Investment		0.0362	0.0316	0.714
		(0.0771)	(0.0857)	(1.761)
Current account balance			-0.0109	0.233
			(0.0941)	(1.098)
Stock price volatility				0.355
				(0.415)
Observations	151	151	151	61
FE	YES	YES	YES	YES

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The possibility the locate macroeconomic processes and the inherent booms' characteristics that have predictive power for the quality of the build-ups allows this paper to proceed to the next section which studies the policy actions around the booms of private credit. Additionally to the ex-post analysis that allows policymakers to predict the quality if the booms, the hypothesis that they have efficient tool to intervene on the early stages of booms' development is supported by the real-time analysis performed using the variables from the Table 5. All the variables that are not connected to the inherent characteristics of them booms stay unchanged, while duration and duration to peak are not applicable anymore, since they are not observed. The average size is changed to the initial size. The regression table is presented in the Table 6, while the results from the real analysis are the following: out of all variables, the Initial Size, the Stock Price volatility, the Current Account balance and the GDP per capita bring the most predictive power for the real time booms classification.

Table 6: "Real time analysis"

	1	2	3	4	5
bad boom					
Initial size	0.763	1.251$^{"}$	1.251	1.215$^{"}$	0.709
	(0.467)	(0.666)	(0.697)	(0.665)	(0.834)
Stock price volatility		0.129***	0.130***	0.127***	0.224**
		(0.0326)	(0.0337)	(0.0319)	(0.0797)
Loans to deposits		-0.00141	-0.00131	-0.000701	-0.00394
		(0.00314)	(0.00318)	(0.00313)	(0.00313)
Current account balance			0.0483	0.0410	0.151*
			(0.0320)	(0.0306)	(0.0760)
Investment				-0.0321	-0.0231
				(0.0813)	(0.0766)
Log GDP per capita					-2.182**
					(0.696)
Observations	160	60	60	60	60
Pseudo-R2	0.148	0.354	0.370	0.398	0.547

Standard errors in parentheses
$^{"} p < 0.1$, $^{*} p < 0.05$, $^{**} p < 0.01$, $^{***} p < 0.001$

ROC-AUC analysis performed in order to check the predictive power of the model gains the following conclusions: high volatility of the stock market together with a bigger initial size and an increase in the current account balance that coincide with a private's credit build-up can be treated as powerful predictors that the boom can turn out «unhealthy» and important signals that should be spotted by the policymakers. The ROC curves are presented in Appendix III.C.

D. Robustness

The first concern might come from the choice to use the lowest threshold of $0.75\ s.d.$ as the baseline specification in the model. Although done for the sake of increasing the number of observations and preserving the biggest possible final sample, it is true that the results might be affected by the choice of this parameter. In order to check robustness, this paper also obtains the boom variables for $1\ s.d.$ and $1.25\ s.d.$ thresholds and double-check the results with additional specifications where it is possible. The first check is to see whether the basic specification only accounting for the intrinsic traits of the booms exhibits the same behaviour when run with the two other thresholds. The results presented in Appendix III.D.1, and while the smallest threshold ($0.75\ s.d.$) gains similar results for both full- and reduced-sample models, models with the other two thresholds specifications do not. The $1\ s.d.$ threshold model gains the same conclusions for the Duration to Peak indicator, and the same signs for most of the variables (however, insignificant) as the baseline threshold models, while the $1.25\ s.d.$ threshold model fails to achieve any statistical significance. This is a potential caveat of this study, however the nature of this problem lies not in the inability to replicate the results due to an economic or theoretical issues but rather appears because of a significantly reduced sample, which in case of $1.25\ s.d.$ drops to 195 observations in full- and to 34 observations in the reduced-sample model. Thus, the study adapts the $0.75\ s.d.$ threshold as the baseline one, however being aware of this potential limitation.

Another potential concern about the methodological approach is the threshold of 3 years that is taken for determining the quality of the boom in connection to a banking crisis. While this threshold is the one used in the literature the most, it still seems to be quite unjustifiable. In order to account for a potential bias caused by the choice of the threshold, this paper uses the threshold of 4 years to check the robustness of its findings. Again, the procedure follows the one described in the Section II.C, however now if an episode of rapid accumulation of private debt in the period t is followed by a systemic banking crisis within four years (so if the banking crisis dummy equals to 1 at least once in the interval of t to $t+4$), such a boom is considered «bad» or «unhealthy».

The newly created variables differ in the following way: for the threshold of $0.75\ s.d.$ 5 booms are reclassified (1% of all booms), thus making the number of bad booms go from 67 in the original specification to 72 in the new one. For the threshold of $1\ s.d.$ only 2 booms are reclassified (0.6% of all booms), making the number of bad booms go from 52 in the original specification to 55 in the new one. For the $1.25\ s.d.$, there are no changes made. Considering the

24

changes are not significant, the choice of threshold does not seem to play a definitive role in the model's set-up. However, to make completely sure it does not, the regression from the Table 5 is run with the newly created dependant variable. All of the results hold, however the magnitude of the marginal effects is altered insignificantly: in the full specification, β for the average size increased from 3.604 to 4.64. The rest of the changes are minor and do not constitute any cases of interest.

IV. Macroeconomic Policies around the Booms

A. Empirical Strategy

After the policy variables are quantified, the variables from the three groups described in Part II.F – macroprudential measures, monetary policy indicators and financial reforms – are included in the panel logistic regression explaining the quality of the booms. In order to put macroeconomic policies enacted around the booms into the connection with their quality and spot the policies that are significantly connected to the «bad» booms of private debt, the following empirical model is estimated:

$$log\left(\frac{P[badboom_{i,b,t} = 1 | Z_{i,b,t-1}, LP_{i,b,t-1}, FP_{i,b,t}]}{P[badboom_{i,b,t} = 0 | Z_{i,b,t-1}, LP_{i,b,t-1}, FP_{i,b,t}]} \right) = \alpha_i + \beta Z_{i,b,t-1} + \gamma LaggingPolicy_{i,b,t-1} + \phi FastPolicy_{i,b,t} + \epsilon_{i,t}$$

The $badboom_{i,b,t}$ dummy equals to 1 if a boom b in a country i in a year t is followed by a banking crisis, while vector $Z_{i,b,t-1}$ includes a set of additional controls analysed with each set of variables from the Part II.F. For some of the controls, they are taken with a one year lag to avoid endogeneity as their developments might be affected by the booms dynamics, while others are taken without any. $LaggingPolicy_{i,b,t-1}$ is the vector of the policy variables that are affecting economy with a time lag (fiscal measures, reforms), while $FastPolicy_{i,b,t}$ is the vector of the policy variables that are affecting economy quickly (monetary measures). α_i is the country fixed-effect which accounts for within-sample countries specificity and only country-fixed effects are used. Thus the coefficients of interest are those presented by the vectors γ and ϕ.

B. Financial Liberalisation Reforms

Together with the debate on whether a higher level of financial development of the EMDEs might play a role in the booms quality, there is no consensus on whether financial liberalisation, or the reduction of role of the state in the financial system, that ofter comes with a higher level of financial institutions and markets, is needed by the developing world (Arestis and Demetriades, 1999). Theoretical models predict that financial liberalisation has a significant positive effect on the economic development through diverting the harmful effects financial repressions have on the efficiency and allocations of investment and through increasing the returns to investments (McKinnon, 1973; Shaw, 1973).

Based upon this influential body of work that advocates for financial liberalisation, international financial organisations like WorldBank or IMF started advising countries, especially those developing ones or in transition, on financial sector deregulation and liberalisation. A composition of different measures policymakers were advised to proceed with in order to achieve higher economic outcomes has become almost inseparable from the term of financial liberalisation. Moreover, the term «Washington Consensus» that represented this set of measures had become the representation of the new wave of economists and policymakers who believed that the one-fits-all approach aimed at increasing fiscal discipline, FDI openness, financial and trade liberalisation, and privatisation would help countries to develop (Rodrik, 2006).

At the same time, theoretical advances were not always supported by the empirical studies based on the real examples of «Washington Consensus»-type policies implementation. If the liberalisation of the banking and financial sector happens without proper conditions that include a stable monetary system and an established supervision network for the national banks, it can have unfavourable economic impact, especially in the context of the EMDEs (Balassa, 1989). Thus it is important to see the way financial liberalisation reforms affect the booms of private debt, which serve as an indicator for a major economic situation in the country.

Table 7 below presents the results of the model that connects the components of the financial liberalisation index with the quality of the booms in the studied countries, while Table 8 presents the same specification results with a different dependant variable. While Table 7 shows the effect financial liberalisation reforms have on the probability of a boom during the reform year to turn out badly, Table 8 illustrates how reforms are connected to the probability of any boom to occur during the reform year. Since financial liberalisation is tightly linked to financial

26

development, FD is included as a control in several different specifications analysed. Table 9 presents the results for both dependant variables with the vector of lagged financial liberalisation variables. All models are analysed in both full- and reduced-sample specifications, and the most convincing evidence derived from the analysis is presented in the tables.

Both types of specifications are analysed due to the following reasons: 1) lagged variables allow to avoid the endogeneity concerns as some of the financial liberalisation reforms can potentially be caused by the private debt developments and booms (although there is no such established mechanism in the literature); 2) lagged variables are used for the reforms as they can be attributed to the group of «lagging» policy measures; 3) at the same time, the overall level of financial liberalisation in a particular year can be vital for determining the subsequent boom's quality and developments. A more liberalised banking sector can provide more liquidity to the private sector and thus spur the private credit build-ups via an increased credit supply channel (Verner, 2019). Thus both models are included into the analysis in this section.

Table 7: "Financial Reforms effect"					
	bad booms				
creditcontrols_merge	1.044	0.931			
	(0.833)	(0.788)			
intratecontrols_merge	0.641	0.596			
	(1.233)	(1.187)			
entrybarriers_merge	-0.696	-0.759			
	(1.223)	(1.270)			
intlcapital_merge	0.781	0.746			
	(1.095)	(1.162)			
privatisation_merge	-2.525**	-2.547**			
	(0.963)	(0.967)			
securitymarkets_merge	-0.762	-0.545			
	(1.311)	(1.522)			
bankingsuperv_merge	0.113	0.0837			
	(1.400)	(1.330)			
FD		-1.860	0.326	0.512	-3.547
		(6.963)	(4.737)	(5.812)	(11.29)
finreform_n_merge			-4.611	-12.52	-18.18*
			(3.615)	(6.711)	(9.023)
Constant	-1.228	-0.481	1.023		
	(1.597)	(2.831)	(2.405)		
Observations	144	142	142	68	53
FE	NO	NO	NO	YES	YES
1991-2017	✓	✓	✓	✓	X
1991-2005	X	X	X	X	✓

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

While there are a lot of effects from different financial liberalisation measures that increase the probability of a build-up to occur, only the privatisation of the banking sector in the years of the booms, the one dimension of the financial reforms that has the lowest correlation with the rest of the components, can be definitive to its quality. At the same time, it holds no explanatory power for distinguishing boom years from the «within-trend» private debt developments. The lower the share of the state ownership in the banking sector is, the lower the probability the boom of private debt issued by this sector will turn out badly. While the high levels of banking sector nationalisation is considered to be «the most direct form of control a government can have over credit allocation» (Abiad et al., 2008), increasing the level of private ownership can help to achieve «higher benefits for firms due to the increase of efficiency» (Tori and Onaran, 2017). Indeed, section III shows that efficiency of the financial sector institution is the major driving force behind the quality of the boom, and privatisation is complimentary to the FD's index efficiency components.

Interestingly, neither credit nor interest rate controls liberalisation has a positive effect on the quality of the boom. At the same time, both of these measures are important for the overall private debt build-ups developments. While restrictive credit controls and reserve requirements serve its purpose of restraining the credit accumulation by the private sector and thus liberalisation of this account is connected to an increase in a boom's occurrence probability, the interest rates liberalisation, or the process of «both deposit interest rates and lending interest rates being determined at market rates» is negatively related to the booms' occurrence. Besides, boom occurrence probability is positively connected to entry barriers lifting and banking supervision relaxing, while it tends to decrease for the years that were marked with the reforms aimed at developing and liberalising the securities market

The correlation with the interest rates liberalisation can be explained trough the overall depth and efficiency of the banking sector's institutions channel, as when the rates are set by the government they do not account for the local market structure and development levels. Indeed, when the control for the local level of financial development is included into the model, the coefficient for the interest rates controls becomes insignificant. Thus the explanatory power held by this type of financial reform over the boom occurrence probability might be spurious as the correlation is led by the general financial development indicator.

Still, the negative impact of the «planned economy» approach to the interest rates can be seen through the lenses of the financial repression research. Since under «financial repression» governments tend to «under-pay domestic savers» (McKinnon, 1973), when the government is

responsible for setting up the rates, it can abuse this power by making the rates in the economy lower than the market would have otherwise dictated (Kirkegaard and Reinhart, 2012). While some of the EMDEs are especially prone to the high sovereign debt levels, local governments have incentives to cap the rates and sustain prolonged periods of low interest rates in order to decrease the debt-servicing and other related costs (Hoffmann, 2019). The overall low interest rates environment can in turn spur the unhealthy and rapid borrowing by the private sector, that can lead to the booms of private debt. Thus, seeing the negative correlation between the liberalisation of the interest rates account and the boom probability might mean going away from the unnecessarily low interest rates that benefit local governments and the overly loose monetary stance that promotes private sector's excessive credit expansion.

Table 8: "Financial Reforms effect"					
	all booms				
creditcontrols_merge	0.328	0.562*	0.695*		
	(0.217)	(0.260)	(0.290)		
intratecontrols_merge	-0.358	-0.581*	-0.412		
	(0.220)	(0.238)	(0.266)		
entrybarriers_merge	0.481*	0.801**	0.990**		
	(0.218)	(0.250)	(0.313)		
intlcapital_merge	-0.114	-0.126	0.116		
	(0.188)	(0.207)	(0.249)		
privatisation_merge	0.0645	0.176	0.204		
	(0.181)	(0.230)	(0.254)		
securitymarkets_merge	-0.383	-1.083*	-1.296**		
	(0.326)	(0.421)	(0.492)		
bankingsuperv_merge	-0.168	-0.150	-0.487[″]		
	(0.226)	(0.253)	(0.280)		
FD				15.44***	12.36***	10.03*
				(3.366)	(2.994)	(4.577)
finreform_n_merge					1.287	1.702[″]
					(0.980)	(1.022)
Constant	-1.873***					
	(0.423)					
Observations	595	471	455	455	305
FE	NO	YES	YES	YES	YES
1991-2017	✓	✓	✓	✓	X
1991-2005	X	X	X	X	✓

Standard errors in parentheses

[″] $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9 presents the results for the specification with the lagged financial liberalisation reforms variables, employed to explain both quality of the booms and their overall occurrence. While the model that predicts the probability of any boom of private debt to occur (Column 4)

totally coincides in the results with the one presented by Table 8 (Column 3), it is still challenging to distinguish bad and good booms by the liberalisation policy presence. While as before, the model with the country-fixed effects does not gain any meaningful insights into how policies enter the private debt accumulation process, full-sample specification provides additional comprehension of the effects financial liberalisation dimensions have on the bad boom occurrence possibility.

While privatisation of the banking sector in a year before the boom inception has the same impact as the one performed during the boom year, banking supervision and international financial flows liberalisation are related to an increased probability of a bad build-up presence in an upcoming year. The channel through which a less prudential supervision of the banking sector increases the chances a boom to end up in a banking crisis speaks for itself as increased monitoring can prevent both excessive and dangerous credit accumulation. Regulators decrease the risk taking behaviour by the financial actors in the economy by integrating country-specific risk-based capital adequacy ratios, while increasing its own credibility and trust to its legal power by exhibiting both political and economic independence (Noy, 2004).

Table 9: "Financial reforms: lagged "

	bad	booms	all	booms
creditcontrolslag	0.890	1.604	0.544**	0.661**
	(0.720)	(1.226)	(0.199)	(0.243)
intratecontrolslag	0.165	1.142	-0.0345	-0.128
	(0.706)	(0.895)	(0.192)	(0.214)
entrybarrierslag	0.0726	-0.495	0.338	0.515*
	(0.597)	(1.068)	(0.190)	(0.234)
intlcapitallag	1.140*	0.945	0.0197	-0.0126
	(0.581)	(0.778)	(0.169)	(0.199)
privatisationlag	-1.189*	-0.846	0.187	0.397
	(0.542)	(0.736)	(0.160)	(0.211)
securitymarketslag	-0.625	-3.416	-0.551	-0.906*
	(1.117)	(2.431)	(0.285)	(0.397)
bankingsupervlag	-1.234*	-0.363	-0.707***	-0.767**
	(0.619)	(0.783)	(0.206)	(0.242)
FD	1.886	-2.853	5.840***	13.12***
	(4.013)	(8.689)	(1.525)	(2.673)
Constant	-2.869		-3.356***	
	(2.026)		(0.629)	
Observations	146	69	597	541
FE	NO	YES	NO	YES

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

At the same time, the mechanism through which capital account restrictions affect boom's quality might seem less straightforward. International financial flows restrictions removal is linked to financial fragility through creating currency mismatches on financially-constrained firms' balance sheets (Tornell et al., 2004). When a country opens up for the international capital inflows, firms, especially those in the 'non-tradable goods' sectors of the economy, start to receive external financing that they lacked before having access to the international market Since the revenues such firms are making are not linked to the currency they are borrowing in, any exchange rate fluctuations or shifts in external conditions can create currency mismatches, increase companies' vulnerability and susceptibility to external shocks and thus lead to a full scale banking and financial distress (Barajas, 2017).

C. Financial Liberalisation before and after the Crisis of 2008

While different components of the financial reforms vector affect the bad booms occurrence probability differently, another interesting direction to analyse it goes through comparing the effects of the cumulative index of financial liberalisation on the probability of a boom to turn out badly. Last three columns of Table 7 and last two columns of Table 8 demonstrate the results of the models that only employ the cumulative index to explain the booms. While several studies show that financial liberalisation can be linked to an increased probability of a financial crisis to occur (Caprio and Klingebiel, 1996), other authors find that banking sector vulnerability is defined by the local level of institutional efficacy and supervision and non-linearly connected to the reforms (Hamdaoui et al., 2016). Thus since the effects of financial liberalisation on the economy can be influenced by the local level of financial development and financial depth, the vector of controls for each specification includes an index of financial development (FD).

The first insight that comes from the results presented in Tables 7 and 8 is that it is indeed the case that the level of financial liberalisation in a country affects both the occurrence and the quality of the booms of private debt. However, a significant connection only persists on a reduced sample that covers the data before the Global Financial Crisis of 2008 (GFC). The year of 2005 is taken as a threshold to distinguish between the full and reduced sample to be consistent with the dependant variable creation design: since the point of this division is to see whether the effect of financial liberalisation would differ on the pre-crisis data, the crisis itself should not affect any variables in that sample. Thus, since bad booms dummy is forward-looking and embed the

information on the subsequent crises up to 3 years in the future, in order to exclude the 2008 crisis, the last «unaffected» year should be 2005.

Last columns in both tables show that the cumulative index of financial liberalisation has strong predictive power for the dependent variables, however the effects differ dramatically. While there is a positive connection between financial liberalisation and a build-up occurrence in a developing country, that is predicted by the papers claiming a negative effect liberalisation brings to the developing world, the effect reverses when it comes to distinguishing «bad» and «good» booms. Indeed, an increase in the overall financial liberalisation has a strong diminishing effect on the probability of a boom to turn out unhealthy and be connected to a major banking crisis. In turn, this result corroborates the conclusion that controlling for the level of financial development in a country, there is no definitive link between financial liberalisation and economic distress what so ever. Oppositely, higher level of liberalisation, while accompanied by a bigger number of private debt build-ups, has no negative effect on their quality but rather decreases the probability of the bad booms occurrence.

Comparing these results to the ones obtained from the full sample specification, covering both pre- and post-crisis years, it becomes clear that the fact that financial liberalisation stops holding any predictive power over both dependant variables must be connected to the events of 2008. Since the model stays the same and the number of observations only increases, this effect can't be explained by the econometric design issues, and the reason must lie in economic landscape evolvement or policy environment changes before and after the crisis. The first vector of analysis is the simple ex-post reasoning: while before the GFC, there was a clear trend towards a higher financial liberalisation, that coincided with economic growth and sustainable enhancing of the standards of living in the developing world (Appendix IV.C.1), this correlation ended up with the crisis of 2008. The crisis hit both more advanced economies with the highest levels of financial liberalisation and developing countries that only started to undertake the reforms (Dolphin and Chappell, 2010). Thus, data show no consistent relation between financial liberalisation, private debt developments, and its quality on the full sample: the reversal of the trend in the post-crisis years doesn't allow to see any conclusive evidence that would consistently be true for the whole period of time analysed in the paper.

At the same time, it is possible that something more economically-driven happened around the crisis years that reversed the trend: while the conclusions from the ex-post standpoint are undeniable, they do not show the reason behind the reversal of the trend, and thus present no economic theory of why financial liberalisation was associated with positive economic outcomes

only for a limited period of time, ending with the GFC. Some authors claim that financial liberalisation is something that can lead to a financial distress (Akinsola et al., 2018): indeed, while financial liberalisation brings higher economic growth prospects, it also can increase the overall vulnerability of the economies. Thus, it might be the case that the relation between liberalisation and economic stability is non-linear. In fact, this would explain the results obtained by the models above: before 2005, the liberalisation was growing up to the point it became dangerous for the economy and «triggered» the financial crisis, and thus must have decreased afterwards to demonstrate the inverted U-shape relationship.

Two figures below demonstrate the developments of the average financial liberalisation index for the studied countries over the full and reduced sample of years. The hypothesis above seems to hold while looking at the reduced sample graph (on the left), as the year of 2005 is marked with the highest average level of financial liberalisation. At the same time, the full sample graph (on the right), does not corroborate the explanation outlined above: there is no evident reversal of the financial liberalisation trend on the EMDEs sample, while the flattening of the curve might indeed indicate that countries have reached the maximum possible liberalisation, and that almost no developments over the 10-year period of time show that this level of liberalisation has been an optimal one. Thus, the loss of predictive power for the liberalisation index can be explained through the following mechanism: while the countries are still at the low levels of liberalisation, increasing it helps to diminish the probability of bad booms to occur due to an increased efficiency of funds allocation and their availability. At the same time, this process can't last forever: when financial liberalisation reaches a certain point, there is no sense or instruments to increase it further and thus while it stays at a constant level, it has no additional explanatory power over the booms of private debt or their quality.
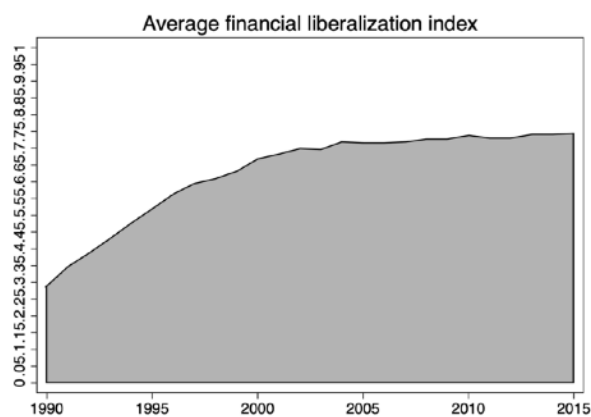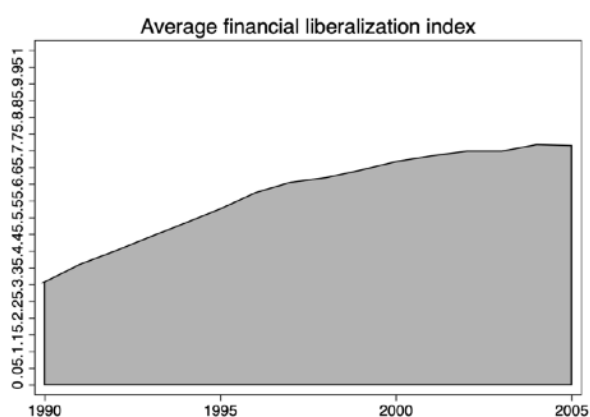
D. Macroprudential Measures

Historically, financial liberalisation in the developing world increases its attractiveness for the foreign investments and pull significant capital inflows from the abroad that affect both domestic exchange rates and credit levels. This situation when countries start to face volatile capital inflows coupled with deteriorated current account balances and other demand imbalances create financial fragility, especially evident in the aftermath of the GFC. The crisis has shown the limitations of the microprudential approach, that was mainly employed by the monetary regulators before: the modern financial system became much more sensitive to systematic risk rather than to risk on the level of individual institutions (Hannoun, 2010). It highlighted the fact that financial sector stability is unfeasible without a thorough macroprudential set of policies that can mitigate the consequences of an overly globalised system prone to frictions (Gazel, 2019). Credit growth, both in public and private sectors, started to be considered as a major source of economic turbulence, thus quite a few macroprudential measures, or economic policies that were aimed at reducing the adverse spillovers from the financial sector onto the real one, were enacted in order to guarantee financial stability.

Thus, speaking about the booms of private debt, it is crucial to consider the effect macroprudential policies have on their developments and quality. The macroprudential policy toolkit is usually employed to «create buffers and curb excessive private sector leverage and this helps mitigate the effects of shocks on the housing sector, and thus on economic and financial stability» (Jácome and Mitra, 2015). While macroprudential measures are considered to be one of the most efficient types of policy interventions when it comes to credit booms containment, it is important to bear in mind that their implementation takes time after they are enacted, and the the pass-through of policy instruments to the economy is reliant on the local institutions quality and accountability (ESRB, 2019). To account for that, while evaluating the macroprudential policies effects on the private debt build-ups, besides the vector of lagged macroprudential measures themselves, models include the vector of controls in a form of local GDP per capita and Financial Development index.

While the vector of reforms include over 20 variables with different degrees of specification, in order not to run out of degrees of freedom, this paper takes into consideration only the most important indicators from each big group (and also those that are particularly relevant for the private debt developments): 1) capital and liquidity requirements; 2) asset and credit expansion

requirements; 3) reserves requirements; and 4) other risks. The first group of variables is presented by the *'Liquidity'* variable that describes the measures taken to mitigate systemic liquidity and funding risks. The second group variables of interest are limits to the loans-to-value ratio – *'LTV'*, which are mostly aimed at controlling the households' credit expansion and required collateral, and *'LLP'* – which accounts for loans loss provisions as a part of macroprudenial policy aimed at controlling sectoral credit provision (for example, housing loans). Reserve requirements are presented by the *'RR'* variable responsible for both domestic and foreign currency reserves, while the *'SUM'* indicator compounds all of the macroprudential measures in a country into a one cumulative measure. All of the measures are grouped by their reactiveness into the loosening and tightening categories, so it is more clear which effect each direction of macroprudential policy has and whether they are symmetrical.

Table 10 below presents the results of the model that connects the local macroprudential policy loosening with the boom occurrence probability and quality of the booms in the studied countries, while Table 11 presents the same specification results with the vector of policy tightening variables. Both tables shows the effects macroprudential policies enacted a year prior to the boom episode have on the probability of it to turn out unhealthy and whether tightening or loosening of the macroprudential policy can be connected to an increased probability of a boom to occur in the year right after the measures were implemented. All of the analysed specifications in this section include country-fixed effects.

Table 10: "Macroprudential policy loosening effect"

	bad booms	all booms
LLP_Llag	-0.0211	-0.128
	(4.214)	(0.866)
LTV_Llag	-6.691*	-0.124
	(3.338)	(0.690)
Liquidity_Llag	-1.235	0.0782
	(1.931)	(0.484)
RR_Llag	-1.092	-0.273
	(1.236)	(0.324)
SUM_17_Llag	2.415"	0.456
	(1.410)	(0.279)
FD	6.677	6.957***
	(7.729)	(1.749)
lagGDPpercap	-0.000631***	-0.00000136
	(0.000181)	(0.0000270)
Observations	143	1290
FE	YES	YES

Standard errors in parentheses
" $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: "Macroprudential policy tightening effect"

	bad booms	all booms
LLP_Tlag	0.502	0.512
	(0.939)	(0.364)
LTV_Tlag	-0.0410	0.601"
	(1.386)	(0.358)
Liquidity_Tlag	-1.243	-0.0871
	(1.363)	(0.289)
RR_Tlag	0.518	-0.0943
	(0.624)	(0.170)
SUM_17_Tlag	0.195	-0.0540
	(0.434)	(0.109)
FD	6.635	7.428***
	(7.484)	(1.767)
lagGDPpercap	-0.000597**	0.00000318
	(0.000190)	(0.0000269)
Observations	143	1290
FE	YES	YES

Standard errors in parentheses
" $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Interestingly, none of the effects that macroprudential policies have on the booms' development are symmetrical, which gains the first insight that it might be dangerous for the policymakers to assume otherwise and base their interventions on the notion that if loosening of the certain policies lead to an increase in the certain indicator, their reversal would be connected to a decrease in it. This result becomes especially relevant when the effect from the cumulative measure of the macroprudential policies is taken into account: while there is a positive and significant connection between the cumulative measure for policy loosening and the boom's quality deterioration, there is no opposite effect from the tightening of the policy on the quality improvement. In other words, while policymakers can exacerbate the boom's consequences by having an overly loose macroprudential policy stance in the economy, they can not reverse the process of boom's quality retrogression with an immediate set of tight macroprudential policies.

The second unexpected set of results is connected to the LTV variable explanatory power over the booms dynamics and their quality. First, there is a negative correlation between the loosening of the LTV limits and the probability of a boom to turn out badly, which might seem counterintuitive at first. Indeed, the more loose the limits to the loan-to-value ratios are, the lower the chances that the boom of private credit that follows this loosening would be connected to a

banking crisis. Second, the tighter the limits are, the higher the chances that the following year will be marked with a private debt build-up occurrence.

However, operations with the loan-to-value limits tend to be associated with a decline in housing prices appreciation, but most importantly, they alter expectations local economic agents have concerning the future prices dynamics (Igan et al., 2011). So the mechanism behind such an effect might be the following: since LTV limits control the demand side of the private debt market and stop borrowers with insufficient savings from entering the scene, lower LTV limits are actually indicative of a healthier cohort of the borrowers on the market Since borrowers with lower LTV limits are less prone to speculative borrowing and tend to be more resilient to the price shocks (Jácome and Mitra, 2015), the overall decrease in the limits (or their loosening) can indeed be connected to healthier borrowing, and thus lower probability of a boom to turn out badly.

At the same time, LTV limits tightening is associated with an increased probability of the booms due to the following reasons. First, as tightening can alter expectations of the economic agent, the process when they hedge against the risk of any further tightening in the upcoming years and start to borrow money immediately can trigger a build-up of the private debt. It does not affect the quality of the booms as people just stop postponing taking a loan, and want to do so while still being eligible for it. At the same time, tightening of the LTV limits might happen in the middle of the rapid credit expansion in order to tame it, as normally «LTV and DTI ratios limits are adopted to mitigate sector specific credit booms» (Basto et al., 2018), however since it takes time for the market to adjust for the new regulation, the booms might still be associated with the macroprudential policy tightening.

E. Monetary Policy

While macroprudential policies and financial reforms are measures that can be and in many cases are specifically enacted around the especially volatile economic episodes, there are also more simple, everyday measures with which policymakers intervene to alter the quality of the private debt in the economy and the way it develops over time – for example, monetary policy measures. Some authors claim that while monetary interventions can be used to guarantee the long-run financial system soundness, in the short- and medium-turn it could increase instability, and fuel excessive credit and risk taking by the private sector (Bauer and Granziera, 2016). Even though these conclusions are contingent on the initial level of the debt-to-GDP ratio and on the overall

development of the economy and its financial depth, the effects of the monetary conditions on the booms developments can be quite significant.

To account for the monetary conditions and see if they have any meaningful effect on the private debt build-ups in the analysed sample of EMDEs, this paper relies on two different empirical specifications: one which shows if real interest rate in the economy is connected to the booms occurrence and quality, and the other which connects the dependent variables to the lending rate. Both types of interest rates are considered to be a combination of the general economic factors in the country and the monetary policy stance, set by the Central Bank. Both specifications are analysed with a set of controls that are considered critical for the way rates affect the economy and the private sector credit accumulation: initial private debt size (debt-to-GDP ratio), GDP in per capita terms and GDP growth. Since monetary policy and its components are not considered to be lagging, the variables are taken without a lag. In order to eliminate the endogeneity concerns, Appendix IV.E.1 presents the results with the lagged variables which only differ in the effects' magnitude. Table 12 presents the results for the bad booms dummy, while Table 13 shows the way boom presence is connected to the monetary conditions.

Table 12: "Monetary policy effect"

	bad		booms	
Real interest rate	-0.00832	-0.0192		
	(0.0389)	(0.0472)		
Private debt	0.104***	0.158**	0.0891**	0.159*
	(0.0287)	(0.0558)	(0.0290)	(0.0644)
GDP per cap	-0.000636**	-0.000999*	-0.000356	-0.000789
	(0.000243)	(0.000407)	(0.000238)	(0.000469)
GDP growth rate	-0.133	-0.0982	-0.145	-0.117
	(0.0845)	(0.0927)	(0.0873)	(0.0989)
Lending interest rate			0.200**	0.208*
			(0.0665)	(0.0910)
Constant	-8.751***		-11.48***	
	(1.357)		(2.360)	
Observations	307	80	307	80
FE	NO	YES	NO	YES

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

While real interest rate does not seem to have a significant predictive power over either occurrence or quality of the booms, lending interest rate serves as a powerful predictor for the booms' quality in both full and reduced sample specifications. From the IMF's definition, lending rates are those representative interest rates offered by banks to resident customers, specific for each analysed country in the sample. Indeed, lending rates serve as the closest proxy to the actual debt-

servicing cost for the household and non-financial corporations that borrow in the economy. Thus, the reasoning for the fact that higher rates are associated with a deterioration in the boom's quality is quite straightforward: while normally risk is counted in to the rate of lending, the higher the average risk of the borrowers in the economy, the higher the interest rate would be requested by the financial institutions. Also, the higher the discount rate in the economy, the bigger the chances only risky enterprises would borrow. Since the quality of the borrowers, or the demand side of the equation, is crucial for the general health of the economy through the non-performing loans rates and the countercyclical capital buffer for financial stability and banking sector resilience formation, it also becomes critical for the condition of the booms in the economy.

Table 13: "Monetary policy effect"

	all		booms	
Real interest rate	0.00533 (0.00885)	-0.00255 (0.00911)		
Private debt	0.0882*** (0.0140)	0.146*** (0.0128)	0.0888*** (0.0137)	0.145*** (0.0127)
GDP per cap	-0.0000811** (0.0000312)	-0.0000951** (0.0000344)	-0.0000886** (0.0000313)	-0.0000959** (0.0000346)
GDP growth	-0.0341 (0.0229)	-0.0311 (0.0234)	-0.0356 (0.0228)	-0.0321 (0.0235)
Lending interest rate			-0.00745 (0.00905)	-0.00389 (0.00974)
Constant	-4.188*** (0.660)		-4.010*** (0.693)	
Observations	1103	1082	1107	1086
FE	NO	YES	NO	YES

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

At the same time, the monetary policy stance effect is hard to disentangle only having the composite rate. It might seem that the supply side of the market would want to tame the booms by increasing the policy rate in the economy. However, the results from Table 13 do not corroborate this assumption: when distinguishing boom and non-boon years, risk that is embedded into the lending rate should not differ dramatically as the majority of the booms do not lead to any financial distress. Thus, the developments of the lending rates between those episodes must normally be attributed to the monetary policy fluctuations. If that is the case, pure monetary policy stance effect on the booms developments should be seen in the last two columns of Table 13, where a higher rate should be connected to a lower probability of a boom. However, neither lending nor real interest rates are important for explaining the overall booms' occurrence, which leaves the tentative conclusions on how pure monetary policy stance affects the economy unconfirmed.

V. Conclusion

Tracking private debt developments and analysing the way booms of private debt could turn out has become increasingly important in the present environment, marked with the historically highest levels of indebtedness. Even though credit provision is proven to be essential, especially in for EMDEs, the danger rapid expansion brings to the vulnerable economies of the developing world is undeniable and must be timely curtailed by the local policymakers. While the majority of the private debt booms do not pose any jeopardy to economic development, it is crucial to be able to detect those that do and intervene effectively.

This paper documents evidence that policymakers in EMDEs have tools to distinguish bad and good booms in the early stages of their accumulation. By analysing the behaviour of several indicators as Stock price volatility, Current account balance, and Loans-to-deposits ratio, that precedes the beginning of a private credit boom, policymakers can understand the quality of the future boom. Moreover, they can start to guess the way the boom will turn out just by looking at its initial size: not as powerful as the rest, it still allows to predict the quality with a better than «coin-toss» probability (AUC=0.65). Being able to recognise bad booms, policymakers can employ measures that are proven to be effective while dealing with dangerous build-ups.

While the local level of financial development, specifically the access and efficiency of the financial institutions, are crucial for determining the quality of the private-debt build-ups, the results of the intervention might also be contingent on the general economic and financial maturity. At the same time, anti-«Washington consensus» views that reject the efficiency of the financial liberalisation for the developing world are not corroborated by the findings of this paper. Even though financial liberalisation reforms tend to increase the probability of a build-up to occur, they are associated with a decreased probability of a boom to turn out badly. Besides, financial liberalisation can have long-run economic benefits but must be accompanied by a stable banking system and reasonably limited interventions.

As for the macroprudential measures, they do not seem to be effective as preventive policies that can stop booms' quality from deteriorating. However, macroprudential loosening can have detrimental effects on the private debt booms' quality, leaving the right balance between financial liberalisation and macroprudential supervision to be determined in further research. Besides, a more conclusive analysis of the effects from the monetary and fiscal interventions is needed, while an interesting area of development also lies in determining additional effects GFC had on the private debt developments and policy interventions around it.

Literature used:

1. Abiad, A., Detragiache E., & Tressel T. (2008). A New Database of Financial Reforms. IMF Working Paper No. 08/266.
2. Akinsola, F. A. (2018). Revisiting financial liberalisation and economic growth: A review of international literature. UNISA Working Paper.
3. Alam, Z., Alter, M. A., Eiseman, J., Gelos, M. R., Kang, M. H., Narita, M. M., ... & Wang, N. (2019). Digging deeper – Evidence on the effects of macroprudential policies from a new database. International Monetary Fund.
4. Al-Yousif, Y. K. (2002). Financial development and economic growth: another look at the evidence from developing countries. *Review of financial economics*, *11*(2), 131-150.
5. Arena, M., Bouza, S., Dabla-Norris, M. E., Gerling, M. K., & Njie, L. (2015). Credit booms and macroeconomic dynamics: Stylized facts and lessons for low-income countries. International Monetary Fund.
6. Arestis, P., & Demetriades, P. (1999). Financial liberalization: the experience of developing countries. *Eastern Economic Journal*, *25*(4), 441-457.
7. Ayyagari, M. et al. (2017). Credit growth and macroprudential policies: preliminary evidence on the firm level. BIS Papers No 91.
8. Balassa, B. (1989). Liberalizing trade between developed and developing countries. In *New Directions in the World Economy* (pp. 355-377). Palgrave Macmillan, London.
9. Basto, R., Gomes, S., & Lima, D. (2019). Exploring the implications of different loan-to-value macroprudential policy designs. *Journal of Policy Modeling*, *41*(1), 66-83.
10. Bauer, G. H., & Granziera, E. (2016). Monetary policy, private debt and financial stability risks. Private Debt and Financial Stability Risks (November 11, 2016).
11. Barajas, M. A., Restrepo, S., Steiner, M. R., Medellín, J. C., & Pabón, C. (2017). Currency mismatches and vulnerability to exchange rate shocks: non-financial firms in Colombia. International Monetary Fund.
12. Bernanke, B. S., Gertler, M., & Gilchrist, S. (1999). The financial accelerator in a quantitative business cycle framework. *Handbook of macroeconomics*, *1*, 1341-1393.
13. Bernardini, M., & Forni, L. (2017). Private and Public Debt: Are Emerging Markets at Risk? International Monetary Fund.
14. Bezemer, D. J., Grydaki, M., & Zhang, L. (2014). *Is financial development bad for growth?*. University of Groningen, Faculty of Economics and Business.
15. Caldera Sánchez, A., et al. (2017). Strengthening Economic Resilience: Insights from the Post-1970 Record of Severe Recessions and Financial Crises/ OECD Economic Policy Papers, No. 20.
16. Caprio, G., & Klingebiel, D. (1996). Bank insolvency: bad luck, bad policy, or bad banking?. In *Annual World Bank conference on development economics* (Vol. 79, pp. 1-26).
17. Chen, M. S., & Kang, J. S. (2018). *Credit Booms—Is China Different?* International Monetary Fund.
18. Claessens, S., Keen M., and Pazarbasioglu C. (2010). Financial Sector Taxation. IMF report with background material presented to the G-20 (Washington, DC: International Monetary Fund).
19. Dell'Ariccia, G., Igan, D., & Laeven, L. U. (2012). Credit booms and lending standards: Evidence from the subprime mortgage market. *Journal of Money, Credit and Banking*, *44*(2−3), 367-384.

20. Dell'Ariccia G. et al. (2012). Policies for Macrofinancial Stability: How to Deal with Credit Booms. IMF Staff Discussion Note.

21. Dell'Ariccia, G., Igan, D., Laeven, L., & Tong, H. (2016). Credit booms and macrofinancial stability. *Economic Policy*, *31*(86), 299-355.

22. Denk, O., & Gomes, G. (2017). Financial re-regulation since the global crisis?: An index-based assessment. OECD Working Paper.

23. Demirgüç-Kunt, A., & Detragiache, E. (1998). The determinants of banking crises in developing and developed countries. *Staff Papers*, *45*(1), 81-109.

24. Dolphin, T. & Chappell L. (2010). The Effects of the Global Financial Crisis on Emerging and Developing Economies, Institute for Public Policy Research-IIPR, September.

25. Elekdag, S., & Wu, Y. (2013). Rapid credit growth in emerging markets: Boon or boom- bust? *Emerging Markets Finance and Trade*, *49*(5), 45-62.

26. ESRB. (2019). Features of a macroprudential stance: initial considerations. ESRB Reports.

27. Foluso A. Akinsola & Nicholas M. Odhiambo | David McMillan (Reviewing Editor) (2017) The impact of financial liberalization on economic growth in sub-Saharan Africa, Cogent Economics & Finance, 5:1.

28. García, A.E., & Salas, J. (2016). Spanish boom-bust and macroprudential policy.

29. Gazel, Sümeyra. "The Effects of Macroprudential Policies on Financial Stability in Developing Countries." *Maintaining Financial Stability in Times of Risk and Uncertainty,* edited by Abhishek Behl and Sushma Nayak, IGI Global, 2019, pp. 92-114.

30. Gorton, G. & Ordonez, G. (2016). Good Booms, Bad Booms. NBER Working Paper 22008.

31. Gourinchas, P. O., Valdes, R., & Landerretche, O. (2001). *Lending booms: Latin America and the world* (No. w8249). National Bureau of Economic Research.

32. Gourinchas, P. O., & Obstfeld, M. (2012). Stories of the twentieth century for the twenty-first. *American Economic Journal: Macroeconomics*, *4*(1), 226-65.

33. Hamdaoui, M., Zouari, A., & Maktouf, S. (2016). The effect of financial liberalization on banking sector stability. *International Review of Applied Economics*, *30*(5), 644-667.

34. Hannoun, H. (2010). Towards a global financial stability framework. In Speech at the 45th SEACEN Governors' Conference, Siem Reap province, Cambodia (pp. 26-27).

35. Hoffmann, A. (2019). Beware of financial repression: lessons from history. *Intereconomics*, *54*(4), 259-266.

36. Igan, D. O., Kang, H., Claessens, S., & Habermeier, K. F. (2011). Do Loan-To-Value and Debt-To-Income Limits Work? Evidence From Korea, *IMF Working Papers*, *2011*(297), A001.

37. Jácome, L. I., & Mitra, S. (2015). LTV and DTI Limits-going Granular. IMF Working Paper WP/15/154

38. Jeanne, O., & Korinek, A. (2010). Managing Credit Booms and Busts: A Pigouvian Taxation Approach. NBER Working Paper No. 16377.

39. Jordà, Ò., Schularick, M., & Taylor, A. M. (2013). When credit bites back. *Journal of Money, Credit and Banking*, *45*(s2), 3-28.

40. Jordà, Ò., Schularick, M., & Taylor, A. M. (2013), "Sovereigns versus Banks: Crises, Causes and Consequences", CEPR Discussion Paper 9678.

41. Leaven, L., & Valencia, F. (2013). Systemic banking crises database. *IMF Economic Review*, *61*(2), 225-270.

42. Mathonnat, C., & Minea, A. (2018). Financial development and the occurrence of banking crises. *Journal of Banking & Finance*, *96*, 344-354.

43. McKinnon, R. (1973). Money and Capital in Economic Development (Washington: Brookings Institution).

44. Mendoza, E. G., & Terrones, M. E. (2012). *An anatomy of credit booms and their demise* (No. w18379). National Bureau of Economic Research.

45. Meng, C., & Gonzalez, R. L. (2017). Credit booms in developing countries: are they different from those in advanced and emerging market countries? *Open EconomiesReview, 28*(3), 547-579.

46. Mian, A., & Sufi, A. (2016). Who bears the cost of recessions? The role of house prices and household debt. *Handbook of Macroeconomics* (Vol. 2, pp. 255-296). Elsevier. 29.

47. Mian, A., Sufi, A., & Verner, E. (2017). Household debt and business cycles worldwide. *The Quarterly Journal of Economics, 132*(4), 1755-1817.

48. Noy, I. (2004). Financial liberalization, prudential supervision, and the onset of banking crises. *Emerging Markets Review, 5*(3), 341-359.

49. OECD (2017). Resilience in a time of high debt. OECD Economic Outlook, Volume 2017 Issue 2.

50. Petrovska A., Georgievska L. (2015). Alternative indicator of monetary policy stance for Macedonia. BIS (IFC Bulletin, No39).

51. Rajan, R. G., & Zingales, L. (1998). Power in a Theory of the Firm. *The Quarterly Journal of Economics, 113*(2), 387-432.

52. Reinhart, C., & Kirkegaard, J. F. (2012). Financial repression: Then and now. VOX (26 March). Available at www. voxeu. org/article/financial-repression-then-and-now.

53. Richter, B., Schularick, M., & Wachtel, P. (2018). When to lean against the wind. *Journal on Money, Credit and Banking.*

54. Rodrik, D. (2006). Goodbye Washington consensus, hello Washington confusion? A review of the World Bank's economic growth in the 1990s: learning from a decade of reform. *Journal of Economic literature, 44*(4), 973-987.

55. Sahay, R., Čihák, M., N'Diaye, P., & Barajas, A. (2015). Rethinking financial deepening: Stability and growth in emerging markets. *Revista de Economía Institucional, 17*(33), 73-107.

56. Shaw, E.S. (1973). Financial Deepening in Economic Development (New York: Oxford University Press).

57. Sirtaine, S., & Skamnelos, I. (2007). Credit growth in emerging Europe. *A Cause for* Stability *Concerns.*

58. Svirydzenka, K. (2016). Introducing a new broad-based index of financial development. International Monetary Fund.

59. Tori, D., & Onaran, O. (2017). The effects of financialisation and financial development on investment: Evidence from firm-level data in Europe. SSRN Working Paper.

60. Tornell, A., Westermann, F., & Martinez, L. (2004). The positive link between financial liberalization, growth and crises. NBER Working Paper.

61. Verner, E. (2019). Private Debt Booms and the Real Economy: Do the Benefits Outweigh the Costs?. *Available at SSRN 3441608.*

62. Wachtel, P. (2018). Credit Deepening: Precursor to growth or crisis? *Comparative Economic Studies, 60*(1), 34-43.
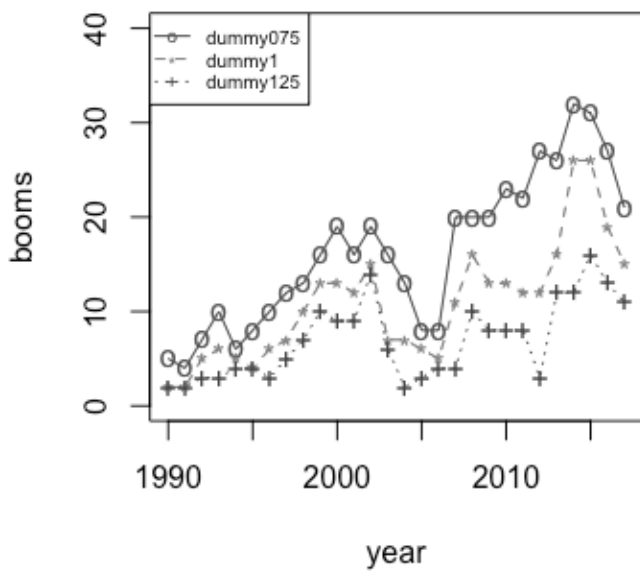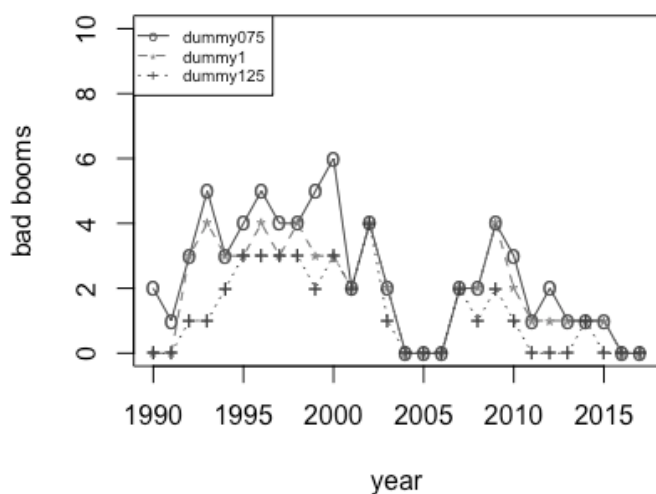
Appendix

Appendix II.B.1
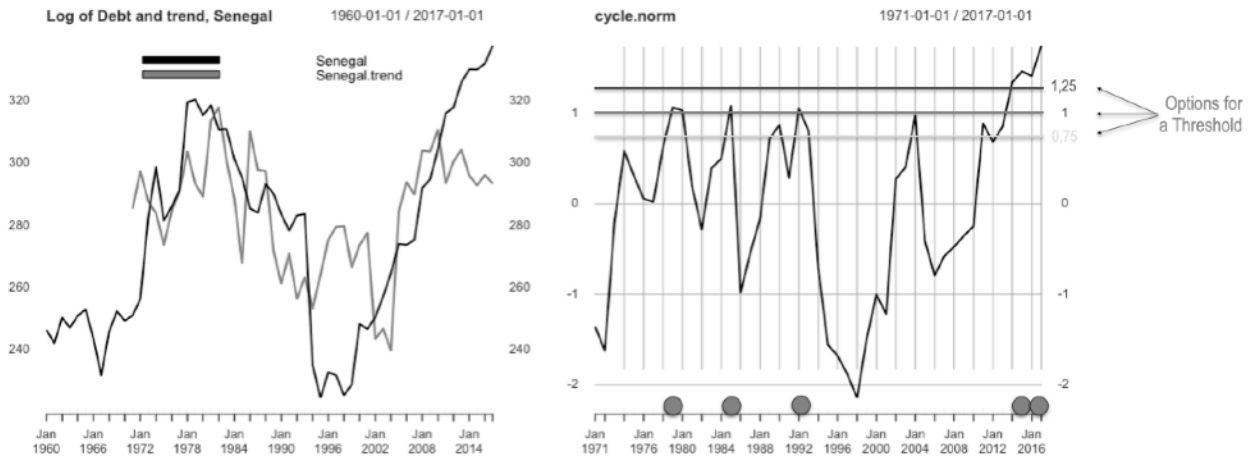
Source: author's calculations

Appendix II.B.2

Source: author's calculations

Appendix II.C

Source: author's calculations

Appendix II.D.1

Var.	Obs	Mean	Median	St. Dev.	Min	Max	Var.	Obs	Mean	Median	St. Dev.	Min	Max
			All countries							**Advanced Markets**			
FD	6222	0.23	0.16	0.21	0.00	1.00	FD	884	0.57	0.58	0.21	0.00	1.00
FI	6222	0.31	0.26	0.23	0.00	1.00	FI	884	0.66	0.71	0.20	0.00	1.00
FM	6222	0.15	0.03	0.22	0.00	1.00	FM	884	0.47	0.47	0.26	0.00	1.00
FID	6222	0.20	0.11	0.23	0.00	1.00	FID	884	0.58	0.61	0.23	0.00	1.00
FIA	6222	0.23	0.12	0.27	0.00	1.00	FIA	884	0.59	0.67	0.31	0.00	1.00
FIE	6222	0.48	0.53	0.23	0.00	1.00	FIE	884	0.64	0.66	0.12	0.00	0.97
FMD	6222	0.14	0.04	0.22	0.00	1.00	FMD	884	0.45	0.42	0.31	0.00	1.00
FMA	6222	0.15	0.00	0.24	0.00	1.00	FMA	884	0.47	0.49	0.29	0.00	1.00
FME	6222	0.15	0.01	0.28	0.00	1.00	FME	884	0.45	0.39	0.34	0.00	1.00
			Emerging Markets							**Low-Income and Developing Countries**			
FD	3026	0.23	0.21	0.17	0.00	0.85	FD	2312	0.11	0.10	0.07	0.00	0.39
FI	3026	0.30	0.29	0.19	0.00	0.87	FI	2312	0.18	0.18	0.12	0.00	0.61
FM	3026	0.15	0.07	0.19	0.00	0.90	FM	2312	0.03	0.00	0.07	0.00	0.52
FID	3026	0.18	0.13	0.18	0.00	0.99	FID	2312	0.07	0.05	0.08	0.00	0.50
FIA	3026	0.23	0.17	0.22	0.00	1.00	FIA	2312	0.08	0.03	0.14	0.00	1.00
FIE	3026	0.47	0.54	0.25	0.00	0.95	FIE	2312	0.42	0.47	0.22	0.00	1.00
FMD	3026	0.13	0.05	0.18	0.00	0.90	FMD	2312	0.03	0.01	0.07	0.00	0.50
FMA	3026	0.16	0.04	0.21	0.00	1.00	FMA	2312	0.01	0.00	0.05	0.00	0.50
FME	3026	0.16	0.03	0.26	0.00	1.00	FME	2312	0.04	0.00	0.16	0.00	1.00

Source: IMF Working Paper. Introducing a New Broad-based Index of Financial development, 2016

Appendix II.D.2

CATEGORY	INDICATOR	DATA SOURCE
Financial Institutions		
Depth	Private-sector credit to GDP	FinStats 2015
	Pension fund assets to GDP	FinStats 2015
	Mutual fund assets to GDP	FinStats 2015
	Insurance premiums, life and non-life to GDP	FinStats 2015
Access	Bank branches per 100,000 adults	FinStats 2015
	ATMs per 100,000 adults	IMF Financial Access Survey
Efficiency	Net interest margin	FinStats 2015
	Lending-deposits spread	FinStats 2015
	Non-interest income to total income	FinStats 2015
	Overhead costs to total assets	FinStats 2015
	Return on assets	FinStats 2015
	Return on equity	FinStats 2015
Financial Markets		
Depth	Stock market capitalization to GDP	FinStats 2015
	Stocks traded to GDP	FinStats 2015
	International debt securities of government to GDP	BIS debt securities database
	Total debt securities of financial corporations to GDP	Dealogic corporate debt database
	Total debt securities of nonfinancial corporations to GDP	Dealogic corporate debt database
Access	Percent of market capitalization outside of top 10 largest companies	FinStats 2015
	Total number of issuers of debt (domestic and external, nonfinancial and financial corporations)	FinStats 2015
Efficiency	Stock market turnover ratio (stocks traded to capitalization)	FinStats 2015

Source: IMF Working Paper. Introducing a New Broad-based Index of Financial development, 2016

Appendix II.E

Good booms (0,75 s. d.)	N	mean	s. d.	min	max
Inherent characteristics of the booms					
Duration	392	4.918	3.026	1	12
Duration to peak	392	3.288	2.391	1	9
Average size	392	1.25	.285	.757	2.157
Real economy variables					
log GDP per capita (current US$)	392	7.449	1.286	4.732	10.859
Investment (% of GDP)	392	24.261	8.122	6.386	55.363
Consumption (% of GDP)	392	83.503	12.547	38.713	124.434
Trade openness (sum of Import and Export as % GDP)	392	70.596	33.604	.511	200.725
FDI (Net inflows, % of GDP)	392	3.846	5.083	-6.898	39.456
Population growth	392	1.911	1.211	-.833	7.776
GDP growth	392	4.197	3.974	-16.995	17.326
Current account balance (% of GDP)	383	-4.931	9.045	-65.029	45.454
Banking and financial variables					
Loans to deposits (bank credit to private sector as a share of total deposits, %)	384	94.766	65.282	25.264	771.735
Capital to assets (bank capital and reserves to total assets, %)	216	11.095	3.254	5	23.6
Nonperforming loans (defaulting loans to total gross loans, %)	236	7.554	6.838	1.08	31.5
Stock price volatility (the average of the 360-day volatility of the national stock market index)	153	18.67	8.303	2.394	40.238

Bad booms (0,75 s. d.)	N	mean	s. d.	min	max
Duration	67	4.313	2.363	1	8
Duration to peak	67	2.731	1.919	1	6
Average size	67	1.373	.296	.561	1.899
log GDP per capita	67	7.507	1.223	4.966	9.558
Investment	67	21.323	7.97	3.924	42.863
Consumption	67	82.911	12.26	56.155	111.236
Trade openness	67	65.058	35.64	21.383	167.054
FDI	67	2.007	3.246	-15.839	11.419
Population growth	67	1.473	1.064	-.541	3.331
GDP growth	67	.742	6.402	-15.096	19.183
Current account balance	67	-1.822	5.675	-18.321	12.529
Loans to deposits	67	122.12	43.419	39.853	330.979
Capital to assets	34	10.819	4.079	1.49	17.7
Nonperforming loans	19	8.539	9.99	2.043	35.8
Stock price volatility	38	33.236	13.496	14.526	67.975

Notes: the resources for data extraction are authors calculations (first three variables), IMF and World Bank data (macroeconomic variables), World Bank Global Financial Development Database (banking variables)

Source: author's calculations

46

Appendix II.F.1

Variable	N	Mean	Std. Dev.	Min	Max
Good booms (0.75 s.d.)					
Credit Controls	99	1.861	1.094	0	3
Interest Rate Controls	99	2.189	1.054	0	3
Banking Sector Entry Controls	99	1.993	1.026	0	3
International Capital Controls	99	1.511	1.11	0	3
Privatization of Banks	99	1.515	1.134	0	3
Security Market Regulation policy	99	1.36	.633	0	3
Banking Supervision	99	.993	.744	0	3
Financial Liberalization (cumulative)	99	.688	.201	0	1
Bad booms (0.75 s.d.)					
Credit Controls	45	2.154	.856	.667	3
Interest Rate Controls	45	2.444	.918	0	3
Banking Sector Entry Controls	45	2.267	.915	0	3
International Capital Controls	45	1.911	.943	0	3
Privatization of Banks	45	1.193	.968	0	3
Security Market Regulation policy	45	1.622	.777	0	3
Banking Supervision	45	.659	.634	0	2
Financial Liberalization (cumulative)	45	.662	.184	.131	.952

Variable	N	Mean	Std. Dev.	Min	Max
No booms (0.75 s.d.)					
Credit Controls	451	1.665	.955	0	3
Interest Rate Controls	451	2.078	1.051	0	3
Banking Sector Entry Controls	451	1.831	1.098	0	3
International Capital Controls	451	1.492	1.034	0	3
Privatization of Banks	451	1.262	1.096	0	3
Security Market Regulation policy	451	1.423	.768	0	3
Banking Supervision	451	.929	.776	0	3
Financial Liberalization (cumulative)	451	.61	.223	0	1
Booms (0.75 s.d.)					
Credit Controls	144	1.953	1.031	0	3
Interest Rate Controls	144	2.269	1.018	0	3
Banking Sector Entry Controls	144	2.079	.997	0	3
International Capital Controls	144	1.636	1.074	0	3
Privatization of Banks	144	1.414	1.092	0	3
Security Market Regulation policy	144	1.442	.689	0	3
Banking Supervision	144	.889	.726	0	3
Financial Liberalization (cumulative)	144	.68	.195	0	1

Source: author's calculations

Variable	N	Mean	Std. Dev.	Min	Max
Credit Controls	983	1.635	.932	0	3
Interest Rate Controls	983	2.157	1.061	0	3
Banking Sector Entry Controls	983	1.931	1.054	0	3
International Capital Controls	979	1.575	1.068	0	3
Privatization of Banks	983	1.132	1.117	0	3
Security Market Regulation policy	983	1.426	.829	0	3
Banking Supervision	983	.893	.8	0	3
Financial Liberalization (cumulative)	983	.589	.222	0	1

Source: author's calculations

Appendix II.F.2

Capital: Capital requirements for banks, which include risk weights, systemic risk buffers, and minimum capital requirements. Countercyclical capital buffers and capital conservation buffers are captured in their sheets respectively and thus not included here. Subcategories of capital measures are also provided in separate sheets, classifying them into household sector targeted (Capital_HH), corporate sector targeted (Capital_Corp), broad-based (Capital_Gen), and FX-loan targeted (Capital_FX) measures.

LLP: Loan loss provision requirements for macroprudential purposes, which include dynamic provisioning and sectoral provisions (e.g. housing loans).

LoanR: Loan restrictions that include loan limits and prohibitions, which may be conditioned on loan characteristics (e.g., the maturity, the size, the LTV ratio and the type of interest rate of loans), bank characteristics (e.g., mortgage banks), and other factors. Subcategories of loan restrictions are also provided, classifying them into household sector targeted (LoanR_HH), and corporate sector targeted (LoanR_Corp) measures.

LTV: Limits to the loan-to-value ratios, including those mostly targeted at housing loans, but also includes those targeted at automobile loans, and commercial real estate loans.

DSTI: Limits to the debt-service-to-income ratio and the loan-to-income ratio, which restrict the size of debt services or debt relative to income. They include those targeted at housing loans, consumer loans, and commercial real estate loans.

Liquidity: Measures taken to mitigate systemic liquidity and funding risks, including minimum requirements for liquidity coverage ratios, liquid asset ratios, net stable funding ratios, core funding ratios and external debt restrictions that do not distinguish currencies.

LTD: Limits to the loan-to-deposit (LTD) ratio and penalties for high LTD ratios.

RR: Reserve requirements (domestic or foreign currency) for macroprudential purposes. Please note that this category may currently include those for monetary policy as distinguishing those for macroprudential or monetary policy purposes is often not clear-cut.

SIFI: Measures taken to mitigate risks from global and domestic systemically important financial institutions (SIFIs), which includes capital and liquidity.

SUM: Cumulative measure of all the macroprudential actions in a country.

Source: IMF Working Paper. Digging Deeper – Evidence on the Effects of Macroprudential Policies from a New Database

Descriptive Statistics: Tightening Macroprudential Policies

Variable	N	Mean	Std. Dev.	Min	Max
Capital T	2088	.05	.243	0	3
Capital Gen T	2088	.021	.155	0	2
Capital HH T	2088	.023	.151	0	1
Capital Corp T	2088	.013	.117	0	2
Capital FX T	2088	.01	.109	0	2
LLP T	2088	.023	.164	0	2
LoanR T	2088	.036	.209	0	3
LoanR HH T	2088	.031	.191	0	3
LoanR Corp T	2088	.011	.107	0	2
LTV T	2088	.033	.196	0	3
DSTI T	2088	.015	.127	0	2
Liquidity T	2088	.082	.309	0	3
LTD T	2088	.005	.072	0	1
RR T	2088	.131	.617	0	10
SIFI T	2088	.021	.152	0	2
SUM 17 T	2088	.561	1.254	0	13

Descriptive Statistics: Loosening Macroprudential Policies

Variable	N	Mean	Std. Dev.	Min	Max
Capital L	2088	.009	.1	0	2
Capital Gen L	2088	.001	.038	0	1
Capital HH L	2088	.006	.076	0	1
Capital Corp L	2088	.002	.049	0	1
Capital FX L	2088	.001	.038	0	1
LLP L	2088	.007	.082	0	1
LoanR L	2088	.005	.082	0	2
LoanR HH L	2088	.005	.082	0	2
LoanR Corp L	2088	.002	.044	0	1
LTV L	2088	.012	.113	0	2
DSTI L	2088	.001	.038	0	1
Liquidity L	2088	.014	.134	0	3
LTD L	2088	.002	.044	0	1
RR L	2088	.1	.494	0	7
SIFI L	2088	0	0	0	0
SUM 17 L	2088	.174	.677	0	11

Source: author's calculations

Appendix II.F.3

Variable	N	Mean	Std. Dev.	Min	Max
Real Interest Rate (%)	1822	7.26	13.293	-97.693	139.812
Lending Interest Rate (%)	1834	22.65	107.079	1	4260.014

Variable	N	Mean	Std. Dev.	Min	Max
No booms (0.75 s.d.)					
Real Interest Rate (%)	892	6.722	12.615	-97.693	61.186
Lending Interest Rate (%)	897	24.184	144.089	1.481	4260.014
Booms (0.75 s.d.)					
Real Interest Rate (%)	362	8.195	10.732	-58.327	93.915
Lending Interest Rate (%)	363	16.341	10.875	4.35	118.38

Variable	N	Mean	Std. Dev.	Min	Max
Good booms (0.75 s.d.)					
Real Interest Rate (%)	317	8	9.525	-58.327	45.349
Lending Interest Rate (%)	318	15.528	8.762	4.35	56.142
Bad booms (0.75 s.d.)					
Real Interest Rate (%)	45	9.566	17.062	-13.174	93.915
Lending Interest Rate (%)	45	22.089	19.527	5.85	118.38

Source: author's calculations

Appendix III.C

The graphs below illustrate the ROC curves for the Columns of the Table 6 and go from Column (1) to Column (5) sequentially.
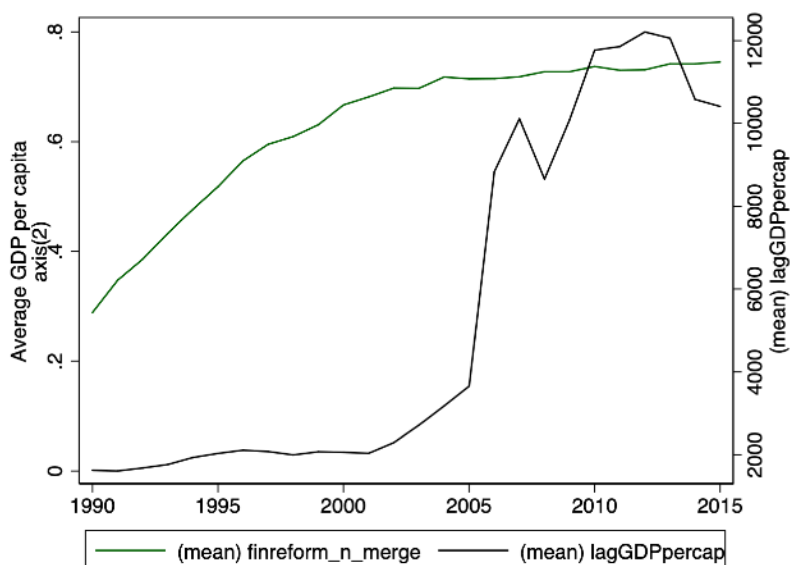

Source: author's calculations

Appendix III.D.1

bad boom	1	2	3
Duration (0,75 s.d.)	0.530 (0.296)		
Duration to peak (0,75 s.d.)	-1.559*** (0.426)		
Average size (0,75 s.d.)	3.881** (1.347)		
Duration (1 s.d.)		2.425*** (0.631)	
Duration to peak (1 s.d.)		-3.422** (1.225)	
Average size (1 s.d.)		-1.139 (1.749)	
Duration (1,25 s.d.)			1.218 (0.622)
Duration to peak (1,25 s.d.)			0.0238 (0.818)
Average size (1,25 s.d.)			0.110 (2.438)
Observations	459	304	195

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

bad boom	1	2	3
Duration (0,75 s.d.)	0.855 (0.547)		
Duration to peak (0,75 s.d.)	-2.095** (0.695)		
Average size (0,75 s.d.)	3.937" (2.307)		
Duration (1 s.d.)		20.55 (2483.0)	
Duration to peak (1 s.d.)		-38.92 (4966.1)	
Average size (1 s.d.)		1.888 (6.365)	
Duration (1,25 s.d.)			-1.564 (3672.2)
Duration to peak (1,25 s.d.)			16.74 (6037.5)
Average size (1,25 s.d.)			29.34 (35.63)
Observations	151	79	34

Standard errors in parentheses
" $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
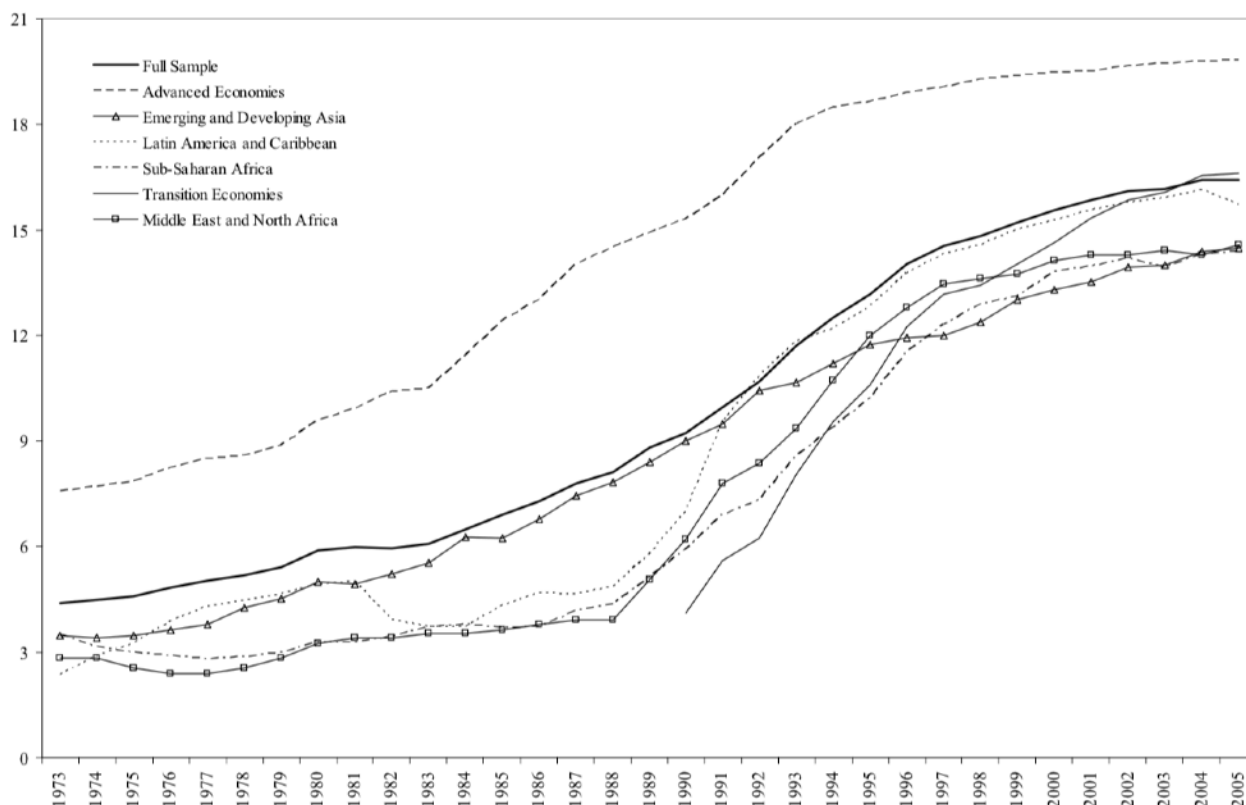
Source: author's calculations

Appendix IV.C.1

Source: author's calculations

Appendix IV.C.2

Figure 1. Financial Liberalization Index by Country Groups, 1973-2005

country	Country name
ifs	IFS 3-digit country code
wdi	WDI 3-letter country code
year	Year
directedcredit	Directed credit/reserve requirements
creditceilings	Aggregate Credit Ceilings
creditcontrols	Credit Controls, defined as 0.75*DIRECTEDCREDIT+0.75*CREDITCEILINGS when CREDITCEILINGS is avilable, and as DIRECTEDCREDIT otherwise.
intratecontrols	Interest rate controls
entrybarriers	Entry barriers/pro-competition measures
bankingsuperv	Banking Supervision
privatization	Privatization
intlcapital	International capital flows
securitymarkets	Security Markets
finreform	Financial Reform Index, 0 to 21, sum of seven components above
finreform_n	Financial Reform Index, normalized to be between 0 and 1
large_reversal	Dummy=1 if D.finreform<=-3
reversal	Dummy=1 if D.finreform<0 & D.finreform>-3
reform	Dummy=1 if D.finreform>0 & D.finreform<=2
large_reform	Dummy=1 if D.finreform>2
status_quo	Dummy=1 if D.finreform==0
Advanced	Dummy for advanced countries
Emerging_Asia	Dummy for emerging Asia
Latin_America	Dummy for Latin America
SSA	Dummy for Sub-Saharan Africa
Transition	Dummy for transition countries
MENA	Dummy for Middle East and North Africa

Source: Abiad, Detragiache, and Tressel (2008), New Financial Reform Database

Appendix IV.E.1

Table 15: "Monetary policy effect: lagged"

	bad		booms	
Real interest rate	0.0146	-0.0126		
	(0.0315)	(0.0313)		
Private debt	0.0925***	0.151**	0.112***	0.185**
	(0.0267)	(0.0546)	(0.0319)	(0.0696)
GDP per cap	-0.000551*	-0.000958*	-0.000513*	-0.000921*
	(0.000229)	(0.000409)	(0.000260)	(0.000466)
GDP growth	-0.0695	-0.0280	-0.0844	-0.0644
	(0.0801)	(0.0796)	(0.0864)	(0.0873)
Lending rate			0.190**	0.210**
			(0.0578)	(0.0773)
Constant	-8.201***		-12.90***	
	(1.324)		(2.201)	
Observations	300	80	300	80
FE	NO	YES	NO	YES

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 16: "Monetary policy effect: lagged"

	1	2	3	4
Real interest rate	0.0301**	0.0265*		
	(0.00971)	(0.0105)		
Private debt	0.0788***	0.139***	0.0828***	0.141***
	(0.0137)	(0.0128)	(0.0139)	(0.0128)
GDP per cap	-0.0000633*	-0.0000773*	-0.0000799**	-0.0000890**
	(0.0000305)	(0.0000351)	(0.0000304)	(0.0000338)
GDP growth	-0.0332	-0.0297	-0.0314	-0.0275
	(0.0240)	(0.0248)	(0.0236)	(0.0245)
Lending rate			-0.00279	-0.000430
			(0.00606)	(0.00229)
Constant	-4.110***		-3.925***	
	(0.661)		(0.690)	
Observations	1067	1034	1072	1039
FE	NO	YES	NO	YES

Standard errors in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: author's calculations