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UDK: 336.748.5(4)
DOI: 10.2478/jcbtp-2020-0033

Journal of Central Banking Theory and Practice, 2020, 3, pp. 5-26
Received: 28 April 2019; accepted: 14 August 2019

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Monetary Policy after the Great Moderation[1]

Abstract: The interferences among some financial, economic and monetary variables are checked as an indicator of economic performance in the long run and for the monetary policy applied between the Great Moderation (GM) of 1987-2001 and the Global Financial Crisis of 2007-2009. For achieving this target, some Granger causality tests are applied to GDP growth, credit growth, and lending interest of 36 countries of the EU and the OECD for the full sample of 1987-2012 and the sub-sample of 2002-2007. Results corroborate the interferences among these variables for the discretionary monetary policy applied immediately after the GM, within the "Ad Hoc Era" or "lax period", and independence when monetary policy was correctly applied and rules-based.

Key words: Monetary policy, Economic growth, Financial crises, Great Moderation, Central Banking

JEL Code: E43, E50

1. Introduction

It is well-known, the usual first aim of monetary policy is the stabilization of prices (Federal Reserve in the USA and European Central Bank in the EU), in addition to other issues such as economic growth (explicitly in the Federal Reserve). There are several reasons for that, but one of them is explained by the words of Milton Friedman (1970):

[1] **Acknowledgments:** The author expresses his gratitude for the funding received from the Regional Government of Aragon European Social Fund and the European Regional Development Fund (Public Economics Research Group).

"Inflation is always and everywhere a monetary phenomenon in the sense that it is and can be produced only by a more rapid increase in the quantity of money than in output."

As this quotation suggests, there would be no inflation if the quantity of money grew at the same rate as output, allowing a country to benefit from economic stability. In a case as this, in which output, money and prices grow at a particular growth rate, monetary policy would exert no impact on real/economic (output) and financial (prices) growth. This fact is related to the Quantitative Theory of Money (QTM), which states that, if the velocity of money is constant and there is no economic growth, then the inflation rate equals the growth rate of money[2].

Previous to the Volker disinflation in the USA (which occurred during 1980-1985), there was high inflation of 9% but monetary policy was restrictive (Goodfriend and King, 2005). Nonetheless, it is arguable that there were at least two recessions in that period, and then the quantity of money could have decreased less than output. Avoiding this discussion, in this paper we try to analyze whether financial variables as credit (instead of inflation) and economic variables as GDP are influenced by monetary policy, and the influence of monetary policy on the interaction between economic and financial variables.

So, another main question in this paper is to check whether economic growth has been at any time the target of central banks, and therefore, whether inflation has always been the lonely target of monetary policy, in addition to whether it *should* be so. Therefore, two recent periods of monetary policy and its causality on financial (lending) and real (GDP growth), and the causality between the last two are compared in this paper. First, the period from the beginning of the Great Moderation (GM) from 1987 to 2012 is analysed, and second, the period immediately after the GM, considered the lax period from 2002 to 2007 in which no correct monetary policies were followed (Peña, 2017a and Taylor, 2009) and this encouraged the Global Financial Crisis (GFC) of 2007-2009 and, after that, the Great Recession (GR). Lee and Werner (2018) have highlighted the importance of quantities in monetary policy and shown evidence about the non-impact of monetary policy in real terms (output) since the GM. Nonetheless, we consider that it could be a differentiate effect on the application of the not ruled-based monetary policy from the previous years to the GFC. So, the main contribution of this paper is considering separately the lax period between the GM and the GFC to study if monetary policy Granger-causes economic or financial fluctuations.

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[2] http://www.caixabankresearch.com/documents/10180/1148227/38-39%2BDossiers%2B4%2BING.pdf

Hence, we beg the following questions: is the interest rate independent from real and financial variables as GDP and loan credit growth in the long term? Is there any difference in the previous answer if the monetary policy is not ruled-based, as occurred immediately after the GM? In the long term, was there any independence between those financial and economic variables? And finally, do these results change if a discretionary monetary policy is applied, as in the lax period?

To answer these questions following this introduction, the paper is divided as follows. The second section shows the theoretical view and literature review on the topic. The third section exposes the methodology, data and results of the paper, while the fourth section discusses the results and contributes policy measures. Finally, fifth section provides the conclusions and further research.

2. Theoretical view and literature review

As the 2018 Nobel Laureate Paul Romer (2016) suggests, Milton Friedman and Anna Schwartz considered that monetary policy impacted on GDP during the Great Depression of 1929. In this paper we show that when monetary policy is *correctly* applied (following rules as Taylor's, taking inflation and GDP into account accurately), then money *does not cause* output shifts, whilst if the monetary policy is *incorrectly* applied (in a discretionary way or with incorrect monetary rules, as taking only inflation into account or following non-economic *criteria*), money *causes* output shifts. In order to check this result and taking into account the monetary policy established by many central bankers mainly since 2001, the paper estimates whether lending amounts Granger-cause lending interest (as indicator of a target of monetary policy) and whether lending interest Granger-cause GDP growth, differentiating between 1987-2012 and the lax period after GM (2002-2007). By this way, it can be checked if the lax monetary policy of 2000s influenced interests and if interests influenced the output just before the GR. This time division is related to the two eras exposed by Taylor (2012), differentiating between the "Rules-Based Era", from 1985-2003, when central bankers followed a predictable systemic approach, with a good economic performance; and the "Ad Hoc Era", when monetary policy is settled according to the "discretion of authorities", developing a poor economic performance.

Some authors as Romer (2016), consider that, currently, there is a relevant importance on the non-economic performance of maybe not so relevant psychological aspects on monetary policy such as the communication and way of speaking of central bankers, the "imaginary shocks", or the extended belief in Dynamic Stochastic General Equilibrium (DSGE) models that future monetary policies can-

not be predicted because each new monetary shock requires new models, thinking and policies.

Turning back to Friedman's thinking (Friedman, 1968, 1970, 1977), he considered that real economy should be independent, as he believed in the existence of a natural rate of inflation and a rate of unemployment (similar to the NAIRU or "Non-Accelerating Inflation Rate of Unemployment") independent from inflation in same ideal cases. In spite of that, some authors consider that if there is a failure of this independence hypothesis, there is a more attractive trade-off between output and inflation, strengthening the role of the monetary policy. For instance, Blanchard (2018) suggests central bankers to allow output to exceed for some time. Nonetheless, Peña (2017b) finds a significant correlation between economic (unemployment) and financial (credit loans) variables only when monetary policy is not rules-based (immediately before the GR, during the lax period), sustaining the need of the independence hypothesis for a good economic performance.

Lee and Werner (2018) found that rates of interest from monetary policy do not Granger-cause economic growth in general for the period 1957Q1-2008Q4 for 3 of 4 developed countries (UK, US and Japan, with the exception of Germany). On the other hand, other findings are that the nominal GDP growth is highly and positively correlated with, and Granger-causes interest rates in all four countries. Therefore, we consider this as an argument for supporting the no causality and independency of the impacts of monetary policy on the real economy measured by GDP. According to this, what is the difference for central bankers in maintaining lower or higher interest rates for the economy? None. Nonetheless, monetary policy is necessary to control three main aspects: correct rules-based monetary policy, correct regulation, and correct banking performance. Some previous articles have explored the relevance of monetary policy on these three aspects. First, the relevance of rules-based monetary policy on credit booms and crises (Taylor, 2007 and 2012, and Peña 2017a) is remarkable. Second, the importance of monetary policy on real economy and the role of the banking regulation, studying the relationship between unemployment and financial value added previously, during and after the Great Moderation (Peña, 2017b). Finally, some papers consider the relevance of banking efficiency (Peña, 2019).

According to Taylor (2007) and Peña (2017a), good monetary policy performance in the early 1980s, considered as the Great Moderation (GM), was followed by a period in which Taylor rule was not followed by most central bankers at least since 2001 to 2006. This facilitated a lending boom that is related with the housing boom previous to the GFC. Peña (2017b) observed a different behaviour be-

fore and after the GM respect to the GM years in the correlation between unemployment and credit loans. In fact, during the GM there was no significant effect between both variables, in contrast to the other periods. This article also wonders about the much expectancy that some central bankers have deposited on the banking regulations considering, as Vassiliadis et al. (2012), that this tool is not the panacea. Indeed, there is an important pressure in banking profitability by adapting capital to the new guidelines of Basel III. Finally, Peña (2019) analyses a period at the end and after the GM, concretely the period between 1996 and 2014, and he found a significant correlation between unemployment and banking costs in a non-linear relationship. The contribution of this paper is considering the periods from Taylor (2007), Peña (2017a) and Peña (2017b), but applied for the question of Lee and Werner (2018) about the causality of monetary policy on GDP (and, in addition, its causality on credit and the causality between GDP and credit) to shed more light on the proposition of Friedman (1970) exposed at the introduction.

We sustain the hypothesis of the existence of several optimal constants on the equilibrium in the long run, i.e.: real economic growth, inflation, rate of unemployment (or NAIRU), and money growth, and therefore, if monetary policy is correctly applied, the observed rates could tend to these optima and there will be no causality relationship between money and real and financial variables. Otherwise, official interest rates of central banks would Granger-cause real and financial variables as GDP growth or lending.

So, literature has pointed to at least three independent theoretical constants. First, the natural rate of unemployment. Friedman suggested the existence of a natural rate of unemployment, whilst Tobin qualified it as NAIRU. According to Friedman (1968, p.8), "At any moment of time, there is some level of unemployment which has the property that it is consistent with equilibrium in the structure of real wages". Second, according to Friedman (1960), "The stock of money [should be] increased at a fixed rate year-in and year-out without any variation in the rate of increase to meet cyclical needs", proposing the k-rule of Friedman. A variation from this proposal is the Taylor's rule explained above. Finally, Friedman and other authors considered an ideal constant inflation rate; a 2% target of inflation rate is applied by the European Central Bank, for instance.

Therefore, inflation would be independent from output if a rules-based monetary policy was applied, a target of interest rate taking into account both variables. In the long-term, both would be constants (and hence, independent), according to the natural rates of unemployment and inflation, and therefore, the interest rate should also be independent for avoiding interferences, for this reason Fried-

man suggested the k-rule (a constant growth of the monetary base). On the other hand, the real and financial economies should also grow without interferences. Nonetheless, there are usually interferences that turn monetary policy as necessary, and also its sterilization.

According to the theoretical views of this section, we can affirmatively answer to the four questions of the introduction. Let's see if the empirical results corroborate these theoretical expectations.

3. Data, methodology and results

This paper has employed data from the World Bank Database, including three variables from a dataset of 36 countries of the European Union and the OECD for the periods 1987-2012 (full sample) and 2002-2007 (period of lax monetary policy in most countries). In order to check the interdependence and effects of monetary policy on financial and economic variables in the full sample and in the lax period, there is an analysis of the effects of the lending interest rates (*int*, as indicator of monetary policy target) on credit loan growth (*dlnc*, measured as the differences in the logarithm of the private credit loans provided by the financial sector), and on the economic growth (*gdpgr*, annual growth rate of the GDP). The way employed in this paper for testing these facts is studying the Granger-causality of monetary policy on these two variables and vice-versa, for checking what variable causes each other if there is any interdependence.

Table 1 shows the descriptive statistics (number of observations, mean, standard deviation, minimum and maximum) for the three variables.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
dlnc	1504	10.73	16.85	-160.74	130.06
gdpgr	1587	3.44	3.78	-32.12	21.83
int	1032	16.41	47.63	0.50	824.56

Table 2 summarizes Tables 3 to 8 (see Appendix), which show the results. These tables show the p-value and the rejection (1) or not rejection (0) of the null hypothesis applied for each country. The data relevant for analysis will be the percentage of countries in which the null hypothesis is rejected (the average of rejections) and the average p-value for each sample of countries.

Table 2: Summary of results

Period	p-value	reject, 1, or not reject, 0	p-value	reject, 1, or not reject, 0	At least one hypothesis rejected
Tables 3 and 4	Dependent: dlnc, independent: int		Dependent: int, independent: dlnc		
1987-2012	0.363	0.29411765	0.32791176	0.44117647	0.58823529
2002-2007	0.10395455	0.63636364	0.04959091	0.86363636	0.95454545
Tables 5 and 6	Dependent: gdpgr. independent: int		Dependent: int. independent: gdpgr		
1987-2012	0.24502941	0.44117647	0.15944118	0.55882353	0.76470588
2002-2007	0.01730435	0.95652174	0.12434783	0.60869565	1
Tables 7 and 8	Dependent: gdpgr. independent: dlnc		Dependent: dlnc. independent: gdpgr		
1987-2012	0.44066667	0.27777778	0.43561111	0.11111111	0.36111111
2002-2007	0.17814706	0.70588235	0.11482353	0.79411765	0.97058824

In Table 3 we can observe that the null hypotheses that *int* does not cause *dlnc* or *dlnc* Granger-causes *int* for the full sample are rejected in 29% and 44% of the countries, respectively, while the average p-value for all the countries is 0.33 and 0.36. On the other hand, as Table 4 exposes, for the sub-sample between 2002 and 2007 the results show that the null hypotheses were rejected in a 64% and 83% of the countries, respectively. The average p-value for the null hypotheses that *int* does not cause *dlnc* was 0.10, and 0.05 for the opposite causality. Furthermore, if we check if there is any kind of causality between both variables, in the 95% of the countries there is at least one rejection of any of the two null hypotheses.

The explanation could be that there is evidence for the non-interdependence between economic and monetary variables for the period between 1987 and 2012, while there is evidence that the lending interest Granger-causes the economic growth rate for the lax period of 2002-2007[3].

Table 5 shows the results for the full sample. It is shown that only for the 44% of the countries the null hypothesis that the variable int does not Granger-cause the variable *gdpgr* is rejected, while for the 55% of the countries the null hypothesis is rejected for the opposite Granger-causality. The average p-value of the former causality is 24.5%, but 16% for the latter. In Table 6, the results for the sub-sample are exposed. The percentage of countries in which the former null hypothesis is rejected achieves the 96%, while the percentage for the latter achieves the 61%.

[3] This period has been chosen as "lax period" instead of 2002-2006 for two reasons: first, this allowed to analyze a weaker sample and many countries obtained no result due to bad econometric properties, and second, we have chosen to incorporate 2007 because it is the year in which the GFC started.

The average p-value for all countries in the period between 2002 and 2007 (lax period) is 0.02 for the former hypothesis and 0.12 for the latter.

This means that price instruments of monetary policy (interest rates) did not cause economic variables as nominal GDP growth, as Lee and Werner (2018) obtained for 3 of 4 developed countries for the full sample between 1950 and 2008 (before the Quantitative Easing, QE). In fact, they observe that the "monetary mantra" as they refer to the traditional belief by central bankers that lower rates cause a higher rate of economic growth, is the opposite in two dimensions, correlation and causation, allowing them to state that higher economic growth leads to higher interest rates. This paper corroborates that the "monetary mantra" could be false for the full sample, but may be not for the period previous to the GFC.

Furthermore, this paper finds a new result: the interdependence and causality between some monetary and financial variables during the period of lax monetary policy between 2002 and 2007, but not for the GM. For this period, the monetary mantra that monetary policy measured by lending interest rates affects economic growth is corroborated. Nonetheless, the sign of the relationship is not necessary to be negative between interest rates and economic growth. As Peña (2017a) empirically observes, this relationship is negative for the period of the GR in the euro area but not in some other periods. In fact, and based on the empirical findings of Heider, Saidi and Schepens (2018), Brunnermeier and Koby (2019) explain the existence of a "reversal rate", an interest rate under which monetary policy effects are the opposite of traditionally expected. In this case, lower interest rates could lead to lower economic growth.

Table 7 shows the findings for the full sample on variables *lnc* and *gdpgr*. Only for the 36% of the countries at least one of the null hypotheses that the variable *lnc* does not Granger-cause the variable *gdpgr* or the Granger-causality in the opposite direction is rejected. The results for the sub-sample are exposed in Table 8, when in the 97% of the countries at least one of the former null hypotheses is rejected.

There is non-interdependence between economic and financial variables for the full sample period, when rules-based monetary policy were applied, while there is some causality between financial and economic variables for the period after the GM.

Therefore, according to Taylor (2007), during the Great Moderation (1987-2001), there were independent relationships among financial, economic and monetary variables in a period when the monetary policy was correctly applied. Nonethe-

less, the period in which lax monetary policies were applied in most countries, there was also evidence that in most advanced countries the monetary policy Granger-caused financial and economic variables. The four questions of the introduction are also positively answered by the empirical findings.

4. Discussion

The period of the Great Moderation, in which a correct monetary policy was applied according to the Taylor rule (Taylor, 2007), there is no causality between monetary and financial or economic variables according to the results of the previous section. This is in line with the results of Lee and Werner (2018) who obtained non-significance of the Granger causality of interests on economic growth for 3 of 4 countries. It suggests that predictions of Friedman relative to the natural constants are in force only when monetary policy is correctly applied according to financial (inflation) and economic (GDP) indicators. This period led to the longest period of financial stability.

In the period in which lax monetary policy was applied, that monetary policy caused financial and economic variables. Concretely, as our results show, monetary policy caused credit growth, and therefore, unchained the credit boom which led to the sub-prime crisis that originated the GFC. On the other hand, monetary policy also caused an excessive economic growth that led to a growth rate of GDP higher than the potential and encouraged the GR, helped by the interdependence between financial and economic variables of that period. Furthermore, the role of monetary policy could influence the interference and causality among financial, economic and monetary variables.

Some authors advocated fora sheer luck as an explanation for the financial stability during the GM (Canova and Gambetti, 2005; Gambetti, Pappa and Canova, 2008 and Sims and Zha, 2006) or the inconsistency of the former hypothesis and the doubtlessness about the good policy (Benati and Surico, 2009). Nonetheless, authors as Taylor (2009) have corroborated the good policy as the correct explanation (Lubik and Schorfheide, 2004; Clarida, Gali, and Gertler, 1999), due to the effects of the lax monetary policy of the after-GM-period, which led to financial instability of the GFC and the GR.

This article shows the evidence that, in the long run and when there is financial stability (GM), there is no interdependence between monetary, financial and economic variables, while with financial instability (lax period between GM and GFC of 2007-2009) it is observed (based on the results of this paper) that monetary

policy Granger-causes economic and financial variables, and there is a relevant causality in any direction between economic and financial variables. Therefore, maybe there was no good policy during the GM but good luck or other factors; nonetheless, this would be surprising taking into account the results obtained that in the lax period, when there were no good monetary policies according to Taylor (2009), monetary policy *caused* interferences in loan credit and GDP immediately before the GFC and GR. We can state that monetary policy was not rules-based but discretional, without following neutrality on the QTM equation, affecting the velocity of money and, therefore, causing financial instability.

As Lehtimäki and Palmu (2019) suggest, in addition to, or instead of output gap and inflation variables, under uncertain economic conditions, as in the period 2007-2010, communication and transparency tools are broadly used by central bankers, facilitating their predictability. Furthermore, and corroborating the results of this paper, Jansen and De Haan (2009) study whether the communication was an explanatory variable for the monetary policy of the initial period of the European Monetary Union (EMU), from 1999 to 2002 (part of the GM in this paper). They observe that the key explanatory variables were only macroeconomic indicators related to inflation and output. On the other hand, Hayo and Neuenkirch (2010) compared the predictability of Taylor rule and communication in the monetary policy of the Federal Reserve during 1998-2006, finding more predictability on communication conventions than in Jansen and De Haan for the ECB. This period includes the "Ad Hoc Era" previous to the GFC. This era could be continuing even nowadays, when policy measures are *ad hoc*, sometimes driven by random, political and short-run shocks, as current tensions in international trade, rather than long-run macroeconomic variables. Even more, these policies are usually settled before the opportune moment, if there is any, according to macroeconomic indicators, and using the well-known communication tools for that.

The use of these tools, helped by new technologies, is a way of achieving credibility, but it reduces the policy relevance of other more important variables in the central banking practice as the economic interactions. Lehtimäki and Palmu (2019) state that, according to the empirical evidence, effective communication enables market shifts. Nonetheless, what happens if communication worsens financial stability? For instance, markets could predict a wrong monetary policy, and this could be even worse for the economy. Communication and non-conventional policy might only be a tool for applying rules-based policies, not a target itself. According to Praščević and Ješić (2019), central bankers have to follow accurate monetary policies in order to achieve the stabilization of inflation and output, but a precondition to this is a credible policy-making, which could miti-

gate negative consequences of the recent very low interest rates. For the sake of financial stability, fiscal policy can be also used (Dumičić, 2019).

Currently, the Quantitative Easing (QE) and non-conventional monetary policy may also lead to a credit boom. But in this case the bubble would not come from households due to sub-prime mortgages; in this case there may be a boom of corporate bonds, overall in the USA. This could lead to another crisis. An interesting further research would be the study of the Granger-causality of monetary policies of the analysed countries for the current period of 2008-2019.

Furthermore, current regulatory frameworks as Basel III consider that the origin of the next crisis could not be predicted, being originated by a previously non-seen shock (wait-and-see approach). Therefore, it has been extended that each crisis` needs from economic policies differ from the previous ones, as DSGE models sustain. Nonetheless, in this paper we think that there are similar shadow reasons that could lead to the same crises, but with different faces. In fact, the more the regulated the banks are, it does not mean the less probability of a crisis. There are like three pillars for the avoidance of banking crises: correct monetary policy, correct regulation, and correct banking performance. With any one of these pillars missing, a banking crisis becomes more probable. If banks are overregulated, they would be forced to hold more capital, which could lead them to lower profitability, and therefore, less capital available for them because of being less attractive for investors, thus creating a vicious circle.

Finally, we consider that the good performance during the GM was due to the following of rules-based monetary policy by central bankers, which settled official interest rates similar to the market ones by an activist approach, allowing non-interferences among the main economic variables and monetary policy. Nonetheless, the current discretionary monetary policy (after GM) based on a wait-and-see approach leads to differences in the official and market interest rates, provoking interferences and causalities among economic, financial and monetary variables, which lead to the current poor economic performance.

While some authors as Blanchard (2018) suggest that the independent hypothesis, and, therefore, the natural rate hypothesis has currently failed, we have observed that this failure is generated only when central bankers fail to apply accurate rules-based policies (as observed during the lax period in this paper), we have uncertainty and incorrect interferences. But this does not avoid the possible existence of a natural rate only observed in ideal cases, as Friedman suggested. In fact, some natural rates could explain what our data reflect: the absence of causality of monetary, real and financial variables in some ideal cases as the GM

in which monetary policy was rules-based following the main macroeconomic variables, i.e. output and inflation.

Despite Blanchard (2018) effectively suggesting the inexistence of the natural rate hypothesis according to his evidence, he also states that it is not conclusive evidence. Nonetheless, he also suggests that the decrease in economic output relative to the trend could reflect a decrease in the potential trend, or could reflect persistent and strong economic effects of the GFC on the supply of the economy. These effects could be considered hysteretic consequences of lower economic activity perpetuating itself. Blanchard and Summers (1986) provide hysteresis as an explanation for other economic crises, referring that changes in the natural rate could be path-dependent, as Phelps (1972) proposed. Finally, Blanchard concludes that, if so, the monetary policy shocks might have no effect on GCF.

Moreover, and regarding to the Lucas (1976) critique of the Phillips curve, Blanchard (2018) suggests that expectations matter and the trade-off between inflation and economic activity could disappear if circumstances change or the policymakers exploit it. Handler (1987), in contrast, observed two relevant facts: first, real sector is sometimes a function of the inflation rate, which is determined by monetary policy. Second, he finds an "inverse Phillips curve" in which unanticipated inflation stimulates real activity with some delay, but anticipated usually dampens real activity development. Nevertheless, some authors found a lower and less significant coefficient of the relationship between unemployment and inflation since the mid-1990s (Blanchard, Cerutti, and Summers 2015; Miles, Panizza, Reis, and Ubide 2017), but, according to Blanchard, the effect of unemployment on wages remains positive yet smaller. The reason of why it is smaller "remains largely mysterious" to him. According to our findings, monetary policy *matters* and a rule-based policy could be the reason for the decrease of this coefficient during the GM. So, monetary policy *matters*, but not only for the expectations of the markets, which is supplementary, if not prejudicial, but for monetary management itself, in which a rule-based monetary policy could lead to less uncertain due to the avoidance of interferences among economic variables and to a corroboration of the natural rate hypothesis.

As seen before, some authors suggest the existence of a reversal rate, which could be positive and may be related with the k-rule of Friedman. This could be a natural rate, the optimal interest rate for an economy, keeping constant on time and being positive instead of zero. The reason is that Friedman considered the zero-rate as the lowest bound for interest rates, and current monetary policies have shown the existence of negative interest rates. It is worth mentioning that these *ad hoc* policies, QE, and negative interests lead to other economic distur-

bances. As an example, low interest rates for credit and bonds enable inefficient businesses to survive, and the longer the central bankers prorogue this inefficient cycle and its possible bubbles, the deeper the next financial crisis will be. Other implications from this kind of policies exceed the mere economic effects and could affect social, demographic and cultural behaviours. For instance, lax policies lead to seeking for higher profitability on risky, illiquid, and long-run assets more than others cheaper assets as money, due to the excess of liquidity. In the case of a government, investors could even prefer short-run terms of public debt rather than the long-run, leading to the well-known inverted yield curve in the bond market. Regarding to the households, more expensive illiquid assets provoke higher prices at the real-estate market, and therefore, sometimes discouragements to emancipate and form a family, with the consequent loss in the vegetative balance due to a decrease in the population growth rate.

5. Conclusions and further research

Recently, Lee and Werner (2018) suggested that official interest rates of monetary policy do not cause economic growth, in contrast to many other authors` expectations for the period between 1950 and 2008. Nonetheless, they do not consider the differences in the two eras of economic performance differentiated on the approach established to settle monetary policy according to Taylor (2012), concretely, the Great Moderation (GM) and the period immediately after that. This paper uses a sample of 36 countries of the EU and the OECD and applies Granger-causality among economic (GDP growth), financial (loan credits) and monetary (lending interests) variables in order to check if the above-mentioned absence of causality is corroborated when the period immediately after the GM is considered. The results show that when the discretionary monetary policy after the GM was applied (2002-2007), there were interferences among economic, financial and monetary variables, while there were no interdependence during the whole period (1987-2012), including the GM period. These interferences could explain the credit boom previous to the Global Financial Crisis of 2007-2009 and the subsequent Great Recession. Repeating the same mistakes as in the "Ad Hoc Era" could lead to another financial crisis.

Appendix

Table 3: Results of the Granger causality between credit growth and lending interest, 1987-2012

	Dependent: dlnc, independent: int		Dependent: int, independent: dlnc		
Country	p-value	reject?	p-value	reject?	At least one reject
Australia	0.43	0	0.149	0	0
Austria	0.021	1	0.948	0	1
Bulgaria	0	1	0.087	1	1
Canada	0.72	0	0.929	0	0
Chile	0.169	0	0.449	0	0
Czech Republic	0.029	1	0.221	0	1
Denmark	0.443	0	0.554	0	0
Estonia	0.834	0	0.018	1	1
Finland	0.203	0	0.043	1	1
France	0.953	0	0.819	0	0
Germany	0.624	0	0.115	0	0
Greece	0.267	0	0.146	0	0
Hungary	0.333	0	0.047	1	1
Ireland	0.003	1	0.95	0	1
Iceland	0.406	0	0.004	1	1
Israel	0.698	0	0.727	0	0
Italy	0.703	0	0.826	0	0
Japan	0.147	0	0.014	1	1
Korea	0.216	0	0.228	0	0
Luxembourg	0.117	0	0.036	1	1
Latvia	0.08	1	0.008	1	1
Mexico	0.061	1	0	1	1
Lithuania	0.37	0	0.015	1	1
Netherlands	0.649	0	0.452	0	0
New Zealand	0.004	1	0.698	0	1
Norway	0.359	0	0.423	0	0
Poland	0.01	1	0.603	0	1
Portugal	0.036	1	0.042	1	1
Slovak Republic	0.022	1	0.002	1	1
Slovenia	0.748	0	0.668	0	0
Spain	0.772	0	0.009	1	1
Sweden	0.637	0	0.864	0	0
United Kingdom	0.672	0	0.03	1	1
United States	0.606	0	0.025	1	1
Average	0.363	0.29411765	0.32791176	0.44117647	0.58823529

Table 4: Results of the Granger causality between credit growth and lending interest, 2002-2007

Number of observations for each country: 6	Dependent: dlnc, independent: int		Dependent: int, independent: dlnc		
Country	p-value	reject?	p-value	reject?	At least one reject
Australia	0	1	0	1	1
Belgium	0.669	0	0.273	0	0
Bulgaria	0.113	0	0	1	1
Canada	0	1	0	1	1
Chile	0	1	0.002	1	1
Czech Republic	0.31	0	0	1	1
Estonia	0	1	0	1	1
Hungary	0	1	0.557	0	1
Iceland	0.005	1	0	1	1
Israel	0.005	1	0.017	1	1
Italy	0.32	0	0	1	1
Japan	0	1	0	1	1
Korea	0.119	0	0	1	1
Latvia	0.181	0	0.002	1	1
Mexico	0.001	1	0.014	1	1
Lithuania	0.272	0	0	1	1
Netherlands	0.292	0	0	1	1
New Zealand	0	1	0	1	1
Slovak Republic	0	1	0.226	0	1
Slovenia	0	1	0	1	1
United Kingdom	0	1	0	1	1
United States	0	1	0	1	1
Average	0.10395455	0.63636364	0.04959091	0.86363636	0.95454545

Table 5: Results of the Granger causality between economic growth rate and lending interest, 1987-2012

		Dependent: ctopib, independent: int		Dependent: int, independent: ctopib		
Country	obs	p-value	Reject?	p-value	Reject?	At least one reject
Australia	26	0.685	0	0.004	1	1
Austria	23	0.051	1	0	1	1
Bulgaria	20	0.376	0	0.717	0	0
Canada	26	0.025	1	0.007	1	1
Chile	26	0	1	0.025	1	1
Czech Republic	18	0.416	0	0.094	1	1
Denmark	16	0.021	1	0.295	0	1
Estonia	15	0.106	0	0.421	0	0
Finland	18	0	1	0.018	1	1
France	18	0.143	0	0.001	1	1
Germany	16	0.202	0	0	1	1
Greece	17	0.009	1	0.37	0	1
Hungary	19	0.014	1	0.105	0	1
Ireland	19	0.032	1	0.492	0	1
Iceland	26	0.174	0	0	1	1
Israel	26	0.878	0	0.208	0	0
Italy	26	0	1	0.046	1	1
Japan	26	0.453	0	0.018	1	1
Korea	26	0.003	1	0	1	1
Luxembourg	12	0.215	0	0	1	1
Latvia	18	0.601	0	0.002	1	1
Mexico	18	0.41	0	0.188	0	0
Lithuania	16	0.459	0	0.384	0	0
Netherlands	26	0.086	1	0.256	0	1
New Zaeland	12	0.118	0	0.001	1	1
Norway	23	0	1	0.368	0	1
Poland	14	0.197	0	0.359	0	0
Portugal	13	0.494	0	0.267	0	0
Slovak Republic	14	0.025	1	0.025	1	1
Slovenia	12	0.898	0	0.397	0	0
Spain	16	0.54	0	0.014	1	1
Sweden	19	0	1	0.331	0	1
United Kingdom	26	0.008	1	0.001	1	1
United States	26	0.692	0	0.007	1	1
Average	672	0.24502941	0.44117647	0.15944118	0.55882353	0.76470588

Table 6: Results of the Granger causality between economic growth rate and lending interest, 2002-2007

Number of observations for each country: 6	Dependent: ctopib, independent: int		Dependent: int, independent: ctopib		
Country	p-value	Reject?	p-value	Reject?	At least one
Australia	0	1	0	1	1
Belgium	0	1	0.136	0	1
Bulgaria	0.011	1	0.845	0	1
Canada	0.008	1	0	1	1
Chile	0	1	0	1	1
Czech Republic	0.017	1	0.21	0	1
Estonia	0	1	0	1	1
Hungary	0.002	1	0.068	1	1
Iceland	0	1	0	1	1
Israel	0.068	1	0	1	1
Italy	0	1	0.065	1	1
Japan	0	1	0	1	1
Korea	0.003	1	0	1	1
Latvia	0.006	1	0.014	1	1
Mexico	0	1	0.116	0	1
Lithuania	0.001	1	0.431	0	1
Netherlands	0.009	1	0.084	1	1
New Zaeland	0	1	0.138	0	1
Norway	0	1	0.437	0	1
Slovak Republic	0.273	0	0	1	1
Slovenia	0	1	0	1	1
United Kingdom	0	1	0.186	0	1
United States	0	1	0.13	0	1
Average	0.01730435	0.95652174	0.12434783	0.60869565	1

Table 7: Results of the Granger causality between economic growth rate and credit loan growth, 2002-2007

Number of observations for each country: 6	Dependent: ctopib, independent: dlnc		Dependent: dlnc, independent: ctopib		
Country	p-value	reject?	p-value	reject?	Al menos 1
Australia	0	1	0	1	1
Austria	0	1	0	1	1
Belgium	0	1	0.726	0	1
Bulgaria	0.039	1	0	1	1
Canada	0	1	0.765	0	1
Chile	0	1	0	1	1
Czech Republic	0.032	1	0.068	1	1
Denmark	0.135	0	0.469	0	0
Estonia	0	1	0	1	1
Finland	0.895	0	0	1	1
France	0.022	1	0	1	1
Germany	0.421	0	0	1	1
Greece	0.285	0	0.055	1	1
Hungary	0.79	0	0	1	1
Ireland	0.011	1	0.01	1	1
Iceland	0	1	0.003	1	1
Israel	0	1	0	1	1
Italy	0.978	0	0	1	1
Japan	0.176	1	0.022	1	1
Korea	0	1	0	1	1
Luxembourg					
Latvia	0.004	1	0.579	0	1
Mexico	0.422	0	0	1	1
Lithuania	0.432	0	0	1	1
Netherlands	0.642	0	0	1	1
New Zealand	0.042	1	0	1	1
Norway					
Poland	0.085	1	0.042	1	1
Portugal	0.616	0	0	1	1
Slovak Republic	0.002	1	0	1	1
Slovenia	0	1	0.265	0	1
Spain	0	1	0.259	0	1
Sweden	0	1	0.641	0	1
Turkey	0	1	0	1	1
United Kingdom	0.021	1	0	1	1
United States	0.007	1	0	1	1
Average	0.17814706	0.70588235	0.11482353	0.79411765	0.97058824

Table 8: Results of the Granger causality between economic growth rate and credit loan growth, 1987-2012

Number of observations for each country: 6	Dependent: ctopib, independent: dlnc		Dependent: dlnc, independent: ctopib		
Country	p-value	reject?	p-value	reject?	Al menos 1
Australia	0.292	0	0.711	0	0
Austria	0.305	0	0.571	0	0
Belgium	0.046	1	0.677	0	1
Bulgaria	0.065	1	0.35	0	1
Canada	0.059	1	0.104	0	1
Chile	0.054	1	0.756	0	1
Czech Republic	0.568	0	0.514	0	0
Denmark	0.074	1	0.301	0	1
Estonia	0.804	0	0.964	0	0
Finland	0.739	0	0.143	0	0
France	0.561	0	0.531	0	0
Germany	0.393	0	0.699	0	0
Greece	0.673	0	0.011	1	1
Hungary	0.251	0	0.227	0	0
Ireland	0.811	0	0.483	0	0
Iceland	0.014	1	0.888	0	1
Israel	0.532	0	0.24	0	0
Italy	0.725	0	0.827	0	0
Japan	0.001	1	0.773	0	1
Korea	0.147	0	0.594	0	0
Luxembourg	0.783	0	0.135	0	0
Latvia	0.903	0	0.141	0	0
Mexico	0.033	1	0.553	0	1
Lithuania	0.521	0	0.32	0	0
Netherlands	0.81	0	0.382	0	0
New Zealand	0.161	0	0.666	0	0
Norway	0.083	1	0.527	0	1
Poland	0.817	0	0.086	1	1
Portugal	0.737	0	0.397	0	0
Slovak Republic	0.75	0	0.006	0	0
Slovenia	0.788	0	0.551	0	0
Spain	0.634	0	0.088	1	1
Sweden	0.6	0	0.705	0	0
Turkey	0.616	0	0.41	0	0
United Kingdom	0.514	0	0.263	0	0
United States	0	1	0.088	1	1
Average	0.44066667	0.27777778	0.43561111	0.11111111	0.36111111

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