Iranian Economic Review 2022, 26(3): 549-561
DOI: 10.22059/ier.2021.81544

RESEARCH PAPER

Coordination of Monetary Policy and Macro Prudential Policy: New Evidence from OIC Countries

Mahshid Shahchera [a,*]

a. Monetary and Banking Research Institute, Central Bank of Iran, Tehran, Iran

Received: 07 December 2019, Revised: 24 September 2020, Accepted: 16 October 2020

Abstract
Interaction of macro prudential policy and monetary policy depends on the relation of objectives. Central bank authorities focus on price stability but may not concern with financial stability. Hence, the variables that influenced on financial markets are various and are determined to on risk management perspectives. This paper survey the interaction of monetary policy and macro prudential policy by focusing capital requirement. The aim of this paper are increasing convergence between polices by transitions mechanism. This paper use the dynamic unbalanced panel system generalized method of moment (SYS-GMM) for estimating the interaction of monetary and macro prudential policies. This system considers preference of central bank as proxy of goal's monetary policy. The data includes OIC countries banking system over the period 2003-2017.The sample of 52 OIC countries (Organization of Islamic Cooperation). According to the results, the coefficient of this cross-product is significantly positive that indicating that conservatism of central bank and macro prudential policy instrument, capital adequacy, increase the effect of macro prudential policy on banking lending. The results show that the conservatism of central bank is an important indicator for implementing macro prudential supervision in OIC countries.
Keywords: Monetary Policy, Macro Prudential Policy, Banking.
JEL Classification: E43, E44, G18, G28.

Introduction

The objective of macro prudential policy is financial stability and macro prudential policy could maintain soundness and stability in financial markets. According to evidence, macro prudential policy has important role to managing financial stability that helps to managing better of banking risks. Lending channel could enhance the role of macro prudential policy on mitigation of risks. Reducing risks involve decrease of credit growth. Financial stability involves supervision and resilience of financial system. Central bank has important role in regulation and supervisions. Then, adopting the macro prudential policy and monetary policy could achieve by strengthen supervision of central bank. Central bank could balance between targets and instruments of policies.

Central bank is seeking for monetary policy objectives such as price stability, full employment and economic growth by using the change in key rates, open market operation and reserve requirement. Central bank uses the more measures of instrument during the financial crisis in 2008 and their results of implication of instruments is not appropriate. Central bank needs to systemically transmission of its policies.

Although, coordination of monetary policy and macro prudential policy is very difficult by

*. Corresponding author email: m.shahchera@mbri.ac.ir

central bank but this concept relies that the object of these policies are contradictory. However, the central bank tends to inflation targeting in the short term to financial stability in long term. Therefore, inflation targeting in short term is normally in first priority for the central bank rather than the financial stability. Financial stability is the first priority for the central bank when facing financial crisis.

Macro prudential policy has been less considered in the early 2000s. Slight attention was given to implement regulatory ratios, such as, capital ratios or loan-to-value ratios, as cyclical policy tools (Blanchard et al., 2010). In fact, the term of macro prudential policy was hardly used by the policy makers and regulators and they have tiny concern to engage with this concept.

After recent financial crisis, the role of macro prudential policy enhances to achieving the financial stability. In developed countries, monetary policy and central banks have more important. The attention has already been toward monetary policy and is now toward macro prudential policy. The reason is the importance of strengthening financial stability (Galati, Moessner (2013). although, the role of central bank should not be ignored. But, this paper focuses on the interface of central bank preference and macro prudential policy and its implications.

After the crisis, the importance of complications of financial system and probability of financial crisis is comprehensible; macro prudential policy has been related to different economic conditions to discourse the objectives of preserving financial stability. Many researchers agree that macro prudential policy is seen as aiming at aiming financial stability by adopting policy measures to risk upsetting the financial system as a whole (Cerutti et al., 2015).

Macro prudential policy declines the risks and cost of systemic crises by addressing the interconnectedness between financial institutions and pro cyclicality of financial system (Claessens et al., 2013; Ghosh, 2016).

This paper implies the degree of preference of central bank with monetary policy and macro prudential polices. This paper uses the GMM-SYS method for estimate the system that focus on the linkages between the monetary policy and macro prudential policy and preference of central bank. Monetary policy and its transmission mechanisms, such as the lending channel and other channels explained in the banking literature, should be taken into instruments of macro prudential policy. Despite numerous studies on the contradiction between the goals of the two policies, this paper investigates these effects by simultaneous equations.

The organization of the paper is as follows. Section 2 provides monetary and macro prudential policy's framework. Section 3 provides a review of the existing literature of this study.

Section 4 provides a detailed description of the variables that affect our analysis. The final Section surveys the empirical methodology and key findings of this study and provides concluding comments.

Monetary and Macro Prudential Policy's Framework

Objectives, Instruments and Transmission Mechanisms

The behavior of Central bank describes the response of authorities of central bank to the monetary policy in the economy and markets. This concept has been reviewed by the research of John Taylor (1993). Taylor focus on evaluation of monetary policy as a Taylor function. Taylor rule represents the reaction function of monetary policy. Several literatures focus this concept. Favero and Revelli (2003) identify central bank' S preference by estimating equations related to these concepts.

Cecchetti and Ehrmann (1999), Cecchetti (2001) used the VAR models for the

investigation of central banks preferences in 23 countries (including both developed and developing economies) and estimate the preferences of central banks by inflation-output variability. Results propose that central banks developed stronger aversion to inflation variability in the course of the 1990s.

Custelnuovo and Surico (2004) investigate that the dynamic preference of central bank. However, they use dynamic optimal central problem that could describe responses of policy makers in economy. They use a novel calibration method to estimating central bank ‘s preference and Taylor reaction function.

Monetary policy reflects central bank’s preference as monetary policy ‘s instruments relevant to policy decisions.

Monetary policy follows the main goals such as maximum output, controlling inflation and stable interest rate. Of course, the central bank always puts inflation targeting in the first priority. Dennis (2004) estimate monetary policy functions by the models that could choose optimal situation.

Curdia and Woodford (2010) and Woodford (2012) show that a Taylor-type monetary policy rule could related to indicators of financial distress. These studies do not mention to system risk. However, the efficiency and proficiency of macro prudential instruments is depending on the various factors. For instance, the benefits of macro prudential policies are low if monetary policy rules are optimized to earnings the effects of the macro prudential instrument into account.

Macro prudential has an objective to ensure the financial stability and decrease the potential of systemic risks against domestic and external shocks (BIS, 2010).

Macro prudential policy has time dimension and cross-sectional dimension. The time dimension includes pro cyclicality of financial system and systemic risk involves the cross-section dimension. Both of them can increase the scope of macro-prudential policy and implications of them in the real economy.

Macro prudential policy with aiming financial stability could help to policy makers by controlling financial risks.

Macro prudential policy could manage the credit cycles. This polices could reduce credit growth when the economy overheats and decrease the credit crunch when the economy sustains a downturn. The instruments of macro prudential policy could reach to

Aggregate credit and effectiveness of macro prudential policy is more than monetary policy. Effectiveness of macro prudential policy tools for managing bank lending is high and empirical studies survey the independent effects and potential interaction of macro prudential policy on bank lending.

On the other hand, it should be noted that the lending channel could be a path of transmitting monetary policy in the economy. The bank lending channel as transmission of monetary policy is emphasis on the impacts of capital requirement to loan supply (Bernanke and Gertler, 1995).

This channel has more implications for the synchrony of monetary policy and macro prudential policy. Bank lending channel as mechanism of monetary policy is transferred to the real economy remains a central topic in macroeconomics. The bank lending channel denotes the credit view of this mechanism. Accordingly, monetary policy could be affecting bank assets (loans) as well as banks’ liabilities (deposits) or balance sheets of banks. Also, monetary policy creates shifting the supply of deposits and the supply of bank loans. Bank lending channel emphasis on limitation of leverage and decrease the ability of banks to achieving non depository debt. Therefore, an increase of capital requirement could increase effectiveness of monetary policy on lending.

The lending channels of bank are useful information on how banks modify macro prudential instrument in order to extracting efficiency.

More efficiency would effect on identification of risks. These risks could change the

lending standard or cost of capital. Interaction of monetary policy and macro prudential instrument is strongly substituted. Capital adequacy, crisis management and resolution are following by central bank. Capital adequacy as macro prudential instrument limited to government arrangement and extract the transparency in financial market. Macro prudential instrumental instruments are related to externalities that would increase the systemic risk. The externalities could impact on borrowing decision and leverage of banks in the economic cycles. Externalities make relation between institutions, market and banking systems. Then, the demand side and supply side of credit will be involved (Korinek and Simsek, 2016).

The survey of macro prudential policy and monetary policy include transmission mechanism through bank lending and balance sheet channels that modify how banks are affected by policies.

It is highly likely that transmission mechanism is likely to change structure of financial market and financial practices and the structure of financial market influence on systemic risk over time. Despite of these cross sectorial relation, much effort has been put into coordinating financial markets and systemic risk management.

Coordination of Monetary Policy and Macro Prudential Policy

The monetary and macro prudential policies have their own objectives and instruments that essential to realize interaction. Meanwhile monetary and macro prudential policy's chief objective are price stability and financial stability, their transmission channels and impact each other's objective are considered. The interaction of policies view could help to better survey on effects and transmissions of policies. Also, this view considers simultaneously their effects and transmission across financial market and economy.

Monetary and macro prudential objectives are mutually beneficial and reinforcing (Lautenschläger, 2014). For instance, financial stability could create benefits for implement monetary policy and macro prudential tools may also have been a useful complement to monetary policy as capital requirement and more stable sources of funding.

Macro prudential tools as supervision and regulation are following stability of entire industries and the health of the relationships in the financial sector. Macro prudential tools as supervision and regulation are monitoring systemic risk.

As point of Smets (2014), there are three perspectives about coordination of monetary and macro prudential policy. The separate perspective contribute that the objective of monetary policy is price stability whereas macro prudential is following financial stability that make their instruments. Although, this concept has been more prominent before the recent crisis and after the crisis efficiency and effectiveness be addressed. Separated perspective focus that monetary policy did not contribute to financial fluctuations and the interaction between monetary policy and macro prudential policy is limited. Against this view, integrated perspective contribute that these policies and their objectives are interlaced.

Macro prudential instruments have impact on lending and money creation which are used to maintain price stability (Brunnermieier and Sannikov, 2016).

According to this view, central bank preference involved not only output gap but also financial stability in addition to price gap (Smets, 2014).

Then, financial stability and financial market environment make be part of monetary decision-making. The third perspective considers change in the objective of monetary policy. The financial stability and price stability are interlaced and this connection depends on health of banking system and financial market. Central bank should be realized the unbalancing in the sector of economy. Optimal monetary policy should be choosing by full information about fiscal policy and their failures. Central banks are aware of the interaction of monetary policy and macro prudential policy and fiscal policy that make aggregate vision for central bank.

Literature Review

The monetary and macro prudential policy is more important in recent literatures. The several studies such as Bruno and Shin, 2014; Claessens et al., 2013; Rubio and Carrasco-Gallego, 2014 show that the macro prudential policy upswing the financial stability.

Although, some studies focus on the monetary and macro prudential policy and establish that macro prudential tools do not so much substitute monetary policy but complement it. Andriushin and Kuznetsova (2013) emphasis on it is necessary to coordinate the monetary and macro prudential instrument to mitigate the pro cyclical consequences. The requirement of coordination between monetary and macro prudential policies is more important than the choice of tools.

Macro prudential policy's instruments were focused on long term objectives such as banking stability.

Aiyar et al. (2014) show that the capital requirement has large effect on supply of credit in UK banks during the period of 1998-2007. Other side, the combination of capital requirement and monetary policy should be considered.

Gumata et al. (2013) survey the monetary policy transmission for South Africa. The all of channels that could influence this concept are considered. The interest rate channel is effectiveness transmission in among of other channels.

As point of Bean et al. (2010), Beau et al. (2012), there are the strategic interaction between monetary and macro prudential policy. They approve that macro prudential policy has some potential to stabilize the economy over and above what can be achieved by monetary policy alone, but that this varies depending on the type of shock, or parameter values.

The model DSGE has helped to investigate this issue, Gerali et al. (2010) and Angelini et al. (2014) use the DSGE model for setting interaction between banking sector and real economy. Kannan et al. (2012) and Faia (2013) analyze this interaction by DSGE model that capital ratios as a policy tools. Their finding is capital ratios have beneficial real effects.

Guaithier et al. (2012) find that macro prudential policy instruments reduce default probability. Therefore, that decline makes low probability of crisis and increase stability in financial markets. Macro prudential policy could help to increasing stability and soundness of banking systems.

Aiyar et al. (2016) survey the interaction of monetary policy and macro prudential policy using data on 88 banks in the UK. Their results show that strict monetary policy is accompanying with a drop in credit supply and these interaction of policies depends on size and structure and liquidity. This is seen as consistent with the view that monetary policy should focus on price stability, while prudential tools such as capital requirements are more effectively tends towards financial stability.

Wadhwani (2010) focus on the interaction between the monetary policy and macro prudential policy. Results of this research show that combining both objectives within the central bank is the best technique to prevent for coordination problems. The interaction between the monetary policy and macro prudential policy could help to achieving the target of decreasing inflation and unemployment.

Lim et al. (2011) contribute that macro prudential policy could make effect on cyclicality. They study that macro prudential policy instruments decrease credit booms and likelihood of crisis by using cross country data.

As point of Angelini et al. (2010), there are the linkage of capital requirement and monetary policy. That linkage analyses by using the dynamic equilibrium in Euro Area. Their results show that pro cyclicality behavior is observed. Then, macro prudential policy could effect on macro-economic fluctuations. Although, macro prudential policy and monetary

policy partly influence on interest rate and coordination of policies are useful for archiving to stability.

Antipa and Matheron (2014) use DSGE model in order to relationship monetary policy and macro prudential policy. Their results contribute that macro prudential policy is perfectly a proper complement to monetary policy during the crisis. Despite the decline in output and investment, it has a significant impact on reducing the cost of private sector.

Temesvary (2018) and Frame et al. (2019) show that banks not only lend less to locations with stricter regulations, but they are also less likely to set up operations there. The body of research in the context of the IBRN's 2016 project (summarized in Buch and Goldberg, 2017) also shows a wide range of evidence on regulatory impact on cross-border bank lending flows. Takats and Temesvary (2019) provide evidence that macro prudential rules can stabilize cross-border lending flows during times of severe financial stress, such as the taper tantrum.

Takáts and Temesvary (2019) survey that the interaction of macro prudential and monetary policies cross-border bank lending. They find that tighter macro prudential policy in a home country mitigates the impact on lending of monetary policy of a currency issuer. For instance, macro prudential tightening in the UK mitigates the negative impact of US monetary tightening on USD-denominated cross-border bank lending outflows from UK banks.

They suggest that there may be a meaningful interaction between these policies in the domestic setting as well – a strand of research.

Aikman et al. (2019) explores monetary-macroprudential policy interactions in a simple, calibrated New Keynesian model incorporating the possibility of a credit boom precipitating a financial crisis and a loss function reflecting financial stability considerations. They show that the countercyclical capital buffer improves outcomes significantly relative to when interest rates are the only instrument. The instruments are typically substitutes, with monetary policy loosening when the countercyclical capital buffers strengthen.

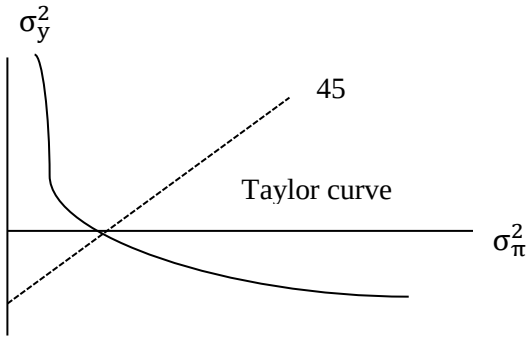
Methodological Framework

This study contributes the linkage between conservatism of central bank, lending channel and capital requirement. The data includes OIC countries banking system over the period 2003-2017; the sample of 52 OIC countries (Organization of Islamic Cooperation). The simultaneous equation Model (SEM) could help to estimate the Model of this paper. Existence of interdependencies between variables is cause of usage of this model. The GMM estimator was applied by model where CONS (conservatism of central bank), Capital adequacy, Credit are endogenous variables that each of equations is base on it. It is important to state that this model satisfied the requirements for identification based on Order condition.

Cons means conservatism of central bank which is proxy by behavior of central bank and monetary policy and capital adequacy ratio implies the transmit ion of monetary policy that shows the linkage between monetary policy and macro prudential policy.

According to the Levieuge and lucotte (2013) cons Index is based on paper of taylor (1979) which the existence of a second order Phillips curve, in the sense that a monetary authority faces a permanent trade-off between the volatility of inflation and that of the output gap.

This trade-off, leading to the negatively sloped so-called Taylor curve, is represented in the Figure 1, with the variability of the inflation rate (σ_{π}^{2}) on the horizontal axis and the variability of the output gap (σ_{y}^{2}) on the vertical axis.



According to this theoretical standpoint, the observed position of an economy on this curve reveals the preferences of the Central Bank in terms of inflation stabilization (σ_π^2) to the output one (σ_y^2). Indeed, while the first bisector corresponds to the case in which monetary authorities assign an equal weight to inflation and output variability in their loss function (1), a Central Bank is said more and more conservative as its corresponding point grows up along the Taylor curve from the right to the left, i.e. as inflation is more (and more) weighted than output variability in its loss function.

$$angle\ (\alpha) = \text{atan}(\sigma_y^2/\sigma_\pi^2) * 180/pi \quad (1)$$

Using this curve, this paper simplifies the presentation of a new index based on the size of the linear angle that connects the origin to the desired point on the Taylor curve:

$$\text{CONS}= \frac{1}{90}\left|atan\left(\frac{\sigma_y^2}{\sigma_\pi^2}\right) * \frac{180}{pi}\right| \quad (2)$$

Capital adequacy ratio is a measurement of capital to risk weighted asset ratio that used to protect depositors and shareholders. This ratio with increasing the protection promotes the stability in banking stability. GDP per capita is economic variables which impact on banking system. Concentration bank is a one of the most important of competitiveness that measure by the proportion of asset or deposits controlled by the largest bank.

The concentration index use Herfindal-Hirschman in this paper. This ratio is the sum of the squared market share of each bank in the system.

A nonperforming loan (NPL) is a loan in which the borrower is in default due to the fact that they have not made the scheduled payments for a specified period. The specified period also varies, depending on the industry and the type of loan. Generally, however, the period is 90 days or 180 days.

The table below provides summary of variables statistics. This table displays the statistical of banking variables. The mean of changes in capital adequacy ratio is equal to 15.755 and median of this variable has 15.35. The average of credit to asset ratio is 73.28 and conservatism proxy of central bank has the average 0.987. Non performing ratio as shown by NPL is on average equal to 14.312 in OIC countries.

Table 1. Summary of Statistic

Variables	Mean	Median	Stdv.	Source
CONS	0.987	1.009	7.86	World Bank &IMF
Capital Adequacy	15.755	15.35	8.18	World Bank &IMF
Concentration	69.33	69.50	27.77	World Bank &IMF
Credit to Asset	73.28	71.81	39.95	World Bank &IMF

NPL	14.312	10.61	12.566	World Bank &IMF

This research employs a dynamic system GMM estimator. The GMM estimator selects parameter estimates so that the correlations between the instruments and disturbances are as close to zero as possible, as defined by a criterion function.

The unit root test for each variable is important in order to avoid quasi-regression problem for both time series and panel data. Therefore, Levin, Lin and Chu test; Im, Pesaran, and Shin W-stat test, Fisher test are used to reflect common unit root of variables. The estimation of results is reported in table (2).

Table 2. Results of Common Unit Root Test

Variable	Levin, Lin, Chu t.	Im,Pesaran ,Shin W-stat	ADF–Fisher Chi-square	PP-Fisher chi-square
CONS	-11.68 (0.000)	-5.569 (0.000)	182.679 (0.000)	303.017 (0.000)
Capital adequacy	-7.22 (0.000)	-2.737 (0.0003)	152.708 (0.0004)	145.582 (0.000)
Concentration	-6.938 (0.000)	-1.016 (0.0002)	110.111 (0.006)	125.072 (0.000)
Credit to Asset	1.97 (0.000)	-1.669 (0.000)	138.045 (0.0001)	100.649 (0.000)
NPL	-4.214 (0.0002)	-12.643 (0.007)	201.199 (0.000)	228.277 (0.000)

Source: Research finding.

This paper use the simultaneous equation in order to the survey that how linkage between conservatism central banks and capital adequacy ratio. This system is based on relationship between lending channel and capital requirement and preference of central bank. Then, three system of simultaneous equation could be defined as follows:

$$\begin{aligned}&\mathrm{Cons}_{i,t} = \\ &r_0 + r_1\,\mathrm{Capitaladq}_{i,t} + r_2\mathrm{Concertation}_{i,t} + r_3\mathrm{Depositgdp}_{i,t} + r_4\,\mathrm{Creditasset}_{i,t-1} + \\ &r_5\,\mathrm{Cons}_{i,t-1} + r_6\,\mathrm{GDP}_{i,t} + \eta_{i,t}\end{aligned} \quad (1)$$

$$\begin{aligned}&Capitaladq_{i,t} = a_0 + a_1\,Depositgdp_{i,t} + a_2 concertation_{i,t} + a_3 creditasset_{i,t} + \\ &a_4 capitaladq_{i,t-1} + a_5\,Cons_{i,t} + a_6\,GDP_{i,t} + \varepsilon_{i,t}\end{aligned} \quad (2)$$

$$\begin{aligned}&\mathrm{Creditasset}_{i,t} = \\ &b_0 + b_1\mathrm{Concertation}_{i,t} + b_2\mathrm{Depositgdp}_{i,t} + b_3\mathrm{NPL}_{i,t} + \\ &b_4\,\mathrm{Creditasset}_{i,t-1} + b_5\,\mathrm{Cons}_{i,t} + b_6\,\mathrm{Capitaladq}_{i,t} + b_7\,\mathrm{GDP}_{i,t} + \emptyset_{i,t}\end{aligned} \quad (3)$$

where, r_i(i=1…6) ,d a_k(k=1…6) andb_j(j=1…7) are the parameters of the simultaneous equation (1),(2) and (3) . $\eta_{i,t}$, $\varepsilon_{i,t}$ and $\emptyset_{i,t}$ are residues of the relative equation for every country (i) and year (t). The GMM-SYS estimator is a system that contains both the levels and the first difference equations. It provides an alternative to the standard first difference GMM estimator.

In Equation (1), Cons is dependent variable and capital adequacy and credit asset are influence on Conservatism variable. Price stability (goal of monetary policy) is proxies by central bank conservatism (CONS index) proposed by Levieuge and Lucotte (2014), which is specifically based, on the Taylor Curve. Central bank governs monetary policy by selecting inflation stabilization. Also, central bank is attempted to promoting and increasing financial stability.

According to the Leviuge et al. (2016), the higher preference for price stability by central bank means higher CONS index. With the theoretical concept of Taylor Curve, index that display the preference of central bank reveal monetary policy goal of inflation stabilization connected to output stabilization.

Other explanatory variables are including concentration, Deposit to GDP and economic variable (GDP per capita) and the level of Cons in t-1. The level of Cons in t-1 is shown by the level of Conservatism (behavior of central bank) in t-1. Capital adequacy ratio and credit asset ratio are dependent variables in both of equations (2), (3) in the mentioned system. Also, both of credit to asset ratio and capital adequacy ratio are considered with a level of (t-1) in this system.

The lending channel of monetary policy is made available the effects of one policy on the objective of the other. Macro prudential policy tools impacts on credit and imbalanced with consequences on aggregate demand and inflation. This system implies on tradeoff between monetary policy and macro prudential policy and preference of central bank for price stability. The linkage between banking system and monetary policy is made available by lending channel that this channel as shown in equation (3). Capital adequacy as macro prudential policy tools considers equation (2).

Results

The macro-prudential policies of the central bank must be able to reduce systemic risks. Coordination is very important despite the differences between monetary policy and macroeconomic policy. It is important to distinguish between monetary policies and macroeconomic policies (oversight of banks) by the central bank. In the stages of separation between monetary policy and macroeconomic policy, attention is focused on weaknesses in banks and monitoring of these cases is the most important for central bank. Considering the decisive goal of financial stability, in addition to the organizational and institutional structure of the supervisory authority as well as the availability of information, the creation of combined indicators on the effectiveness and effectiveness of the policy of caution can be appropriate.

Conservatism of central bank in the level of (t-1) is positive and significant. Relationship between capital adequacy and preference of central bank has negative coefficient and relationship credit to asset ratio and CONS index is positive and significant (Part 1, Table 3).

Capital adequacy in the level of (t-1) and credit to asset ratio in the level (t-1) are significantly positive. Conservatism of central bank has negative coefficient with capital related to capital adequacy and has positive relation with credit to asset (parts 2 and 3).

Coefficient of Concentration variable is significantly negative relation with conservatism of central bank. Concentration has positive coefficient and significant in the part 2. Then, the relation between concentration and capital adequacy is positive. Concentration and credit asset has significantly negative relationship in OIC countries. Then, concentration limited to the lending in OIC countries.

GDP per capita in the system consider as economic variable that make positive relation in the system. Credit to asset has a positive relationship with conservatism of central bank and capital adequacy in OIC countries. According to the results, the coefficients of all variables are statistically significant in the internal of 99% confidence.

This paper extends the model by inserting the term, cross-product of capital and Cons (preference of central bank). The coefficient of this cross-product is significantly positive that indicating that conservatism of central bank and macro prudential policy instrument, capital adequacy, increase the effect of macro prudential policy on banking lending. The results show that the conservatism of central bank is an important indicator for implementing macro

prudential supervision in OIC countries.

Table 3. Estimation of the Simultaneous Equation

variables	System (1)	System (2)	System (3)
Part 1: dependent variable : CONS			
Intercept	0.8367(10.78)	0.7592(8.89)	0.75008(10.11)
CONS(-1)	0.15925(2.08)	0.2102 (2.45)	0.2497(3.41)
Concentration	-0.00100(-2.22)	-0.00467(-2.45)	-0.00813(-1.75)
Capital adequacy	-0.0178(-2.78)	---	-0.00115(-1.69)
Credit to Asset	0.0477(1.74)	---	0.00161(1.88)
GDP per capita	0.1929(2.94)	0.1831(1.83)	0.2011(3.91)
Capital adq.*credit asset	---	0.2401(2.03)	---
Part 2: dependent variable : capital adequacy			
Intercept	0.8315(9.81)	0.7452(8.85)	0.7403(5.69)
Capital adequacy(-1)	0.9362(5.75)	0.981(1.85)	0.991(5.81)
Concentration	0.0087(1.916)	0.00396(1.98)	0.00378(1.66)
CONS	-0.3379(-1.83)	-0.3583(-1.76)	-0.1567(-1.96)
Credit to asset	0.00326(1.99)	0.00935(1.701)	0.00816(2.76)
GDP per capita	0.1792(2.08)	0.1061(2.55)	0.1741(2.23)
Part 3: Depended variable: credit to asset			
Intercept	0.6991(7.32)	0.5569(6.39)	0.7069(5.39)
Credit to asset (-1)	0.9551(1.93)	0.9071(2.806)	0.9973(2.25)
Capital adequacy	-0.02466(-1.663)	-0.08448(-2.64)	---
CONS	1.649(1.664)	1.976(2.04)	---
concentration	-0.01756(-1.67)	-0.005154(-1.64)	-0.0205(-2.08)
NPL	-0.0844(-3.16)	-0.07028(-3.87)	-0.01709(-1.72)
GDP per capita	0.4301(1.807)	0.338(1.77)	0.539(2.94)
Capital adq.* CONS	---	---	0.0314(1.73)
J-stat prob.	0.23	0.25	0.27

Source: Research finding.

The interaction of capital adequacy and credit to asset ratio is used to in part 1 in the system (2). Then, the variables capital adequacy and credit to asset ratio omitted in the estimation of system. The coefficient of this interaction is positive and significant that means this interaction (capital adequacy*credit to asset ratio) has simultaneous effects on preferences of central bank.

Conclusion

The relationship between monetary and macro prudential policy under central bank decisions could help to coordination of between policies and reduce inconsistency and contradiction of between objective.

The recent financial crisis has raised many doubts about the financial stability and the price stability and preferences of each. Monetary policy focuses more on price stability; macroeconomic policies focus on financial stability. The dangers of the recent financial crisis cannot consider as accidental and linked to financial instability. This paper considers the contradictions between monetary policy and macroeconomic policy. Evidence suggests that monetary policy will reduce the monitoring and supervision in the banking system.

The excessive attention of the central bank to monetary policy and the instruments of the base rates can lead to more instability in the banking system. Hence, despite the

contradictions between monetary policy and macroeconomic policy, the balancing of goals and tools is one of the key steps of central bank. Then, as results, Coefficient of Concentration variable is significantly negative relation with conservatism of central bank. Concentration has positive coefficient and significant. Then, the relation between concentration and capital adequacy is positive. Concentration and credit asset has significantly negative relationship in OIC countries. Then, concentration limited to the lending in OIC countries.

According to the results, the coefficient of this cross-product is significantly positive that indicating that conservatism of central bank and macro prudential policy instrument, capital adequacy, increase the effect of macro prudential policy on banking lending. The results show that the conservatism of central bank is an important indicator for implementing macro prudential supervision in OIC countries.

In general, strategies to strengthen central bank policy can be developed, such as the creation of a participatory balance between monetary policy and macroeconomic policy, despite the contradictions between these policies, identifying appropriate tools consistent with the objectives in each of the macroeconomic policies and monetary policy, identifying the points of impact from each of these two policies in the whole economy.

Evidence suggests that monetary policy will reduce oversight and supervision in the banking system. Excessive central bank attention to monetary policy and key interest rate instruments can lead to further instability in the banking system. Therefore, despite the contradictions between monetary policy and macro-prudential policy, creating a balance in goals and tools is one of the key steps of the central bank in the field of monetary and fiscal policy. According to regulations, the central bank is responsible for both monetary policy and banking supervision. Hence, with such contradictions, the need for policy convergence is inevitable, and the central bank can target specific methods to achieve banking stability by targeting inflation. According to the results of this report, it is suggested to use combined indicators and these indicators provide significant effects on macroeconomics in the face of sanctions by strengthening macro-prudential policies in banking.

References

[1] Angeloni, I., & Faia, E. (2013). Capital Regulation and Monetary Policy with Fragile Banks. *Journal of Monetary Economics*, *60*(3), 311-324.

[2] Matheron, J., & Antipa, P. (2014). Interactions between Monetary and Macroprudential Policies. *Financial Stability Review*, *18*, 225-240.

[3] Angelini, P., Neri, S., & Panetta, F. (2014). The Interaction between Capital Requirements and Monetary Policy. *Journal of Money, Credit and Banking*, *46*(6), 1073-1112.

[4] Andriushin, S., & Kuznetsova, V. (2013). Macroprudential Policy Instruments of Central Banks. *Problems of Economic Transition*, *56*(7), 75-94.

[5] Aiyar, S. S., Calomiris, C. W., & Wieladek, T. (2016). How does Credit Supply Respond to Monetary Policy and Bank Minimum Capital Requirements? *European Economic Review*, *82*, 142-165.

[6] ---------- (2014). Identifying Channels of Credit Substitution when Bank Capital Requirements are varied. *Economic Policy*, *29*(77), 45-77.

[7] Blanchard, O., Dell Ariccia, G., & Mauro, P. (2010). Rethinking Macroeconomic Policy. *Revista de Economía Institucional*, *12*(22), 61-82.

[8] Boyd, J. H., & Graham, S. L. (1988). The Profitability and Risk Effects of Allowing Bank Holding. *Federal Reserve Bank of Minneapolis. Quarterly Review-Federal Reserve Bank of Minneapolis*, *12*(2), 3-3.

[9] Boyd, J. H., Graham, S. L., & Hewitt, R. S. (1993). Bank Holding Company Mergers with Nonbank Financial Firms: Effects on the Risk of Failure. *Journal of Banking & Finance*, *17*(1), 43-63.

[10] Bank for International Settlements. (2010). 80th BIS Annual Report 2009/10, Retrieved from

www.bis.org/publ/arpdf/ar2010e.pdf

[11] Bernanke, B. S., & Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic perspectives*, *9*(4), 27-48.
[12] Bean, C., Paustian, M., Penalver, A., & Taylor, T. (2010). Monetary Policy after the Fall. *Macroeconomic Challenges: The Decade Ahead*, 26-28.
[13] Brunnermeier, M. K., & Sannikov, Y. (2016). *The I Theory of Money* (w22533). *National Bureau of Economic Research*, Retrieved from https://www.nber.org/system/files/working_papers/w22533/w22533.pdf
[14] Beau, D., Clerc, L., & Mojon, B. (2012). Macro-prudential Policy and the Conduct of Monetary Policy. Retrieved from https://repositoriodigital.bcentral.cl/xmlui/bitstream/handle/20.500.12580/3808/BCCh-sbc-v19-p273_314.pdf?sequence=1
[15] Bruno, V., & Shin, H. S. (2014). Assessing Macroprudential Policies: Case of South Korea. *The Scandinavian Journal of Economics*, *116*(1), 128-157.
[16] Claessens, S., Ghosh, S. R., & Mihet, R. (2013). Macro-prudential Policies to Mitigate Financial System Vulnerabilities. *Journal of International Money and Finance*, *39*, 153-185.
[17] Cecchetti, S. G., & Ehrmann, M. (1999). Does Inflation Targeting Increase Output Volatility? An International Comparison of Policymakers' Preferences and Outcomes. Retrieved from https://www.nber.org/system/files/working_papers/w7426/w7426.pdf
[18] Cecchetti, S. G. (2001). Legal Structure, Financial Structure and the Monetary Policy Transmission Mechanism. In *The Monetary Transmission Process* (170-207). London: Palgrave Macmillan.
[19] Cerutti, E., Claessens, S., & Laeven, L. (2017). The Use and Effectiveness of Macroprudential Policies: New Evidence. *Journal of Financial Stability*, *28*, 203-224.
[20] Curdia, V., & Woodford, M. (2010). Credit Spreads and Monetary Policy. *Journal of Money, Credit and Banking*, *42*, 3-35.
[21] Castelnuovo, E., & Surico, P. (2004). Model Uncertainty, Optimal Monetary Policy and the Preferences of the Fed. *Scottish Journal of Political Economy*, *51*(1), 105-126.
[22] Cúrdia, V., Ferrero, A., Ng, G. C., & Tambalotti, A. (2011). Evaluating Interest Rate Rules in an Estimated DSGE Model. *FRB of New York Staff Report*, Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1917450
[23] Dennis, R. (2004). Inferring Policy Objectives from Economic Outcomes. *Oxford Bulletin of Economics and Statistics*, *66*, 735-764.
[24] Dennis, R. (2004). Specifying and Estimating New Keynesian Models with Instrument Rules and Optimal Monetary Policies. *FRB of San Francisco Working Paper*, Retrieved from https://www.frbsf.org/economic-research/wp-content/uploads/sites/4/wp04-17bk.pdf
[25] Favero, C. A., & Rovelli, R. (2003). Macroeconomic Stability and the Preferences of the Fed: A Formal Analysis, 1961-98. *Journal of Money, Credit and Banking*, *35*(4), 545-556.
[26] Faia, E., & Rossi, L. (2013). Union Power, Collective Bargaining, and Optimal Monetary Policy. *Economic Inquiry*, *51*(1), 408-427.
[27] Galati, G., & Moessner, R. (2013). Macroprudential Policy – a Literature Review. *Journal of Economic Surveys*, *27*(5), 846-878.
[28] Gerali, A., Neri, S., Sessa, L., & Signoretti, F. M. (2010). Credit and Banking in a DSGE Model of the Euro Area. *Journal of Money, Credit and Banking*, *42*, 107-141.
[29] Gauthier, C., Lehar, A., & Souissi, M. (2012). Macroprudential Capital Requirements and Systemic Risk. *journal of Financial Intermediation*, *21*(4), 594-618.
[30] Ghosh, S. (2016). Macroprudential Policies, Crisis and Risk-taking: Evidence from Dual Banking Systems in GCC Countries. *Journal of Islamic Accounting and Business Research*, Retrieved from https://www.emerald.com/insight/content/doi/10.1108/JIABR-03-2014-0011/full/html
[31] Gumata, N., Kabundi, A., & Ndou, E. (2013). Important Channels of Transmission Monetary Policy Shock in South Africa. *Economic Research Southern Africa,* Retrieved from https://www.econrsa.org/system/files/publications.

[32] Kannan, P., Rabanal, P., & Scott, A. M. (2012). Monetary and Macroprudential Policy Rules in a Model with House Price Booms. *The BE Journal of Macroeconomics*, Retrieved from https://www.degruyter.com/document/doi/10.1515/1935-1690.2268/html
[33] Korinek, A., & Simsek, A. (2016). Liquidity Trap and Excessive Leverage. *American Economic Review*, *106*(3), 699-738.
[34] Lautenschläger, S (2014). How Innovative Should Central Banks be? Retrieved from http://www.ecb.europa.eu/press/key/date/2014/html/sp141129.en.html
[35] Lim, C. H., Costa, A., Columba, F., Kongsamut, P., Otani, A., Saiyid, M., Wezel, T., & Wu, X. (2011). Macroprudential Policy: What Instruments and How to Use them? Lessons from Country Experiences. Retrieved from https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1956385
[36] Rubio, M., & Carrasco-Gallego, J. A. (2014). Macroprudential and Monetary Policies: Implications for Financial Stability and Welfare. *Journal of Banking & Finance*, *49*, 326-336.
[37] Smets, F. (2018). Financial Stability and Monetary Policy: How Closely Interlinked? *35th Issue (June 2014) of the International Journal of Central Banking*, Retrieved from https://www.ijcb.org/journal/ijcb14q2a11.pdf
[38] Svensson, L. E. (2019). The Relation between Monetary Policy and Financial-stability Policy. *Series on Central Banking Analysis and Economic Policies*, *26*, 293-295.
[39] ---------- (2013). Some Lessons from Six Years of Practical Inflation Targeting. Retrieved from http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.310.6569&rep=rep1&type=pdf
[40] Woodford, M. (2012). Inflation Targeting and Financial Stability (w17967). *National Bureau of Economic Research*, Retrieved from https://www.nber.org/system/files/working_papers/w17967/w17967.pdf
[41] Wadhwani, S. B. (2010). What Mix of Monetary Policy and Regulation is best for Stabilizing the Economy? *The Future of Finance: The LSE Report*, Retrieved from http://innovbfa.viabloga.com/files/LSE___the_future_of_finance___aug_2010_1.pdf#page=149
[42] Zulkhibri, M. (2019). Macroprudential Policy and Tools in a Dual Banking System: Insights from the Literature. *Borsa Istanbul Review*, *19*(1), 65-76.