THE MONETARY TRANSMISSION MECHANISM UNDER DUAL FINANCIAL SYSTEM

1 INTRODUCTION

Global financial crisis highlighted the sufficient level of profitability and financial stability of Islamic banks and Islamic financial system itself compared to conventional ones. Thenceforth lots of countries started paying attention to products and services of Islamic financial system and to Islamic financial system itself. Then Islamic financial system proved its stability during the Covid-19 pandemic – it not only stayed resilient during and aftermath the pandemic, but also continued to grow.

Notably, recent growth comes from non-Islamic regions, reflecting the extension of market geography and sustain interest from non-target audience. Among the countries with biggest rise in assets are Russia (+183%)[1], Canada (+146%)[1], the United States (+138%)[1], Maldives (+121%)[1], Nigeria (+101%)[1] and Tajikistan (+84%)[1] and the growth is primarily achieved by growth in Islamic funds, sukuk and Islamic banking.

Thus, non-Islamic economies actively increases the share of Islamic financial system assets, rising the attention to Islamic financial system and the way it can be incorporated in the conventional one, pursuing different goals. More precisely, nowadays in 136[2] countries Islamic finance presence either directly or indirectly.

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[1] Refinitiv Islamic finance development report, 2022

[2] **GCC(Gulf Cooperation Council)**: Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE; **Southeast Asia**: Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand; **South Asia**: Afghanistan, Bangladesh, India, Maldives, Nepal, Pakistan, Sri Lanka; **Other MENA (Middle East and North Africa, excluding GCC)**: Algeria, Egypt, Iran, Iraq, Jordan, Lebanon, Libya, Mauritania, Morocco, Palestine, Sudan, Syria, Tunisia, Yemen; **Europe**: Albania, Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Georgia, Germany, Greece, Guernsey, Hungary, Ireland, Italy, Jersey, Latvia, Liechtenstein, Luxemburg, Macedonia, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom; **Other Asia**: Australia, Azerbaijan, China, Hong Kong, Japan, Kazakhstan, Kyrgyzstan, New Zealand, Russia, South Korea, Taiwan, Tajikistan, Turkmenistan, Uzbekistan, Vietnam; **Americas**: Bahamas, Bolivia, Brazil, Canada, Cayman Islands, Chile, Guyana, Mexico, Suriname, Trinidad and Tobago, United States; **Sub-Saharan Africa**: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Chad, Comoros, Djibouti, Ethiopia, Gabon,

More than 30 countries from this list are functioning under dual financial system regime and half of these countries have the share of Islamic banking in total banking assets more than 10%[3].

However, the existence of the dual financial system places some challenges for monetary authority. Since both Islamic and conventional financial systems are interacted in the economy, monetary instruments should be chosen the way to affect both types of banks effectively. However, Islamic and conventional financial systems are based on different sets of principle. The main differences are the following: under Islamic finance money has no intrinsic value, it serves only as a medium of exchange; the payment of receipt of interest is prohibited, debt can be transferred only at par value and the income can be obtained only from investment and trade activities; focus should be on real-economy activities, gambling, speculative and conjecturing activities are prohibited under Islamic finance; socially detrimental activities, such as tobacco and alcohol, are also prohibited under Islamic finance. Moreover, most of the products of Islamic banks are based on profit and loss sharing concept to comply with the prohibition of receipt of interest. Profit and loss sharing concept implies equitable sharing of risks and profits between parties involved in financial transaction.

Stated distinction between Islamic financial system and conventional financial system are expected to create challenges to monetary authority in implementing monetary policy within a dual financial system, especially using conventional monetary instruments. The presence of Islamic financial system requires implementations of specific Islamic instruments to affect the behavior of Islamic banks. Besides, empirical findings highlight interactions between conventional and Islamic financial systems and the complexity in distinguishing

Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast, Kenya, Liberia, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, Somalia, Somaliland, South Africa, Tanzania, Togo, Uganda, Zambia, Zimbabwe.

[3] Refinitiv Islamic finance development report, 2022

Islamic banks from conventional outlining additional challenge to monetary authorities in countries with dual financial system.

Chong & Liu, 2009 finds that the returns on the Islamic deposit accounts in Malaysia follow conventional interest rates and concludes that Islamic finance does not deviate from conventional one because of competitive pressure even if consumers are religious. *Cevik & Charap, 2015* obtains the same results for Turkey.

Nevertheless, intercountry analysis in *Meslier et.al, 2017* illustrates that not only Islamic banks respond to the conventional banks' behavior but also conventional banks do. Authors state that in Muslim countries or in countries with significant presence of Islamic finance in the financial system conventional banks are enough sensitive to the returns on the Islamic deposit accounts and tend to set higher interest rates on deposits to attract customers, while the behavior of Islamic banks is influenced only by other Islamic banks.

Raditya & Mansor, 2017 discovers the asymmetry in the competition behavior of Islamic and conventional banks. Authors find that the pass-through from conventional interest rates to returns on Islamic deposits accounts in Malaysia is more significant when the conventional interest rates increase. In case when conventional interest rates decrease, Islamic banks tend to change returns on Islamic deposits accounts less significant and at a slower pace.

Overall, despite an expansion of Islamic finance industry, the implementation of monetary policy and its transmission mechanism in the presence of both conventional and Islamic finance remain unstudied. The first thing to begin with is to conduct the complex analysis of the relation between conventional and Islamic rates. The analysis based on the sufficient set of economies, including countries with different level of religiosity, monetary regime and state of the economy, allows to distinguish main peculiarities of initial parts of monetary transmission mechanism under dual financial system.

Hence, the paper contributes to recent literature by conducting complex analysis of the interactions between conventional and Islamic rates. Additionally, the presence and the nature of the asymmetry of these interactions are also examined for better understanding of peculiarities. The analysis is based on the set of countries, including Muslim majority countries with dominant Islamic financial system and less Islamic ones with no dominant financial system. Monetary regimes of analyzing economies also vary from different forms of exchange rate and inflation targeting to countries without well-defined regimes. Besides, the set of countries includes both developed and developing countries with different states of the economy and institutional quality. Overall, the set is enough diverse to get sustain results and point out the main factors of peculiarities. The NARDL approach is used to examine short-run and long-run interactions along with the asymmetries between conventional interest rates and Islamic rates of return. Results show that conventional and Islamic rates are poorly interacted in the long-run, specifically, when increase in conventional interest rates appears. Besides, neither statistically significant short-run, nor long-run asymmetries are detected, except one short-run in the country with high and volatile inflation. Hence, the fact that Islamic rates are associated more with the real economy prevent any strong causal relations between conventional and Islamic rates in the long-run. However, in the short-run Islamic rates may follow conventional rates due to lag in reaction caused by the need to reevaluate the projects considering changes in economic conditions.

The paper is organized the following way: **Section 2** consists of the overview of the literature on Islamic banking. **Section 3** includes data description and description of the variables. In **Section 4** the specification of the empirical model is defined. **Section 5** provides estimated results. In **Section 6** main conclusions are presented.

2 ISLAMIC FINANCE

Islamic finance refers to commercial activity conducted in accordance with Islamic jurisprudence, offered products and services are Shariah compliant. Prohibition of Riba, Gharar and Maysir in financial transactions are the fundamentals of Islamic banking system that distinguish it from conventional banking system.

Prohibition of Riba means that interest-related transactions are illegal. Riba commonly arises with different types of loans, for example, car loan, mortgage, hire purchase, personal loan and term loan or overdraft, with deposits and credit cards. Since Islamic banks are interest-free, conventional monetary instruments are not appropriate ones to directly affect Islamic banks and, thus, the macroeconomic variables, related to the operation of Islamic banking system.

Prohibition of Gharar implies that transactions associated with high uncertainty or that may cause any injustice or deceit against any of the parties involved in financial transaction are illegal. Gharar occurs with different types of insurance, with derivatives instruments and short-selling contracts.

Prohibition of Maysir prevents acquisition of monetary gain from mere chance, speculation, or conjecture. Maysir is associated with different types of insurance and derivatives instruments.

Despite the fundamental differences in the functioning of Islamic and conventional financial systems, they offer products and services which do not differ significantly. Common forms of Islamic finance activity are the following: banking (current accounts, deposit and investment accounts; mortgages, home purchase plans and other financing), investments (funds and sukuk) and insurance (general insurance, life insurance and pensions). The commonly used mechanisms under Islamic finance activities are summarized in the **Table 1**.

<table>
<tr><th colspan="2">Banking</th><th>Investments</th><th>Insurance</th></tr>
<tr><td colspan="2">current accounts, deposit and investment accounts; mortgages, home purchase plans and other financing</td><td>funds and sukuk</td><td>general insurance, life insurance and pensions</td></tr>
<tr><td>Wakalah is a contract between two parties: one provides capital, and another uses it under a delegated authority to invest in Shariah compliant activity for agreed fee, generated return is distributed under predetermined ratios between parties.</td><td>Ijarah is financial instrument, in which one party leases the property for the contract term, with monthly payments comprised of a charge for the lease and also a rental component, as they are living in the property at the same time.</td><td rowspan="2">It is allowed to invest in equities of firms which are engaged in Shariah compliant activities and not excessively leveraged; cash at zero return; sukuk which is financial certificate, issuer sells it and then uses the proceeds to purchase an asset that the investor group has direct partial ownership interest in. The issuer must also make a contractual promise to buy back the bond at a future date at par value; tangible assets such as property and machinery.</td><td rowspan="2">Takaful is arrangement between parties to guarantee each other and make contributions to a pool or mutual fund. The pool of collected contributions creates fund. Contribution is based on the type of coverage required and personal circumstances. The fund is used to cover costs and pay claims, any remaining surpluses after making provisions for the likely cost of future claims and other reserves, belong to the parties of the fund.</td></tr>
<tr><td>Murabaha refers to the sale of goods and the margin of profit is included in the sale price of goods. The subject of sale must exist, be owned by the seller, and be in his physical or constructive possession. So, the seller assumes the risks of ownership.</td><td>Musharaka is a contract established by partners, who agree to share business profits and losses. Profits are distributed in the proportion mutually agreed in the contract. If one or more partners choose to become non-working partners, the ratio of their profit cannot exceed their</td></tr>
</table>

Murabahah requires an offer and acceptance, which must include: Certainty of Price, Place of Delivery; and Date when the Price will be paid.	ratio in capital investment.		
Mudarabah is a financial instrument, in which one party participates with money and the other with efforts and skills. The profit is divided in strict proportion, and no party is entitled to a predetermined amount of return. Financial losses are borne solely by the investor.	**Diminishing Musharakah** is a financial instrument, in which one party purchases the shares of the other party, gradually. Shares of the parties are divided into units, and it is pre-agreed that the purchaser will purchase all those units over a period of time, and will become the sole owner of the asset.		

Table 1. *Commonly used mechanisms under Islamic finance activities.*

Overall, products and services of Islamic finance are more Shariah compliant adaptation of products and services of conventional finance, however, the profit and loss sharing concept and the strict difference between the function of money deliver significantly different interactions with the economy.

Firstly, money is a product besides a medium of exchange and a store of value under conventional financial system and just a medium of exchange under Islamic ones while product is real asset. Thus, due to the nonexistence of real assets behind the money, while disbursing funds, the expansion of money takes place, creating inflation under conventional financial system and no money extension and, thus, no inflation is expected to be created under Islamic finance.

Secondly, due to inflation one party increases the price of the product or service to incorporate inflationary effect into the cost of the product or service under conventional financial system, while no extras can be charged under Islamic financial system and, thus, less inflationary pressure is expected to appear.

Thirdly, if the failure appears, the loans become nonperforming ones under the conventional financial system, under Islamic financial system the management is taken over to hand over a better one according to profit and loss sharing concept.

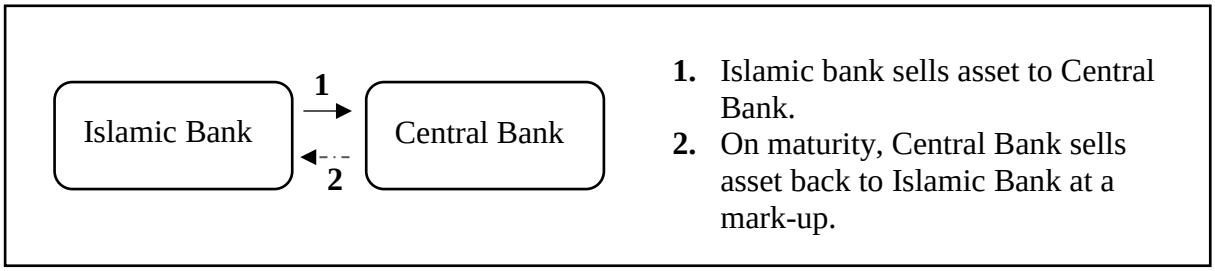
Additionally, sharing profits under Mudarabah and sharing the business under Musharakah provide extra taxes for government budget and allows to minimize the tax burden on other employees, affecting savings and consumption.

Along with the conventional banks Islamic banks must comply with the liquidity requirements, however, they are limited in assets that are Shariah compliant and high-quality ones. Number of countries[4] have issued sukuk to deal with the scarcity of high quality, liquid and Shariah compliant assets, however, the share of sukuk in Islamic finance is steal enough low.

Central Banks are also able to provide Islamic banks with liquidity by Shariah compliant open market operations and by accepting deposits through different Shariah compliant deposit facility models.Shariah compliant open market operations are provided through Waada based model. It implies that

[4] Bahrain, Malaysia, Turkey, Qatar, UK

Islamic bank facing liquidity stress sell an asset to Central Bank, Central Bank subsequently sells the asset back at a mark-up. The mark-up may be based on the conventional repo rate or linked to another economically equivalent index. The only difference from the conventional open market operations, except the requirement for assets to be Shariah compliant, is that Central bank gives discretionary promise rather than contractual obligation to sell asset back or conversely Islamic bank discretionary promise to buy asset from Central bank rather than gives contractual obligation. The scheme for this transaction is the following:

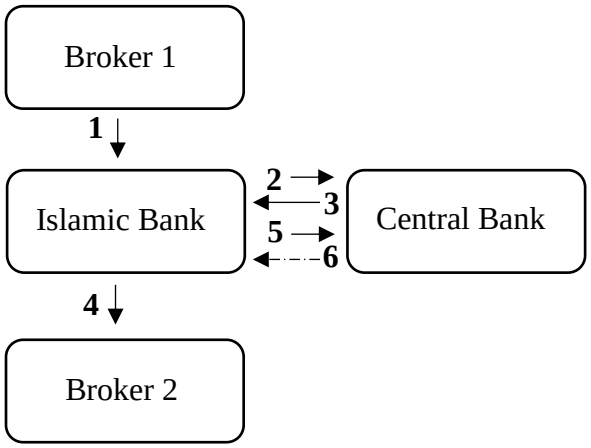


Scheme 1. *The Shariah compliant open market operations*.

Unlike Shariah compliant open market operations, Shariah compliant deposit facility models significantly differ from conventional ways of Central bank interactions with commercial banks.

The commonly used models are the following: Murabaha, Wakalah, Wadiah, and Jualah models.

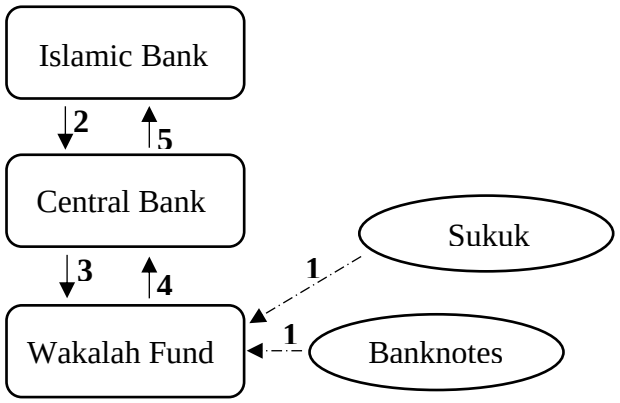
The Murabaha model implies that Central bank uses deposits from Islamic banks to undertake trades with underlying commodities. Then the return from these operations minus costs and fees is returned to Islamic banks instead of interest. The schemes to describe this model is the following:



1. Islamic bank purchases commodities from broker.
2. Islamic bank sells commodities to Central Bank at a mark-up.
3. Central Bank appoints Islamic bank to sell commodities back.
4. Islamic bank sells commodities to broker without any mark-up.
5. Islamic bank returns revenue from trade to Central Bank.
6. Central Bank pays Islamic bank back.

Scheme 2. *The Murabaha model.*

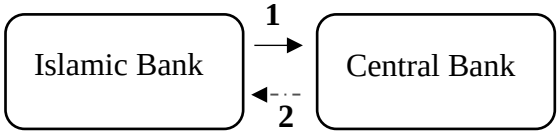
Under the Wakalah model Central Bank places deposits of Islamic banks into a fund of sukuk and then returns principal with profits back to Islamic banks. The scheme is the following:



1. Central Bank establishes a fund.
2. Islamic bank places a deposit in Central Bank.
3. Central Bank uses deposit to invest in the fund.
4. Central Bank gets principal back plus profit.
5. Central Bank returns principal plus profit to Islamic bank.

Scheme 3. *The Wakalah model.*

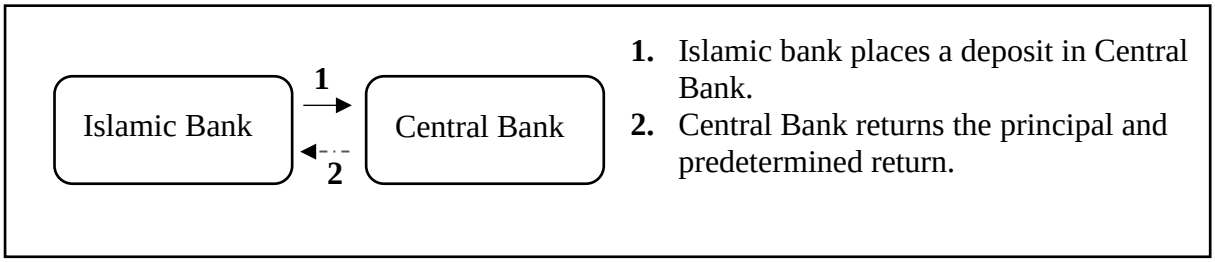
The Wadiah model implies that deposits of Islamic banks in Central Bank are held for the certain fees. Islamic banks may permit to use their deposits for any activities, then they get back principal back minus fees for holding the deposit, otherwise, Islamic banks get not only principals but also generated return that may cover all the fees. The scheme is the following:



1. Islamic bank places a deposit in Central Bank with (without) permission to use it for funding Shariah compliant activities.
2. Central Bank returns the principal minus fees (plus generated return from funded activities).

Scheme 4. *The Wadiah model.*

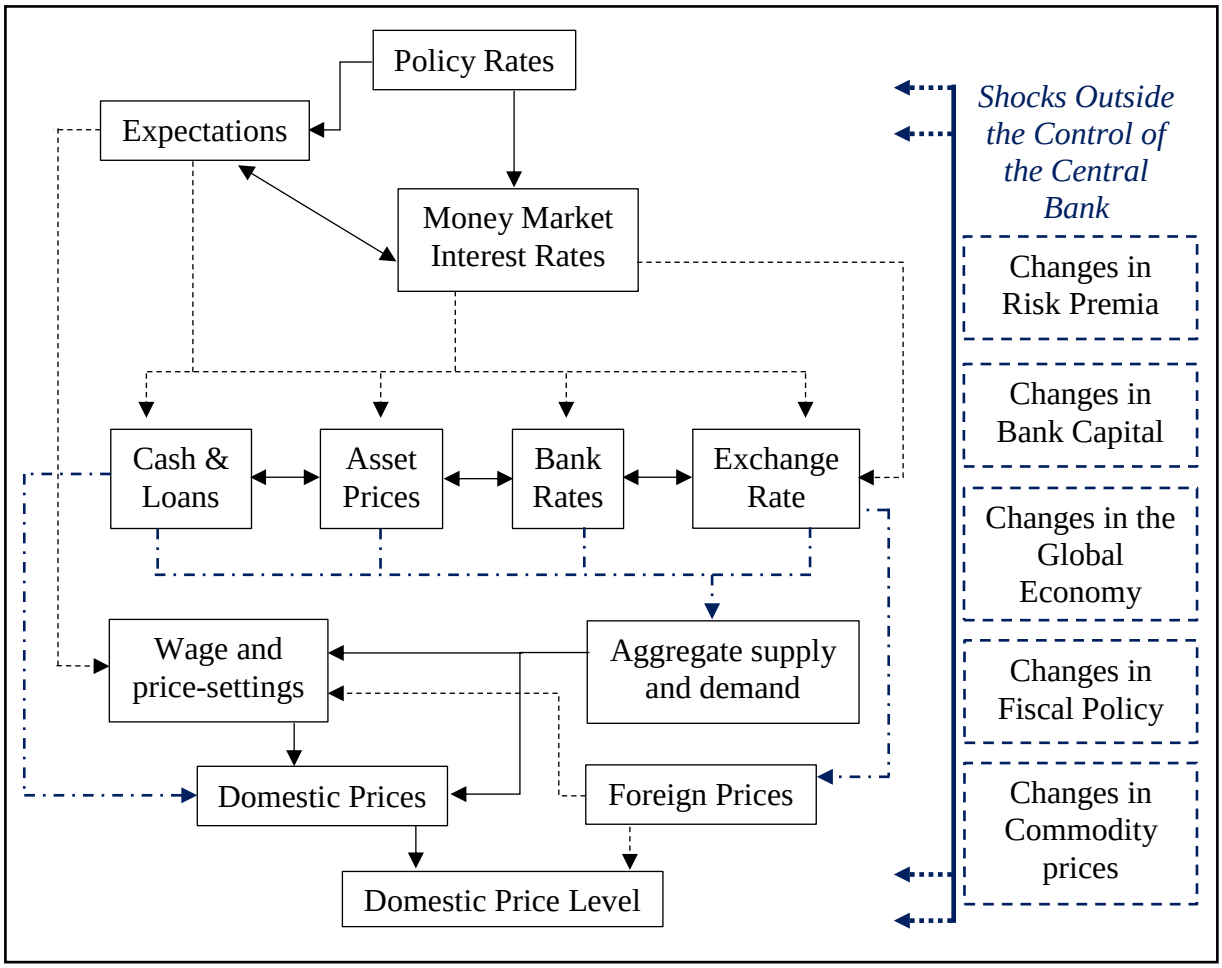
Under the Jualah models Central Bank accepts deposits from Islamic banks and pays certain return back. The scheme is the following:



Scheme 5. *The Jualah model.*

Despite the fact, that Islamic banks rather rarely face liquidity stress compared to conventional ones, Central Bank still has to consider the structural peculiarities of Islamic banks when monetary policy is conducted and adopt conventional monetary instruments for Islamic banks. Interactions between Central Bank and Islamic banks do not differ significantly from conventional ones, especially when mark-ups are set on the level of conventional rates but imply the sufficient stock of Shariah compliant assets and activities in the economy. Additionally, rates of return in Islamic financial system reflects the state of real economy, thus, it is rather more complicated to affect them through monetary policy directly.

Monetary transmission mechanism is a process through which decisions of monetary authority affect the state of economy. The mechanism of monetary policy transmission is an intricate one since changes in monetary instruments transmitted to the macroeconomic variables through multiple channels. These channels in literature are categorized the following way: the interest rate, the exchange rate, the bank credit, the balance sheet, the asset price, and the expectations channels [see for instance, *Mishkin, 1995; Cecchetti, 1995*]. Additionally, the strength of each channel is determined by country-specific characteristics, such as economic structure [see for instance, *Mohanty, et al., 2008*], financial configuration [see for instance, *Cecchetti, 1999*], statutory guidelines [see for instance, *Cecchetti, 1999*] and others. The monetary transmission mechanism can be described with the following scheme:



Scheme 6. *The monetary transmission mechanism.*

Duality of financial system firstly complicates monetary transmission mechanism on the stage when changes in policy rates affect the money market conditions. The presence of Islamic banks forces monetary authority to undertake additional measures described above to affect the Islamic banks and money market conditions. Therefore, advancements appear when changes in the money market interest rates cause changes in the bank rates, asset prices, exchange rate, amount of money in circulation and loans issued. Competition between Islamic and conventional banks may cause additional interactions and multiply the reaction of the bank rates, asset prices, exchange rate, amount of money in circulation and loans issued and consequently strength the monetary transmission mechanism. Competition may force banks to consider not only changes on the money market but also changes in another part of financial system to prevent drain of clients and as result to overreact on the monetary policy. The asymmetric reaction of Islamic banks on the tightening and loosening monetary policy may strength the effect of

asymmetry of monetary policy which is known as larger effects of loosening monetary policy on prices but smaller on real economy and conversely smaller effect of tightening monetary policy on prices and larger on real economy. Additionally, Islamic banks are less probably to face liquidity stress due to the structure of passive side of the balance sheet comparing to conventional banks. Thus, effects from shocks outside the control of Central Bank may become weaker under dual financial system and the monetary transmission mechanism conversely may become stronger. Overall, the understanding the interaction between Islamic and conventional rates is essential for investigation of monetary transmission mechanism under dual financial system.

3 DATA

Assets of Islamic financial system are primarily allocated in several countries, despite the growing popularity around the globe. The diagram below illustrates recent distribution of Islamic assets. The majority of countries are those ones with dual financial system.

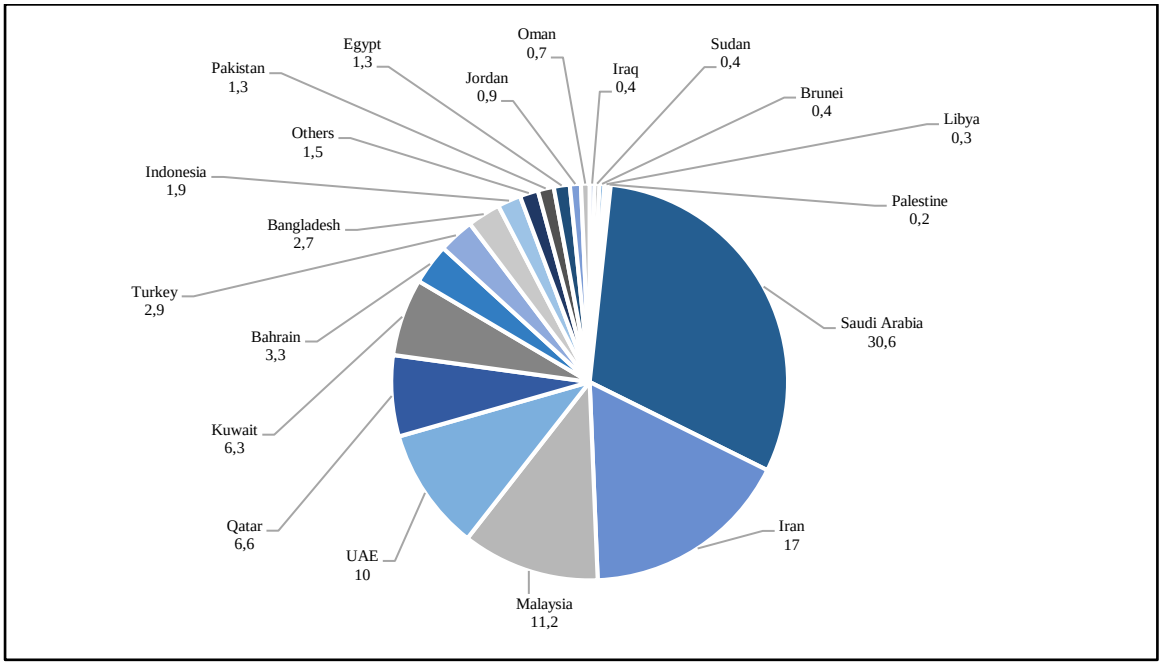


Diagram 1. *Share of Global Islamic Banking Assets (in percent), 2021.* Source: Refinitiv Islamic finance development report, 2022.

However, the share of Islamic banking in the total banking assets in these countries varies significantly. The diagram below illustrates to what extent Islamic banking is represented in financial system of a particular economy.

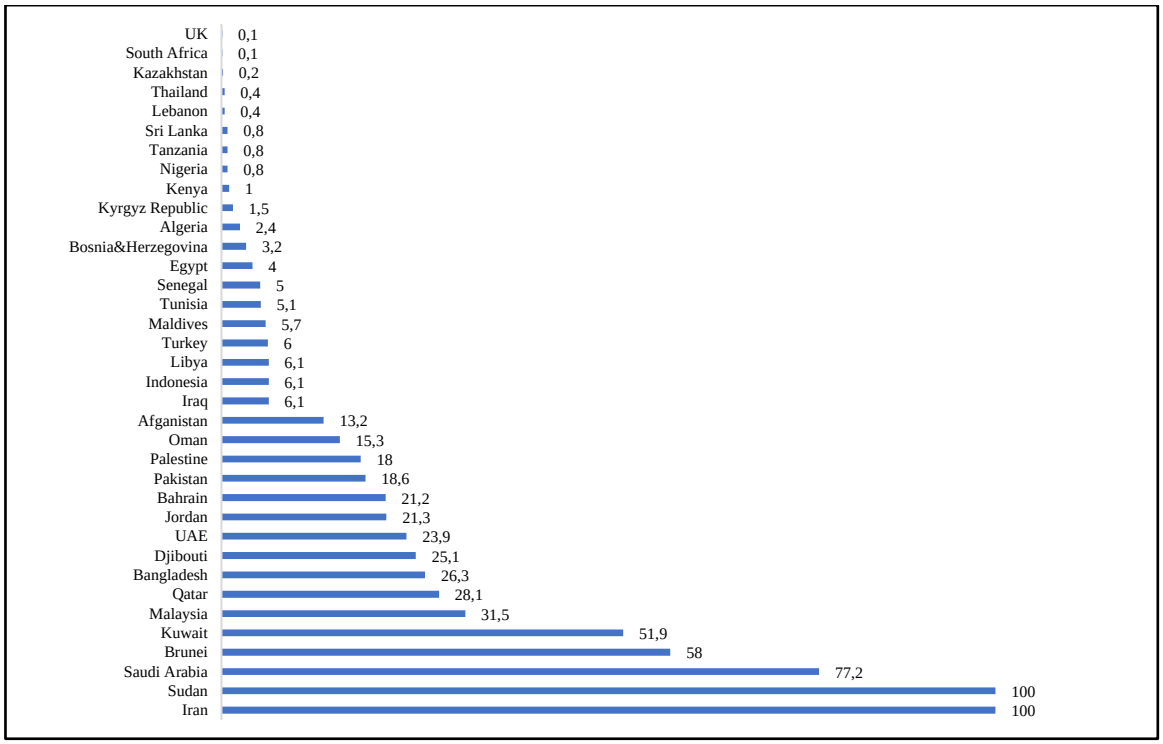


Diagram 2. *Islamic Banking Share in Total Banking Assets (in percent), 2021*. Source: Refinitiv Islamic finance development report, 2022.

Economies with the significant share of global Islamic banking assets are also in the list of countries with sufficient Islamic banking share in total banking assets. Thus, these economies are potentially appropriate ones for the analysis. However, countries both with more than half Islamic financial system and with share less than integer number are excluded from the analysis due to low probability of competition to occur in the financial sector of the economy.

Economies from both lists varies significantly according to the official monetary regimes. It is important to include countries with different types of inflation and exchange rate targeting regimes to exclude the bias of particular monetary regime when interpreting results. Moreover, it is important to control for the different monetary regimes in the regression in order to find the difference in transmission if any. For example, under the exchange rate targeting the exchange rate channel of monetary transmission mechanism does not exist,

economy becomes more sensitive to external shocks. The diagrams below illustrate the diversity in the monetary regimes across countries from both lists.

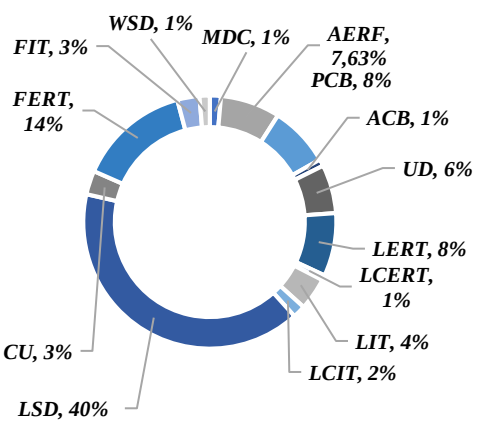


Diagram 3. *Monetary Policy Regimes in Countries with Highest Share of Global Islamic Banking Assets, 2021.*

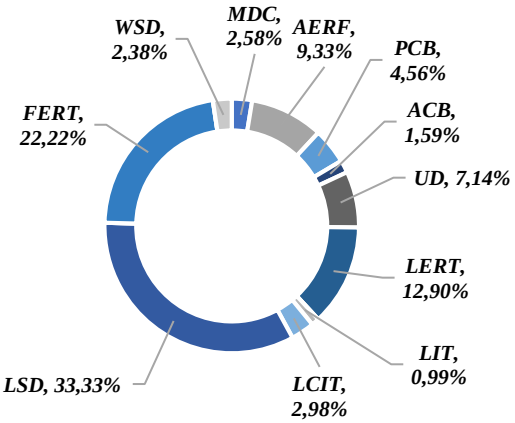


Diagram 4. *Monetary Policy Regimes in Countries with Highest Share of Islamic Banking Assets in Total Assets, 2021.*

Besides, inflation in countries from both lists also varies significantly. The dynamics of inflation is crucial for monetary transmission mechanism. For example, interest rate channel of monetary transmission mechanism is insignificant in those economies with high and volatile inflation due to less controllable real interest rate. The diagrams below illustrate the CPI inflation dynamics in economies.

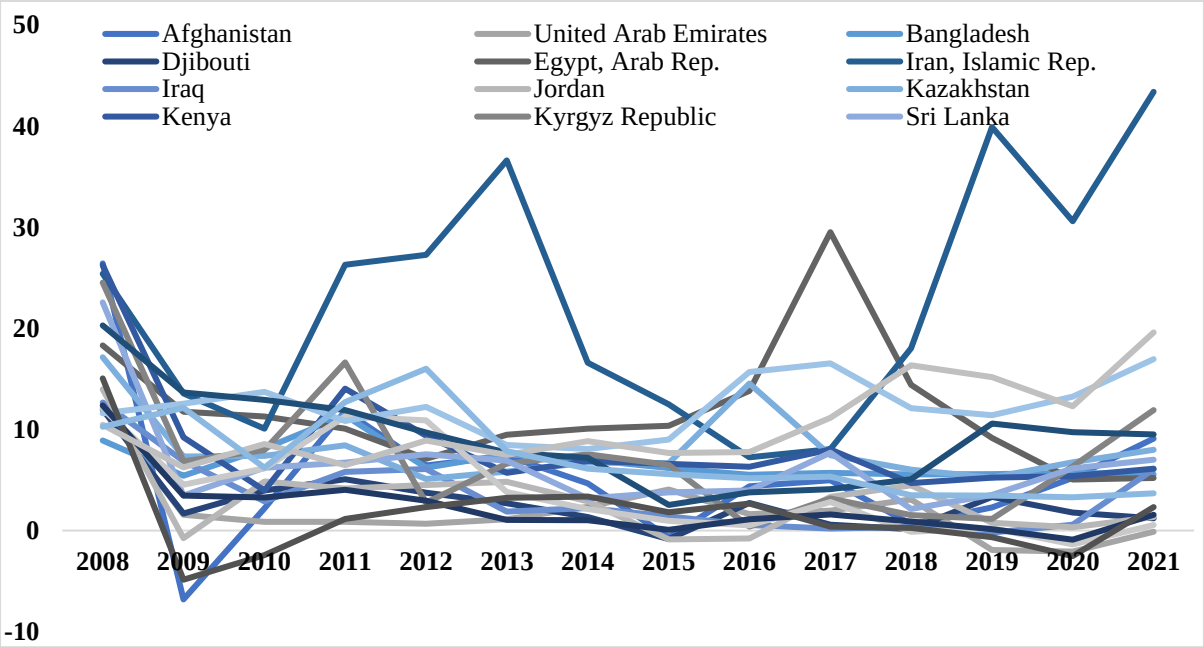


Figure 1. *The CPI inflation dynamics.* Source: World Bank.

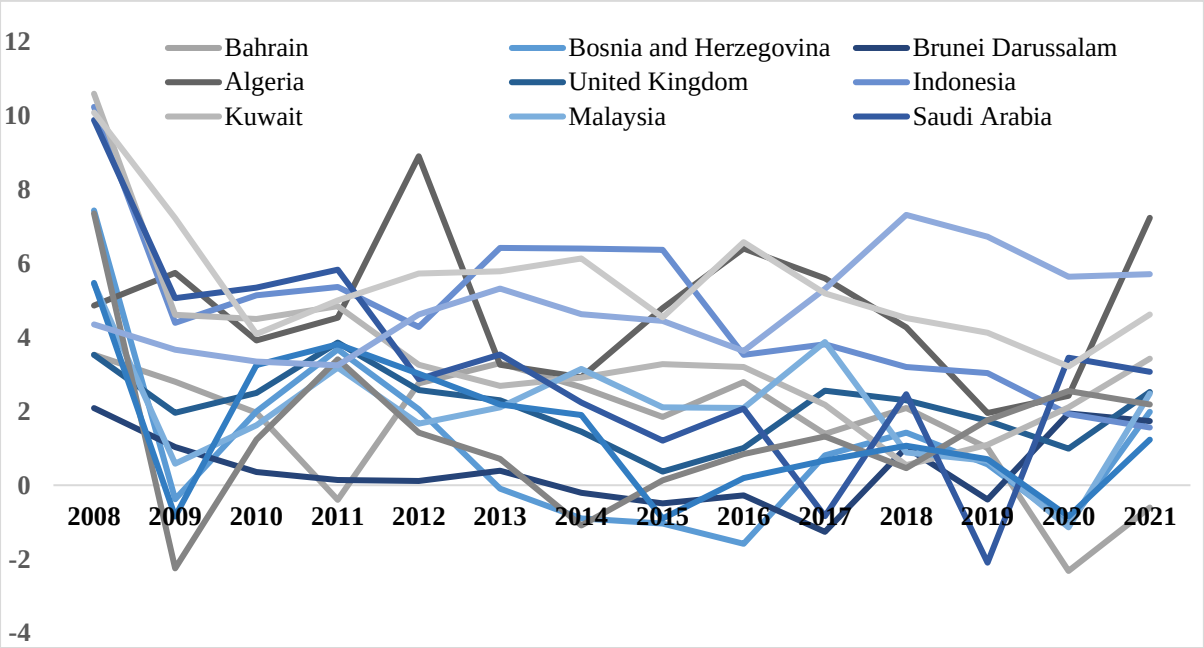


Figure 2. *The CPI inflation dynamics.* Source: World Bank.

Three countries from these lists are chosen for the analysis. The summary information is presented by the following table:

Country	Monetary Policy Regime	Level of CPI Inflation	Share of Global Islamic Assets	Share of Islamic Banking in Total Banking Assets
Indonesia	LSIT	low	>1,5%	< 10%
Malaysia	WSD	low	>10%	> 30%
Pakistan	LSD	high	>1%	> 15%

Table 4. *Summary information.*

Hence, the set of countries contains high and low inflationary countries, countries with the previable Islamic banking segment and not, countries with the inflation targeting regime and without clear-cut monetary policy regime.

The data on interest rates is collected from Central banks of these countries and the approach to calculate average weighted one-year deposit rate for each segment of banking sector is the same, thus, the results are comparable. However, the time period of data sets varies across countries due to availability. The dynamics of interest rates with the policy rate is represented for each country by the following figure:

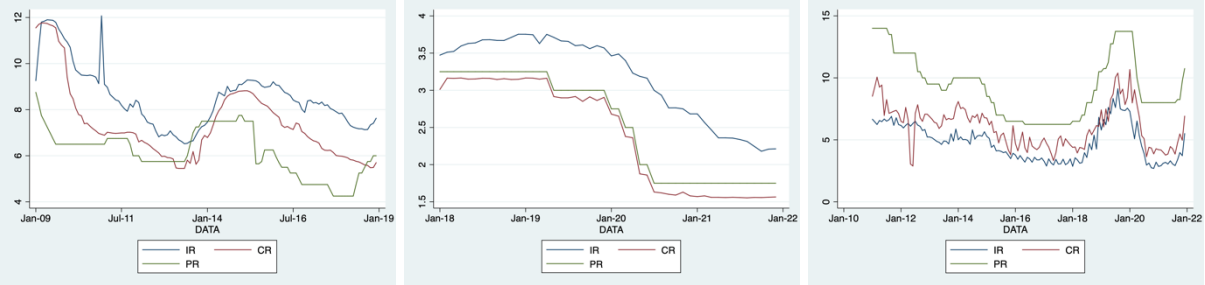


Figure 3. *The conventional rate (CR), Islamic rate (IR) and policy rate (PR) dynamics in Indonesia, Malaysia and Pakistan respectively.*

The dynamic varies across countries. First of all, in Indonesia policy rate is lower than conventional and Islamic deposit rates and the Islamic deposit rate is highest rate, while in Pakistan the opposite situation and the highest rate is policy rate, while Islamic rate is the lowest one. Additionally, Islamic banks are primarily state ones in Indonesia, while in Pakistan and Malaysia the majority of Islamic banks are private ones.

The dynamics of average weighted one-year deposit rates for conventional and Islamic banking sector are represented by the following figure:

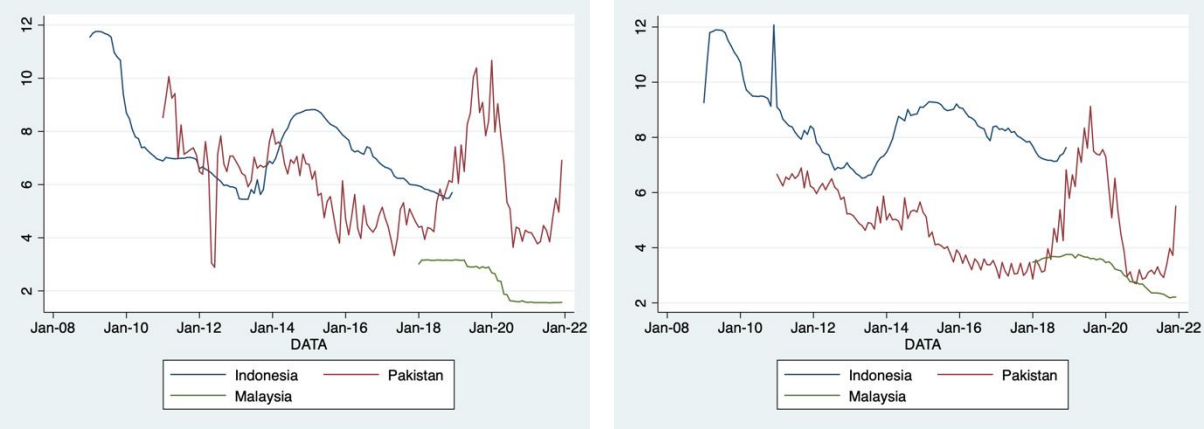


Figure 4. *The dynamics of conventional and Islamic rates respectively.*

Both conventional and Islamic rates are extremely volatile in Pakistan due to high and volatile inflation that increases the risk-premium, while they are enough stable in Malaysia. The highest rates are in Indonesia and the lowest ones are in Malaysia.

Average weighted one-year deposit rates for conventional and Islamic banking sector are chosen for the analysis due to the fact that Islamic credit rate

is primarily based on the deposit rate, thus, Islamic credit rate is less comparable with conventional credit rate.

4 MODEL

Nonlinear autoregressive distributed lag (**NARDL**) approach introduced by *Shin et. al, 2014* is used in the paper to determine short-run dynamics, long-run relation and asymmetries between conventional interest rates and Islamic rates of return.

The long-run relation with asymmetries is described by the following equation:

$$ir_t = \beta_1{}^{+} dr_t^{+} + \beta_2{}^{-} dr_t^{-} + u_t \quad \textbf{(1)}$$

where $\boldsymbol{ir_t}$ is an Islamic rate of return, $\boldsymbol{dr_t}$ is a conventional interest rate, $(\boldsymbol{\beta_t}^{+}, \boldsymbol{\beta_t}^{-})$ is a vector of long run parameters to be estimated and $\boldsymbol{u_t}$ is iid process with zero mean and constant variance. The $\boldsymbol{dr_t}$ is decomposed as $\boldsymbol{dr_t = dr_0 + dr_t^{+} + dr_t^{-}}$, where $\boldsymbol{dr^{+}}$ and $\boldsymbol{dr^{-}}$ are partial sums of positive and negative changes in conventional interest rate, ***dr***:

$$dr_t^{+} = \sum_{i=1}^{t} \Delta dr_i^{+} = \sum_{i=1}^{t} max(\Delta dr_i, 0) \quad \textbf{(2)}$$

$$dr_t^{-} = \sum_{i=1}^{t} \Delta dr_i^{-} = \sum_{i=1}^{t} min(\Delta dr_i, 0) \quad \textbf{(3)}$$

Thus, the long-run relation between conventional interest rate and Islamic rate of return is $\boldsymbol{\beta_t}^{+}$ for increase of conventional interest rate and $\boldsymbol{\beta_t}^{-}$ for decrease of conventional interest rate.

If $\boldsymbol{\beta_t}^{+} < \boldsymbol{\beta_t}^{-}$, then Islamic banks tend to change rate of return at a **slower pace upward** and a **faster pace downward**. Thus, it can be concluded, that conventional and Islamic banks interact collude and to their advantages. Clients are more likely to react negatively to higher credit rates and lower deposit rates and the adverse selection problem is likely to appear under higher credit rates.

Thus, in highly concentrated financial market all types of banks tend to collude and credit rates are expected to be stickier upward while deposit rates are stickier downwards (*Nguyen and Islam, 2010; Holmes et. al, 2015*). If it holds, then it throws discredit upon the Islamicity of Islamic banks.

If $\boldsymbol{\beta_t}^+ > \boldsymbol{\beta_t}^-$, then Islamic banks tend to change rate of return at a **faster pace upward** and a **slower pace downward**. Thus, the potential deposit withdrawals from Islamic banks affects the process of Islamic rate formation. If it holds, then Islamic banks behave according to Islamicity since the profit is not only the concern of Islamic banks – clients are the key.

However, the approach represented by **equation (1)** is restrictive since it does not allow errors to be serially correlated and even a week endogeneity to appear. If it happens, then hypothesis testing becomes complicated. Solution is to introduce NARDL (p, q) model. Hence, the combination of long- and short-run relation with asymmetries is described by the following equation rewritten in error correction form:

$$\Delta ir_t = \beta_1 ir_{t-1} + \beta_2 dr_{t-1}^+ + \beta_3 dr_{t-1}^- + \sum_{i=1}^{p} \sigma_i \Delta ir_{t-i} + \sum_{i=0}^{q} (\theta_i^+ \Delta dr_{t-i}^+ + \theta_t^- \Delta dr_{t-i}^-) + u_t \quad \textbf{(4)}$$

If $-\boldsymbol{\beta_2}/\boldsymbol{\beta_1} = -\boldsymbol{\beta_3}/\boldsymbol{\beta_1}$ in **equation 4** (i.e. $\boldsymbol{\beta_2} = \boldsymbol{\beta_1}$ ***in* equation 1**), then the long-run asymmetry is not observed in the relationship between conventional interest rate and Islamic rate of return. If $\sum_{\boldsymbol{i=0}}^{\boldsymbol{q}} \boldsymbol{\theta_i}^+ = \sum_{\boldsymbol{i=0}}^{\boldsymbol{q}} \boldsymbol{\theta_i}^-$, then the short-run asymmetry is also unobservable.

Hence, the procedure is the following: NARDL model is estimated to test hypothesis on presence of short- and long-run asymmetries along with the long run interaction between conventional interest rate and Islamic rate. Then asymmetric cumulative dynamic multiplier effects of one percent point change in

dr^- and dr^+ are graphed to demonstrate the asymmetries in the relationship between conventional interest rate and Islamic rate of return.

5 RESULTS

5.1 MALAYSIA

Table below shows the long run increasing and decreasing effect of conventional deposit rate on the Islamic deposit rate. When the conventional rate rises, it increases Islamic rate by 0.795% but when it decreases, it increases Islamic deposit rate by 1.86%.

The long run asymmetry and short run asymmetry is tested using F test. Since both F tests are insignificant, so it cannot be concluded that there is any asymmetry.

Asymmetry statistics:

	Long-run effect [+]			Long-run effect [-]		
Exog. var.	coef.	F-stat	P>F	coef.	F-stat	P>F
CR	**0.795**	**8.542**	**0.006**	**1.860**	**.6505**	**0.425**
	Long-run asymmetry			Short-run asymmetry		
		F-stat	P>F		F-stat	P>F
CR		**1.596**	**0.214**		**2.166**	**0.150**

Note: Long-run effect [-] refers to a permanent change in exog. var. by -1

Table 4. *Results of NARLD estimation for Malaysia.*

Figure below illustrates that both decrease and increase in CR (conventional interest rate) have negative effects on IR (Islamic rate) shown by the red and green lines respectively. And the blue line shows the increasing trend of asymmetry with time.

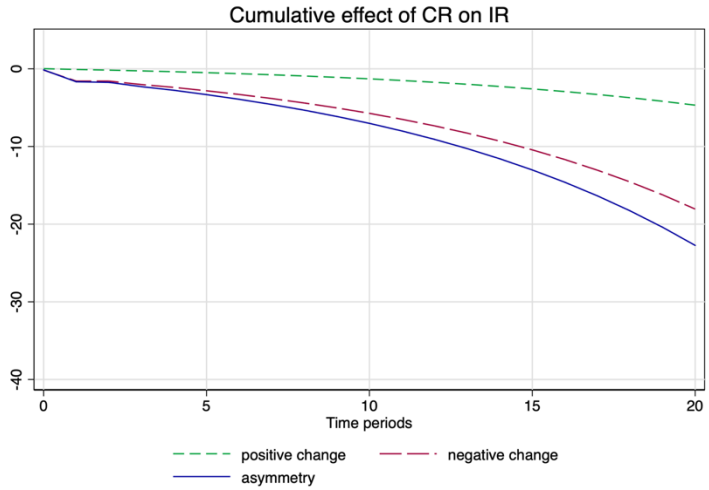


Figure 5. *Cumulative effect graph for Malaysia.*

5.2 INDONESIA

Table below shows the long run increasing and decreasing effect of conventional deposit rate on the Islamic deposit rate. When the conventional rate rises, it increases Islamic rate by 0.244% but when it falls, it decreases Islamic rate by 0.15%.

The long run asymmetry and short run asymmetry is tested using F test. Since both F tests are insignificant so it cannot be concluded that there is any asymmetry.

Asymmetry statistics:

Exog. var.	Long-run effect [+] coef.	F-stat	P>F	Long-run effect [-] coef.	F-stat	P>F
CR	**0.244**	**.297**	**0.587**	**-0.150**	**.07794**	**0.781**

	Long-run asymmetry F-stat	P>F	Short-run asymmetry F-stat	P>F
CR	**.2541**	**0.615**	**.174**	**0.677**

Note: Long-run effect [-] refers to a permanent change in exog. var. by -1

Table 5. *Results of NARLD estimation for Indonesia.*

Figure below shows that decrease in CR (conventional interest rate) have negative effect on IR (Islamic rate) shown by red line. While increasing CR has a temporary negative effect on IR shown by the green line. And the blue line showing the increasing trend of asymmetry with time.

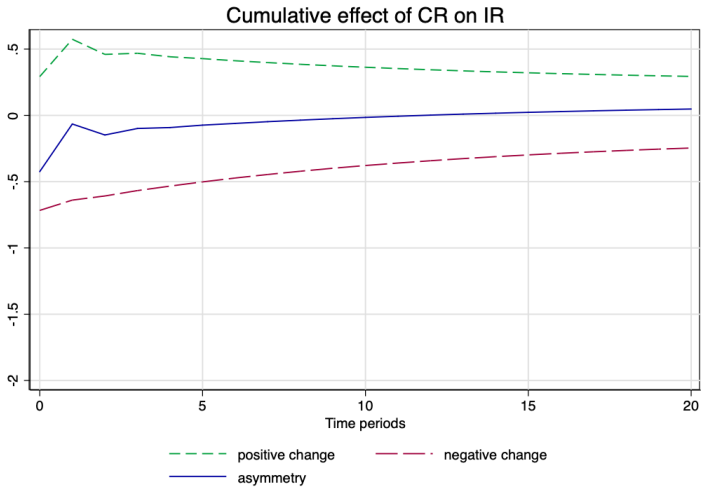


Figure 6. *Cumulative effect graph for Indonesia.*

5.3 PAKISTAN

Table below shows the long run increasing and decreasing effect of conventional deposit rate on the Islamic deposit rate. When the conventional rate increases increases it increases Islamic rate by 0.619% but when it decreases, it decreases Islamic rate by 0.618%.

The long run asymmetry and short run asymmetry is tested using F test. Since only short run F test is **significant** so the presence of short run asymmetry cannot be rejected.

Asymmetry statistics:

Exog. var.	Long-run effect [+] coef.	F-stat	P>F	Long-run effect [-] coef.	F-stat	P>F
CR	**0.619**	**13.1**	**0.000**	**-0.618**	**12.54**	**0.001**

	Long-run asymmetry F-stat	P>F	Short-run asymmetry F-stat	P>F
CR	**.004044**	**0.949**	**3.797**	**0.054**

Note: Long-run effect [-] refers to a permanent change in exog. var. by -1

Table 6. *Results of NARLD estimation for Pakistan.*

Figure below shows that decrease in CR (conventional interest rate) have negative effect on IR (Islamic rate) shown by red line. While increasing CR has a temporary negative effect on IR shown by the green line. And the blue line showing the increasing trend of asymmetry with time.

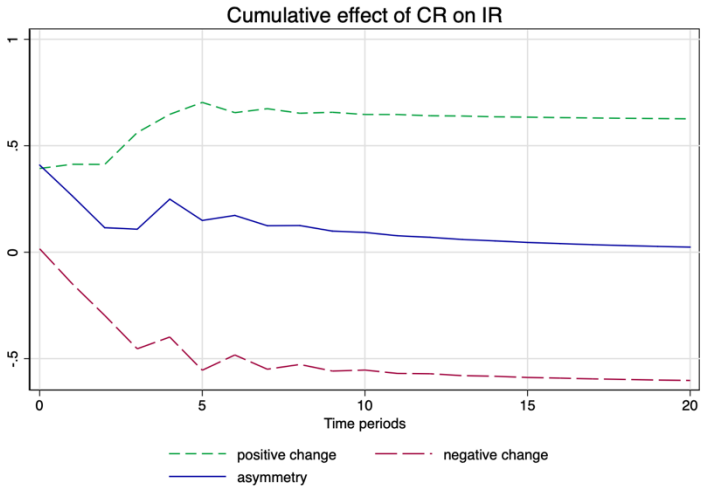


Figure 7. *Cumulative effect graph for Pakistan.*

The summary of the results is represented in the following table:

Country	Long-run effect	Long-run Asymmetry	Short-run Asymmetry
Indonesia	no	no	no
Malaysia	[+]	no	no
Pakistan	[+] and [-]	no	yes

Table 7. *Summary of results.*

Overall, results show that conventional and Islamic rates are poorly interacted in the long-run, specifically, when increase in conventional interest rates appears. Besides, neither statistically significant short-run, nor long-run asymmetries are detected, except one short-run detected in Pakistan, which is characterized by high and volatile inflation and extremely volatile conventional and Islamic rates. However, in the short-run Islamic rates react on the changes in conventional rates, but these reactions are not statistically significant. It may be explained by the fact that Islamic rates need time to react on the changes in the economic activity, while conventional rates almost instantly react on the changes in the policy rate, which arises to response the changes in the economic activity. The high volatility of policy rate in Pakistan and statically significant strong relations between conventional and Islamic rates may indirectly prove this suggestion. However, any meaningful suggestions about peculiar properties of

relation between rates caused by particular monetary policy regime cannot be made.

6 CONCLUSION

Traditional and Islamic banking can be seen as segmented markets, but a change in the traditional policy rate of the Central Bank may generate an external effect on Islamic rates. However, this external effect may be asymmetric. The empirical analysis of the long-term impact of changes in traditional bank rates on Islamic rates in Malaysia, Indonesia, and Pakistan is conducted. In addition, the presence of short-term and long-term asymmetries in the reaction of Islamic rates to changes in traditional rates is assessed.

Results of the NARLD estimations show statistically significant interaction between conventional and Islamic rates presence only in the long-run and when increase in conventional interest rates appears. Besides, there is neither statistically significant short-run, nor long-run asymmetries in these interactions, except one short-run in the country with high and volatile inflation. These results may be explained by the fact that Islamic rates are associated more with the real economy and, thus, prevent any strong causal relations between conventional and Islamic rates in the long-run. Besides, the presence of strong but statistically insignificant short-run interactions may be explained by the fact that there is a lag Islamic rates reaction which is caused by the need to reevaluate the projects considering changes in economic conditions before the rates are changes. To conclude, Islamic banks behave in compliance with Shariah and do not directly follow conventional rates, specifically in the long-run and do not cause complications in the monetary transmission mechanism from the Islamic banking sector.

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