The Validity of the Bank Credit Channel in the Monetary Transmission Mechanism: VAR Analysis of Participation Banks

Parasal Aktarım Mekanizması Sürecinde Banka Kredi Kanalının Geçerliliği: Katılım Bankaları İçin VAR Analizi

Ömer Fazıl EMEK[1]*

[1] Mardin Artuklu Ünivesitesi, omerfazilemek@artuklu.edu.tr, ORCID: 0000-0002-0438-0528
* Yazışılan Yazar/Corresponding author

Abstract

The relationship between Islamic banking and monetary policies, and the way this relationship is reflected in the real sector has attracted increasing attention, primarily because of the growing importance of Islamic banking activities. Therefore, a review of the effectiveness of the loan schemes of Islamic banks in Turkey can make a significant contribution to the literature. This study analyzes whether the loan schemes of public and private participation banks operating in Turkey's dual banking system, are effective. To this end, the study relies on variance decomposition and impulse response function analyses of VAR models compiled from monthly data between 2009:01 and 2020:03. The industrial production index represents economic activity, the interest rate applied to consumer loans, and the total money supply (M1), representing the monetary policy instruments. The model also includes total loans and deposit variables made available for the participation banks, representing the bank loan scheme and other variables, including the nominal exchange rate and consumer price indexes. The study measures the responses of the exchange rate, inflation rate, industrial production index, participation banks' total loans, and total deposits to one-unit shocks applied to monetary policy and interest rates. The findings from the impulse-response functions indicate that the credit channel in participation banks is partially additional since their total loans and deposits react to monetary policies in certain periods due to changes in money supply and interest rates. However, they cannot reflect this at the production level.

Keywords: *Economic Growth, Monetary Policies, Monetary Transmission Mechanism, Exchange Rate, Inflation, Participation Banking, VAR Analysis.*

Jel Codes: *I10, I12, J81.*

Öz

Küresel boyutta önemli bir büyüklüğe erişen İslami bankaların para politikaları ile olan ilişkisi ve bu ilişkinin reel sektöre yansıması gündeme tutunan konular arasındadır. Bu doğrultuda İslami bankaların kredi kanalının etkinliğini Türkiye özelinde incelemek literatüre katkı sağlamak açısından önem arz etmektedir. Bu çalışmanın amacı, Türkiye'de ikili bankacılık sistemi içerisinde faaliyet yürüten kamu ve özel sermayeli katılım bankalarının kredi kanallarının etkin olup olmadığını tespit etmektedir. Bunun için 2009:01-2020:03 yılları arası aylık verilerden derlenen, VAR modellerine dayalı etki-tepki fonksiyonları ve varyans ayrıştırma analizleri yapılmıştır. Modele ekonomik aktiviteyi temsilen sanayi üretim endeksi; para politikaları için tüketici kredilerine uygulanan faiz oranı ve toplam para arzı (M1); banka kredi kanalı için katılım bankaları tarafından kullandırılan toplam kredi ve toplam mevduat değişkenleri; ayrıca nominal döviz kuru ve tüketici fiyat endeksleri olmak üzere diğer değişkenler dahil edilmiştir. Para politikası ve faiz oranlarına uygulanan bir birimlik etkiye karşı döviz kuru, enflasyon, sanayi üretim endeksi, katılım bankaları toplam krediler ve toplam mevduatların tepkisi ölçülmüştür. Etki-tepki fonksiyonlarından elde edilen bulgulara göre katılım bankalarındaki toplam kredi ve mevduatlar, para arzı ve faiz oranındaki değişiklerden kaynaklı para politikalarına karşı belirli dönemlerde tepki verseler de bunu üretim düzeyine yansıtamadıklarından katılım bankalarındaki kredi kanalının kısmen etkili olduğu tespit edilmiştir.

Anahtar Kelimeler: *Ekonomik Büyüme, Para Politikaları, Parasal Aktarım Mekanizması, Döviz Kuru, Enflasyon, Katılım Bankacılığı, VAR Analizi.*

Jel Kodları: *I10, I12, J81.*

1. INTRODUCTION

A number of recent studies have investigated the validity of the monetary transmission mechanism in transferring the effects of monetary policies to the real economy through conventional banks, with the effect of Islamic banks on this mechanism becoming a particular topic of interest. However, while various studies have evaluated Islamic banks' relative performance, risk and durability, there is a lack of research into their roles in the monetary transmission mechanism (Akhatova vd., 2016).

Islamic banks are similar to conventional banks in many of the products and services they offer. However, the core of their banking structure is different as it emphasizes real assets and profit-deficit partnerships. According to Aysan vd. (2018), Islamic banks differ significantly from conventional banks in terms of their original financial structure and different contractual principles while Zulkhibri and Sukmana (2017) note that Islamic banks can respond differently to market-based monetary policies because they use tools without interest within traditional arrangements with interest.

Although the adoption of revenue ratio and profit-deficit partnership represents the ideological side of Islamic banking, there are significant variations in realizing this idealistic perspective because of the coexistence of conventional and Islamic banks (Zulkhibri and Sukmana, 2017). Various theories have been proposed regarding the potential reactions of Islamic banks to monetary policies and interest rate shocks. The most widely accepted theory posits that the tools that Islamic banks use instead of the interest-bearing tools of conventional banks rely heavily on deposit money and have limited Islamic compatibility. Moreover, Islamic banks respond less strongly than conventional banks to tightened monetary policies or higher interest rates because they do not have assets that can account for Islamic financing. This creates a competitive advantage for conventional banks (Akhatova vd., 2016).

Similarly, Zaheer vd. (2013) argue that Islamic banks are reticent about buying deposits in large amounts and with a constant ratio because they are religiously and socially responsible. In addition, monetary policy changes may affect Islamic banks more than conventional banks because they generally lack instruments to replace their so-called Islamic credits. On the other hand, Islamic banks have some structural advantages over conventional banks in being better protected against interest-related risks, more resistant to macro-financial shocks, and more consistent (Zulkhibri and Sukmana, 2017). Moreover, because the contracts made by deposit owners and those that demand credit are made without interest, they have a different motivational quality. For example, they might protect these banks from shocks caused by monetary policies (Zaheer vd., 2013).

It is plausible to assume that in a case where Islamic banks are not affected by interest rates, the demand for money in the economy will be more consistent because interest rates are one of the important factors that are affected by speculation and determine the demand for money. Islamic banks that use Islamic funds as an alternative to interest rates can provide more stable demand for money (Ergeç and Arslan, 2013). However, because Islamic banks comprise a tiny portion of banks in the dual banking system, the weakness of their financial tools and the lack of a unique monetary system leave them very vulnerable to monetary policy changes. This also makes it probable that credit channels via Islamic banks will likely be very effective when monetary policies are tightened.

The monetary transmission mechanism examines the effect of monetary policies on real sectors through conventional banks. In this context, Islamic finance, with a global worth of 2,7 trillion dollars, 68% of which is Islamic banks (IFSB, 2021), has gained increasing recognition as an alternative to conventional banking while its relationship with monetary policies has rapidly attracted interest. Hence, an examination of the effectiveness of Islamic banks' credit channels in Turkey provides a significant contribution to the literature, given that these banks have been growing continuously while becoming a subject of real assets. Accordingly, the present study aims to research the role of participation banks in the monetary transmission process and the validity of their credit channels in the period 2009-2020. A vector autoregressive model (VAR) analysis is conducted with industrial production index, interest rate, money supply (M1), nominal exchange rates, inflation rates, total credit loaned by participation banks, and deposit variables.

Having introduced the significance, purpose, and method of the study, the next section provides theoretical and empirical evaluations about the effectiveness of the transmission mechanism's credit channel. Section 3 presents the method and analysis. Section 4 discusses the empirical findings and makes a number of policy suggestions.

2. THEORETICAL FRAMEWORK

Monetary policies can have many objectives regarding the overall performance of the economy, such as sustainable economic growth, full employment, price, and exchange rate stability. Central banks generally specify intermediary goals that relate directly to economic activity, such as monetary aggregates and interest rates. For example, when the economy is expanding, they implement stricter monetary policies by increasing interest rates or increasing required reserves/selling bonds. These policies, particularly higher interest rates, make investing a bad economic decision and therefore suppress total demand and production levels (Majid and Kassim, 2015). In other words, monetary policies designed to regulate the money supply in order to achieve growth and price stability in the real economy usually use interest rates as a tool in their monetary decisions to affect bank credit supplies, which affects consumption and investment decisions (Hamza and Saadaoui, 2018).

The monetary transmission mechanism also significantly affects economic decisions and is related to the efficiency of monetary policies (Majid and Kassim, 2015). That is, the monetary transmission mechanism "expresses the effects of interest rate changes caused by monetary policies on real variables such as total production and employment (Zulkhibri and Sukmana, 2017)." This relationship between monetary policies and the real economy is explained by the monetary transmission mechanism's effects on several macroeconomic variables, such as inflation, economic growth, and investment (Hamza and Saadaoui, 2018). There are two fundamental approaches to explaining the monetary transmission mechanism. The neoclassical approach asserts that financial markets are perfect whereas the non-neoclassical approach asserts that financial markets have some flaws. Non-neoclassical approaches relate market flaws to state intervention, asymmetrical information, and obstacles that prevent the effective functioning of the market. This is defined as "credit appearance" by the non-neoclassical transmission mechanism approach (Boivin vd., 2010).

The literature on monetary transmission mechanisms has investigated several channels that affect the real economy, such as interest rates, asset prices, exchange rate, and bank credit

channels. Among these, bank credit channels play an important role in transferring the effects of monetary policies to the real economy. The importance of the banking sector and banks in transmitting these effects should especially be stressed. As Sukmana and Kassim (2010) put it, "banking credit channels are an essential monetary transmission mechanism due to its critical role in the financing of the economic activities of the banking sector." They argue that because most of the financing in the economy is provided by bank credits, the banking sector inevitably affects the economy. Therefore, economic stability depends on ensuring the durability of the banking sector.

Banking credit channel theory assumes that tightened or expanded monetary policies significantly affect banks' credit supplies. An expansionary monetary policy will increase the total volume of credit by increasing bank reserves and deposits and vice versa for a contractionary monetary policy (Rafay and Farid, 2019). However, for this assumption to hold, monetary policies must have the ability to affect bank credits and individual bank deposits while banks' other funding cannot be mutually replaceable (Majid and Hasin, 2014).

2.1. Empirical Literature Review

A sub-literature has emerged regarding the question of whether Islamic banks respond similarly or differently to conventional banks to shocks in monetary policies. Empirical studies have not confirmed the expectation that Islamic banks react differently to such shocks because they cannot use interest. Malaysia is an important example of a country with a dual banking system. Sukmana and Kassim (2010) analyzed the significance of Malaysia's Islamic banks in monetary transmission mechanisms between 1994 and 2007. According to findings obtained by running Johansen-Juselius cointegration tests and VAR analyses with several variables, bank credit channels effectively transmit monetary policy effects into the real economy. Regarding Islamic financing and deposits, Islamic banks are as significant as conventional banks in transmitting monetary policies to the real economy. Similarly, Majid and Hasin (2014) used the ARDL Bound test to research the ability of Islamic banks' financial instruments to channel monetary policy effects into the real economy. The findings showed that Islamic financing does affect the monetary transmission mechanism, hence the bank credit channel is functional. These findings prove that Islamic banks are not immune to monetary policy changes in countries with a dual banking system.

In another study of Malaysia between 2000 and 2013, Akhatova vd. (2016) reported that Islamic banks respond faster to monetary policy shocks than conventional banks. The structural VAR analysis test findings showed that credit channels are effective in monetary transmission mechanisms for both bank types. The total amount of Islamic funds decreases quickly following favorable interest rate changes and monetary contraction.

Another critical country for Islamic banking studies that should not be overlooked is Pakistan. Rafay and Farid (2019), for example, evaluated the role of Islamic banks, which have become an essential part of the country's banking sector, in transmitting monetary policy changes into the real economy between 2007 and 2017. Using Johansen-Juselius and VAR analyses, they analyzed the effects on the monetary transmission mechanism of two important balance sheet items, namely Islamic deposits and Islamic financing. The findings indicated that Islamic banks play a significant role in transferring monetary policy changes into the real economy. Furthermore, Pakistan's Islamic banks mostly depend on deposits for primary financing,

which increases the risks for them compared to conventional banks with more varied funding sources. While both banking systems have commercial risks, the most important motivator for keeping funds in Islamic banks is high revenue rates.

Zaheer vd. (2013) reported contrary findings. Using a panel data analysis constant effects method, they analyzed the differences between banks' responses to monetary transmission mechanisms between 2002 and 2010 in relation to the size of the bank, liquidity, and whether it is an Islamic bank. The study aimed to determine whether the growth of Islam in the sector changed the effectiveness of the monetary transmission mechanism. The findings indicated that Islamic banks have a relatively small effect when the monetary policy credit channel's significance increases. Big banks, unlike small banks, continue to provide credit regardless of their liquidity positions. Despite their resemblance to small banks, Islamic banks react to monetary policy shocks like big banks because their deposit collection and credit usage practices differ from those of small banks.

Another country active in Islamic banking is Indonesia. Accordingly, using a panel data analysis constant effects method, Zulkhibri and Sukmana (2017) examined the effects of monetary policy changes in Indonesia between 2003 and 2014 on Islamic bank financing. The findings indicated that the monetary policy transmission mechanism is ineffective in Islamic bank financing in Indonesia. The researchers suggested that this could be because of the expansion of deposit volume in the period studied and high liquidity levels.

The reaction of participation banks to monetary policy changes in Turkey has also become a topic of interest. Turkey's participation banks behave similarly to other countries' Islamic banks, and the bank credit channel is effective. Among these studies, Ergeç and Arslan (2013) used the vector error correction method (VECM) to examine the effects of interest rate changes in Turkey between 2005 and 2009 on conventional and Islamic banks' deposits and credits. The findings showed that participation banks are significantly affected by interest rate changes, which partially debunks the argument that interest-free banks behave more consistently than conventional banks and thereby contribute to financial stability.

Similarly, Aysan vd. (2018) examined the reactions of 35 conventional and 4 participation banks in Turkey to monetary policy shocks and their roles in the monetary transmission mechanism. The panel VAR analysis showed that the credit channel is effective in both bank types. However, participation bank deposits and credit demand are both more responsive to interest rate changes than conventional banks.

Finally, Hamza and Saadaoui (2018) used the dynamic panel data analysis (GMM) method to analyze the reactions of 50 Islamic banks to interest changes between 2005 and 2014. The findings indicated that Islamic bank financing is effective in the monetary transmission mechanism in that monetary contraction leads to a decrease in Islamic financing. However, not all banks react similarly to monetary policy shocks; rather, they react in many unique ways.

3. DATA AND METHODOLOGY

To examine the effect of Islamic banks' credit channels on the monetary transmission mechanism, monthly data between 2009:01 and 2020:03 were collected. The industrial production index was used as an indicator of economic activity, consumer credit interest rates, and total money supply of monetary policy, total credit given as loans by participation banks,

and total deposits of bank credit channels. The other variables included in the model were the consumer price index and exchange rates. The data were taken from the Turkish Republic Central Bank Electronic Data Distribution System database. The units and symbols for the data are indicated in Table 3.

Table 3. Explanations Regarding the Data Variables

Name of the variable	Symbol	Unit	Source
Industrial production index	IPI	Total industry	EDDS
Money supply	M1	Currency in circulation and demand deposit	EDDS
Interest rate	INT	Consumer credit rate (personal finance+vehicle+home)	EDDS
Nominal exchange rate	NER	Sale price in US dollars	EDDS
Consumer price index	CPI	Private coverage CPI	EDDS
Total credit	LOAN	Total credit loaned out by participation banks	EDDS
Total deposit	DEP	Total funds collected by participation banks	EDDS

3.1. VAR Analysis

The VAR model has two equations, one of which has "X_t" and the other "Y_t" as its dependent variable while the explanatory variables are the delayed values of each equation. Thus, VAR comprises "k" equations for "k" time series variables in which all the variables' delayed values are also explanatory variables, as indicated in equations 1 and 2 (Stock and Watson, 2011):

$$Y_t = \beta_{10} + \beta_{11} X_{t-1} + \cdots + \beta_{1p} X_{t-p} + \gamma_{11} X_{t-1} + \cdots + \gamma_{1p} X_{t-p} + \varepsilon_{1t} \tag{1}$$

$$X_t = \beta_{20} + \beta_{21} X_{t-1} + \cdots + \beta_{2p} X_{t-p} + \gamma_{21} X_{t-1} + \cdots + \gamma_{2p} X_{t-p} + \varepsilon_{2t} \tag{2}$$

In VAR analysis, which is a version of the univariate autoregressive (AR) model developed by Sims (1980), each time series is included in the model as endogenous, and the vector equation system is estimated up to "p" lags of each series. VAR analysis aims to interpret the relationship of the determining variables rather than estimate the parameters. Therefore, instead of cointegration tests used to determine the factors of the variables, the goal is to produce impulse response functions and variance decomposition analysis results (Mert and Çağlar, 2019: 215). However, the first condition for conducting a VAR analysis is the stationarity of the variables, determined by conducting unit root tests on the variables.

3.2. Unit Root Tests: ADF and PP

In most time series studies, the series used is assumed to be stationary (Gujarati, 2011: 23). Therefore, it is essential to bring the series into stationary forms by taking their differences in order to avoid biased regression results. Various unit root tests have been developed for this purpose. The most commonly used are Dickey, Fuller (1979)/DF augmented Dickey, Fuller (1981)/ADF, and the Phillips and Perron (1988)/PP tests. For the present study, the ADF and PP tests were conducted on the logarithms of all variables except for the industrial production index to determine the series' stationarity. The results are shown in Table 4.

Table 4: Unit Root Test results

		ADF	PP	ΔADF	ΔPP
With constant	IPI	-1.7371	-2.0113	-15.9738*	-46.2267*
	M1	2.0039	6.0863	-12.0324*	-12.2786*
	INT	-2.2864	-1.6336	-7.0536*	-4.4640*
	NER	1.7472	2.1409	-8.5856*	-7.2897*
	CPI	3.8187	5.6146	-4.1003*	-7.2041*
	LOAN	3.0939	3.7418	-5.1772*	-5.2715*
	DEP	8.7829	8.4487	-3.9939*	-7.6061*
		ADF	PP	ΔADF	ΔPP
Constant/trends	IPI	-2.7210	-11.9664*	-16.0420*	-
	M1	-1.1019	-0.3118	-12.5958*	-18.3577*
	INT	-2.8020	-2.0991	-7.0239*	-4.4218*
	NER	-1.0686	-0.9630	-9.0707*	-7.4934*
	CPI	0.5459	1.3136	-5.3879*	-8.4743*
	LOAN	2.1191	2.7893	-5.8720*	-5.9287*
	DEP	6.3634	11.4757	-8.5723*	-8.8526*

Note: Delay lengths were determined according to the Schwart info criteria. The symbol Δ denotes the first difference. * Corresponds to a significance level of 1%.

The ADF and PP unit root test results indicated that all variables contain unit roots in both constant and constant/trend models (except for industrial production index/IPI, according to the PP/constant and trend models). In this case, the first order differences of the variables were taken to eliminate the unit roots. Based on the ADF/PP unit root test results, the following variables were made stationary by taking their first differences: industrial production index/IPI, money supply/M1, interest rate/INT, nominal exchange rate/NER, inflation rate/CPI, loans extended by participation banks/LOAN, and funds collected by participation banks/DEP. Based on the ADF/PP unit root tests, all variables can be accepted as stationary at I (1) level according to the constant and constant/trend models.

3.3. Analysis Results

Because the VAR model is very sensitive to delay lengths (Sims, 1980), the second step of the analysis is determining the optimum delay length for the method. The findings in Table 5 were obtained to decide the delay count in the model, including all variables. The most suitable delay length was chosen as 2 according to the Akaike information criteria (AIC).

Table 5: Determining Delay Lengths

Delay L.	Log(L)	LR	FPE	AIC	SC	HQ
0	1904.311	NA	1.94e-23	-32.43266	-32.26740	-32.36557
1	2068.735	306.3627	2.70e-24	-34.40572	-33.08366*	-33.86898*
2	**2127.500**	**102.4616**	**2.30e-24***	**-34.57264***	**-32.09377**	**-33.56625**
3	2173.713	75.04796	2.47e-24	-34.52501	-30.88933	-33.04897
4	2200.328	40.03614	3.77e-24	-34.14236	-29.34987	-32.19667
5	2230.582	41.89030	5.58e-24	-33.82192	-27.87262	-31.40658
6	2278.668	60.82605	6.32e-24	-33.80629	-26.70018	-30.92130
7	2339.574	69.75606*	6.03e-24	-34.00982	-25.74690	-30.65517
8	2389.190	50.88846	7.46e-24	-34.02035	-24.60063	-30.19606

The VAR model must also satisfy the stability condition, which is often encountered in practice. This is the condition that the characteristic inverse polynomial roots of the model

remain within the circle, i.e. that their absolute values are less than 1. To check whether this holds for the data, the unit circle graph in Graph 1 was used.
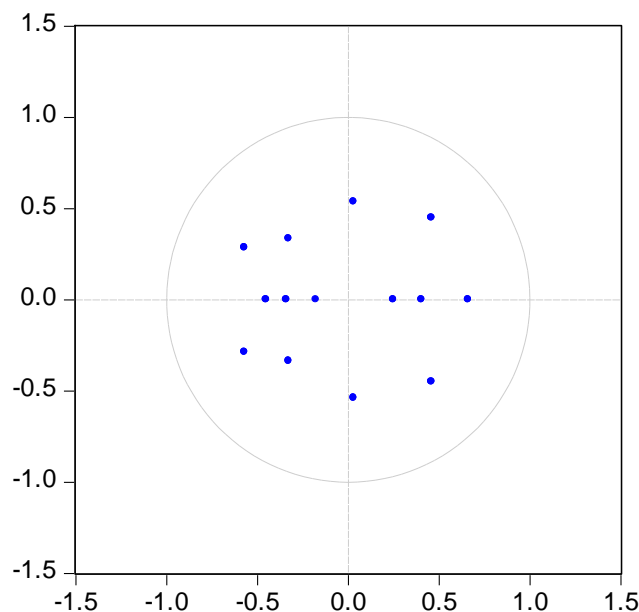
Graph 1: Distribution of VAR Model's Characteristic Inverse Polynomial Roots

As Graph 1 shows, all roots fall within the unit circle boundaries and their absolute values are less than 1, which shows that the data meets the consistency requirement of the model. In the next section, the impulse response functions of the variables are presented, and the findings are interpreted.

The impulse-response function traces the impact of the endogenous variable at the one-standard deviation shock on the change in the current and future value. A shock at the ith variable directly affects the ith variable and the whole equation system (Kutlar, 2017: 226). In other words, the impulse-response functions measure the reactions of the variables vis-à-vis these and other variables. In line with these explanations, the impulse-response functions shown in Graphs 2, 3, 4, and 5 were obtained to measure the responses of a one-unit shock to money supply (M1), interest rate (INT), total loans of participation banks (LOAN), and total deposits of participation banks (DEP) on the other variables.
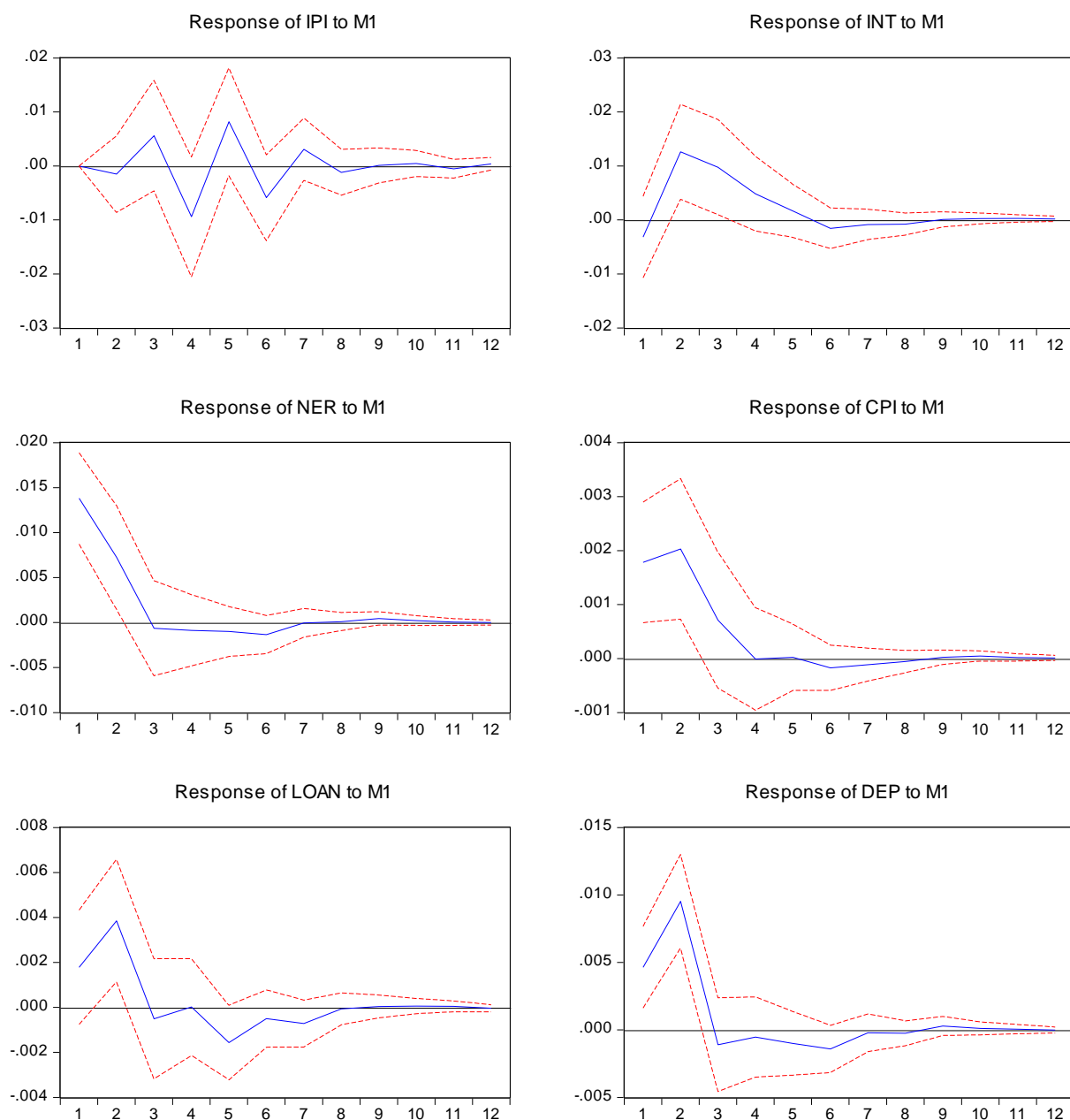
Graph 2: Other Variables' Responses to Money Supply Shocks

Graph 2 shows that interest rates respond to a one-unit shock in the money supply in the first period, but then respond positively and increasingly for about half a period, positively and decreasingly for one period, and finally become insignificant again. The nominal exchange rate responds positively and decreasingly to this shock for more than two periods before becoming insignificant. The consumer price index responds positively and increasingly for about one period, positively and decreasingly for half a period, and then becomes insignificant. Total loans in participation banks, responds insignificantly in the first period, then positively and increasingly for about half a period, positively and decreasingly for half a period, before finally becoming insignificant again. Total deposits in participation banks also respond positively and increasingly for about one period, positively and decreasingly for half

a period, and then become insignificant. Finally, the industrial production index reacts insignificantly in all periods.
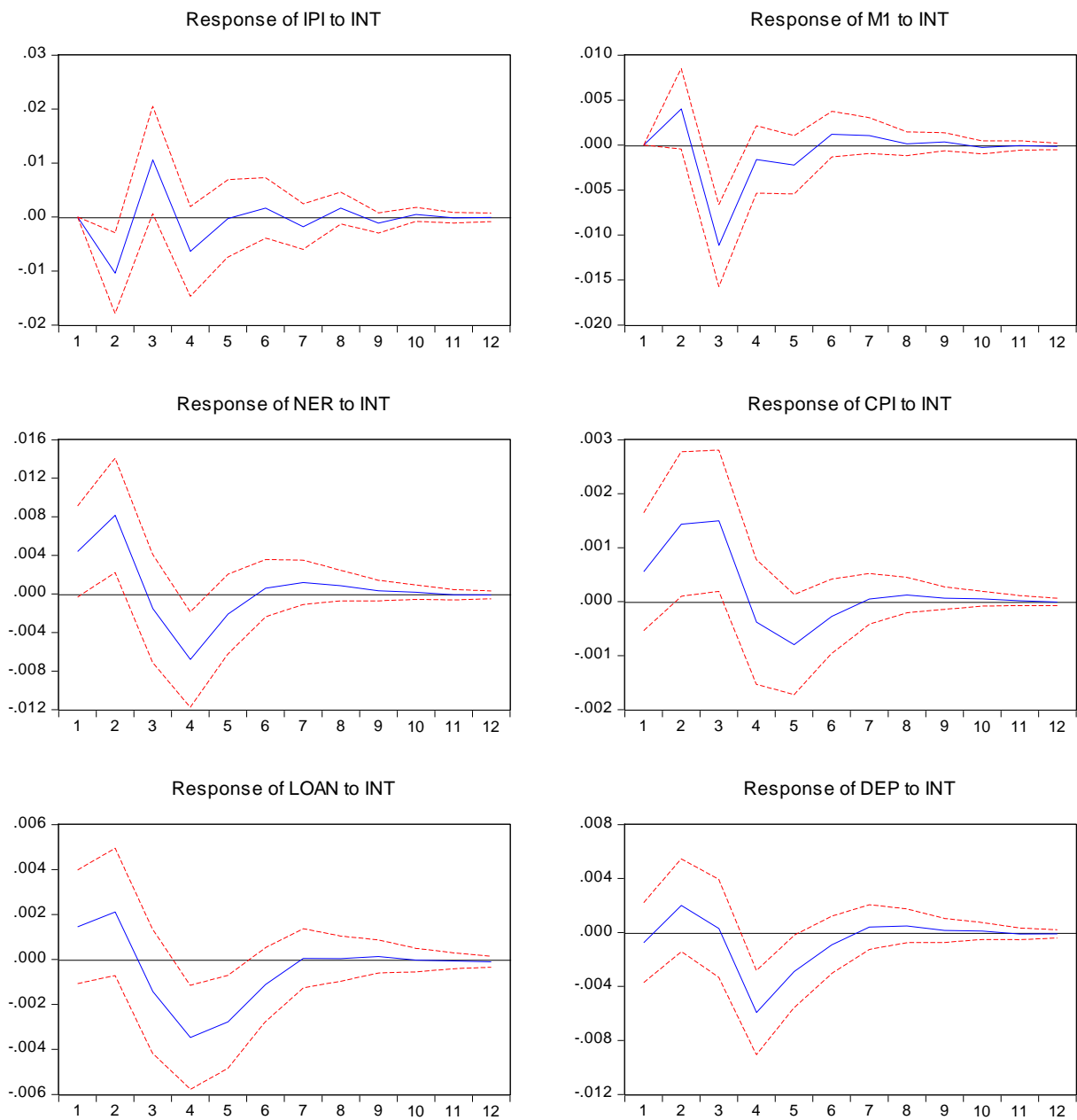
Graph 3: Other Variables' Responses to Interest Rate Shocks

Graph 3 shows that the industrial production index responds negatively and decreasingly to a one-unit shock in interest rates for about one period and then becomes insignificant. The money supply responds insignificantly to this shock in the first period, then negatively and decreasingly for about half a period, negatively and increasingly for half a period, and finally becomes insignificant again. The nominal exchange rate responds positively and increasingly for one period, positively and decreasingly for a limited period, and then becomes insignificant. After responding insignificantly in the first period, the consumer price index

responds positively and increasingly for about one period, and then becomes insignificant again. Total loans in participation banks reacts insignificantly in the first period, negatively and decreasingly for about half a period, and negatively and increasingly for over one period, and then becomes insignificant again. Total deposits in participation banks react insignificantly in the early periods but then negatively and decreasingly for about half a period, negatively and increasingly for one period, and finally become insignificant again.

From an economic perspective, Graph 3 shows that interest rates, exchange rates, and the consumer price index (CPI) respond significantly in various periods to an increase in the money supply, i.e. expansionary monetary policy implementations. In order for the credit channel to be valid for participation banks, real production should also be affected by the change in monetary policy through loans extended and funds collected by participation banks. Accordingly, although loans extended and funds collected by participation banks responded significantly, as expected, to the increase in money supply, this was not reflected in real production through this channel.

Graph 4 shows that money supply, exchange rates, and consumer price index (CPI) responded significantly to an increase in interest rates, i.e. contractionary monetary policy implementations, in various periods. Since the periods of the responses of loans and funds collected by participation banks to the increase in interest rates, and the responses of the industrial production index to the increase in interest rates differ significantly, it cannot be claimed that monetary policies are fully reflected in real production through participation banks.

The variance decomposition against the impulse response analysis, which provides information on the direction of the variables' reactions against the shock, can be evaluated in terms of how the total change is shared between variables (Mert and Çağlar, 2019: 232). The variance decomposition, also a different definition of the system dynamics, connotes the sortation of the change in the internal variable from the shocks placed in the VAR variables (Kutlar, 2017: 230). Therefore, in the final section of the study, Tables 6, 7, and 8 present, respectively, the variance decomposition is presented for the internal variables associated with the money supply (M1), interest rate (INT), and industrial production index (IPI).

Table 6: Money Supply Variance Decomposition

Period	S.E.	IPI	M1	INT	NER	CPI	LOAN	DEP
1	0.040126	0.112950	99.88705	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.057339	2.587444	82.93996	2.314178	3.374902	4.158952	0.539237	4.085328
3	0.065940	2.879326	69.24676	16.64622	2.871956	3.658102	0.494898	4.202743
4	0.068879	2.873592	65.75350	16.00119	5.901759	4.544414	0.818589	4.106964
5	0.069838	3.319580	65.24027	16.20144	5.787584	4.532454	0.894686	4.023987
6	0.070166	3.619064	64.62439	16.18361	6.187344	4.514970	0.885075	3.985553
7	0.070265	3.632640	64.53306	16.24716	6.171598	4.507579	0.935919	3.972044
8	0.070311	3.633490	64.55550	16.22885	6.177790	4.501966	0.934793	3.967613
9	0.070336	3.633684	64.53714	16.23816	6.187400	4.502201	0.934929	3.966477
10	0.070348	3.636279	64.52765	16.24289	6.191149	4.501458	0.934846	3.965729
11	0.070353	3.638418	64.52482	16.24245	6.191909	4.501472	0.935367	3.965558
12	0.070355	3.639908	64.52247	16.24412	6.191651	4.501202	0.935327	3.965322

Table 6 presents the findings obtained from the twelve-period money supply variance decomposition. While 99% of the total change in the first period is explained by the money

supply, i.e. by itself, the explanatory power of all other variables becomes significant in the following periods. More specifically, the money supply explains 64% of the total change in the money supply in period 12 compared to 16%, 6%, 4,5%, 4%, 3,5%, and 1% for interest rate, nominal exchange rate, consumer price index, participation bank total deposits, the industrial production index, and participation bank total deposits, respectively.

Table 7: Interest Rate Variance Decomposition

Period	S.E.	IPI	M1	INT	NER	CPI	LOAN	DEP
1	0.040126	0.060187	0.569217	99.37060	0.000000	0.000000	0.000000	0.000000
2	0.057339	0.245216	6.338100	82.76261	9.733094	0.191965	0.127052	0.601967
3	0.065940	0.209554	8.443367	74.40048	15.29324	0.587120	0.407105	0.659134
4	0.068879	0.343538	8.770121	71.00628	17.79169	0.664547	0.713649	0.710177
5	0.069838	0.342153	8.771823	70.56159	17.79785	0.712003	1.062126	0.752459
6	0.070166	0.396175	8.803359	70.43911	17.72292	0.719950	1.150189	0.768305
7	0.070265	0.397413	8.811499	70.36845	17.75533	0.719842	1.174654	0.772814
8	0.070311	0.397867	8.825688	70.34582	17.76154	0.719648	1.174614	0.774828
9	0.070336	0.397789	8.823788	70.35093	17.75753	0.720171	1.174349	0.775435
10	0.070348	0.397990	8.823402	70.35035	17.75852	0.719993	1.174023	0.775720
11	0.070353	0.398069	8.824470	70.34380	17.76383	0.719935	1.173988	0.775913
12	0.070355	0.398052	8.825136	70.34092	17.76546	0.720037	1.174392	0.776005

Table 7 presents the findings obtained from the twelve-period interest rate variance decomposition. While 99% of the total change in the first period is explained by the interest rate, i.e. by itself, the explanatory power of all other variables becomes significant in the following periods. More specifically, the interest rate explains 70% of the total change in the interest rate in period 12 compared to 18%, 9%, and 1% for nominal exchange rate, money supply, and other variables, respectively.

Table 8: Industrial Production Index Variance Decomposition

Period	S.E.	IPI	M1	INT	NER	CPI	LOAN	DEP
1	0.040126	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	0.057339	95.95665	0.068367	3.280437	0.178230	0.003590	0.474871	0.037851
3	0.065940	90.93622	0.779125	5.051740	1.346973	0.315092	0.882092	0.688758
4	0.068879	87.65386	2.582736	5.482707	1.724119	0.289657	1.266062	1.000860
5	0.069838	85.84119	3.885806	5.334582	2.059937	0.346598	1.430524	1.101360
6	0.070166	85.06324	4.551269	5.341177	2.111345	0.350498	1.481474	1.100992
7	0.070265	84.83043	4.731399	5.390219	2.113598	0.354311	1.480825	1.099216
8	0.070311	84.75866	4.754431	5.439118	2.114645	0.356386	1.478942	1.097817
9	0.070336	84.73396	4.751222	5.460230	2.121187	0.357051	1.479248	1.097104
10	0.070348	84.72349	4.753796	5.463415	2.124852	0.357519	1.480004	1.096924
11	0.070353	84.71693	4.758642	5.463154	2.126100	0.357684	1.480693	1.096801
12	0.070355	84.71369	4.761499	5.462934	2.126530	0.357673	1.480907	1.096769

Table 8 presents the findings obtained from the twelve-period industrial production index variance decomposition. While 100% of the total change in the first period is explained by the industrial production index, i.e. by itself, the explanatory power of all other variables becomes significant in the following periods. More specifically, the industrial production index explains 85% of the total change in the industrial production index period 12 compared to 5,5%, 5%, 2%, and 1% for interest rate, money supply, nominal exchange rate, and other variables, respectively.

4. CONCLUSION

The banking system is entirely based on Islamic principles in Iran, Pakistan, and Sudan. In contrast, a dual banking system is in place in Turkey, Malaysia, Indonesia, the United Arab Emirates, Kuwait, Jordan, Bahrain, and Yemen. There are also Islamic banking units within conventional banking enterprises in Malaysia, Indonesia, the United Arab Emirates, Bahrain, and Yemen. However, this practice is forbidden in Turkey, Kuwait, and Jordan. Islamic finance and banking practices are popular not only in Muslim countries but also in countries with major banks, such as HSBC, Standard Chartered Bank, Citibank, and Deutsche. Recently, non-Muslims have also shown an interest in profit and loss sharing accounts (Ergeç and Arslan, 2013).

This shows that Islamic banking practices have expanded in various countries and institutions. However, given their fundamental differences from conventional banks, there are questions about the role of Islamic banks in monetary policy decisions and their effects on the real economy. The search for answers to these questions, particularly whether their responses to traditional monetary policies are different, has created a sub-literature concerning Islamic banks in dual banking systems.

The present study was conducted to determine the efficiency of the credit channel through participation banks in Turkey, which has a dual banking system. Accordingly, a VAR analysis was conducted on how the real sector reacted to the changes in monetary policies and interest rates between 2009 and 2020 in Turkey through participation banks. More specifically, it measured the response of the exchange rate, inflation, industrial production index, total loans, and total deposits of participation banks to a one-unit effect of monetary policy and interest rates.

Although total loans and deposits in participation banks initially show an increasing reaction to increases in money supply, i.e. expansionary monetary policies, these loans and deposits have no effect on the industrial production index; similarly, although total loans and deposits in participation banks initially show a decreasing reaction to increases in interest rates, i.e. contractionary monetary policies, these loans and deposits have no effect on the industrial production index, which shows that the credit channel is partially effective in participation banks. Thus, almost all variables responded significantly to both expansionary and contractionary monetary policy shocks, although the conditions for pass-through to real production were not fully realized. Therefore, it can be stated that the credit channel of participation banks is partially effective in the monetary transmission mechanism process. On the other hand, the variance decomposition findings show that the explanatory power of total loans and deposits in participation banks for the total periodic changes in money supply, interest rates and industrial production is quite weak.

It can be inferred from these findings that participation banks have not been strongly affected by monetary policies implemented in Turkey and cannot reflect this onto the real sector. While these findings support previous research by Zaheer vd. (2013) and Zulkhibri and Sukmana (2017), they contradict the results of Sukmana and Kassim (2010), Majid ve Hasin (2014), Akhatova vd. (2016), Rafay and Farid (2019), Ergeç and Arslan (2013), Aysan vd. (2018) and Hamza and Saadaoui (2018).

The fact that many studies show that it is partially effective indicates that further studies should be conducted using different methods and time intervals in order to clarify the issue. In Turkey, participation banks have followed a similar growth trend to their Islamic banking counterparts worldwide. Yet, although their activity has increased over the years, they still represent a small portion of the banking system. Their ability to resist monetary policies depends on the development of financial instruments and the variety of these financial instruments that can replace traditional tools. It is also crucial to develop a systemic infrastructure that can compete with conventional banks.

REFERENCES

Akhatova, M., Zainal, M. P., & Ibrahim, M. H. (2016). Banking models and monetary transmission mechanisms in Malaysia: Are Islamic banks. *Economic Papers, 35*(2), 169-183.

Aysan, A. F., Disli, M., & Ozturk, H. (2018). Bank lending channel in a dual banking system: Why are Islamic banks so responsive? *The World Economy, 41*, 674-698.

Boivin, J., Kiley, M. T., & Mishkin, F. S. (2010). *How has the monetary transmission mechanism evolved over time?* NBER Working Paper No. 15879.

Dickey, D. A., & Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*(366), 427-431.

Dickey, D. A., & Wayne , A. F. (1981). Likelihood ratio statistics for autoregressive time series with a unit root. *Econometrica, 49*(4), 1057-1072.

Ergeç, E. H., & Arslan, B. G. (2013). Impact of interest rates on Islamic and conventional banks: The case of Turkey. *Applied Economics, 45*(17), 2381-2388.

Gujarati, D. N. (2011). *Temel ekonometri* (8 b.). İstanbul: Literatür Yayınları.

Hamza, H., & Saadaoui, Z. (2018). Monetary transmission through the debt financing channel of Islamic banks: Does PSIA play a role? *Research in International Business and Finance, 45*, 557–570.

IFSB. (2021). *Islamic financial services industry stability report 2021.* Malezya: Islamic Financial Services Board.

Kutlar, A. (2017). *Ekonometrik zaman serileri: Teori ve uygulama 2. Baskı.* Kocaeli: Umuttepe Yayınları.

Majid, M. S., & Hasin, Z. (2014). Islamic banks and monetary transmission mechanism in Malaysia. *Journal of Economic Cooperation and Development, 35*(2), 137-166.

Majid, M. S., & Kassim, S. H. (2015). Assessing the contribution of Islamic finance to economic growth empirical evidence from Malaysia. *Journal of Islamic Accounting and Business Research, 6*(2), 292-310.

Mert, M., & Çağlar, A. E. (2019). *Eviews ve gauss uygulamalı zaman rerileri analizi.* Ankara: Detay Yayıncılık.

Phillips, P. C., & Perron, P. (1988). Testing for a unit root in time series regression. *Biometrika, 75*(2), 335-346.

Rafay, A., & Farid, S. (2019). Islamic banking system: A credit channel of monetary policy – evidence from an emerging economy. *Economic Research-Ekonomska Istraživanja, 32*(1), 742-754.

Sims, C. A. (1980). Macroeconomics and reality. *Econometrica, 48*(1), 1-48.

Stock, J. H., & Watson, M. W. (2011). *Ekonometriye giriş.* (B. Saraçoğlu, Çev.) Ankara: Efil Yayınevi.

Sukmana, R., & Kassim, S. H. (2010). Roles of the Islamic banks in the monetary transmission process in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management, 3*(1), 7-19.

Zaheer, S., Ongena, S., & Van Wijnbergen, S. J. (2013). The transmission of monetary policy through conventional and Islamic banks. *International Journal of Central Banking, 9*(4), 175-224.

Zulkhibri, M., & Sukmana, R. (2017). Financing channels and monetary policy in a dual banking system: Evidence from Islamic banks in Indonesia. *Economic Notes by Banca Monte dei Paschi di Siena SpA, 46*(1), 117–143.