

# Religiosity versus Rationality: Depositor Behavior in Islamic and Conventional Banks

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## Abstract

This study investigates the behavioral aspects of Islamic bank depositors in a dual banking system. By categorizing depositors into groups based on the amount of their deposited funds, we estimate the responses of these groups to interest rate changes. We take the findings of conventional banks as a comparative baseline and investigate the extent to which the changes in different Islamic depositor groups differ from conventional depositor groups. The findings show that depositors in both Islamic and conventional banks respond to interest rate changes. The analysis indicates that Islamic bank depositors are more responsive when their deposit sizes are larger. When Islamic bank depositors' opportunity costs rise due to a rise in the interest rate, they do not hesitate to withdraw deposits. The relation between interest rate changes and deposits is more robust in Islamic banks than in conventional banks.

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# 1 Introduction

Islamic banking has evolved from a little known financial experiment to a major player in world finance, both in terms of asset size and activity. Especially after the outbreak of the global financial crisis, Islamic banking has emerged as a viable alternative to conventional models of banking. The research often mentions the customers' increasing awareness of Islamic banking products and services and the recent financial crisis which induced the need for alternative havens as the triggering factors behind the growth of Islamic finance (Khan, 2010). In parallel, greater academic attention has resulted in a wide range of research foci, varying from measuring the efficiency of Islamic banks (e.g. Samad, 1999; Abdul-Majid et al., 2010; Srairi, 2010) to identifying differences with conventional banking practices (e.g. Iqbal, 2001; Beck et al., 2013; Elnahass et al., 2014). Moreover, there is now a thriving literature that studies the resilience of Islamic banks during the global financial crisis (Čihák and Hesse, 2010; Hasan and Dridi, 2011; Abedifar et al., 2013). Nevertheless, partly due to data constraints, these studies have not specifically addressed the dynamics of depositors' behaviour.

Examining the behavior of depositors is of crucial importance because deposits fund a substantial portion of banks' assets. The process of how efficiently banks transform deposits into productive capital is at the core of financial intermediation. One of the main mandates in central banking is to manage the level of deposits and credits in the banking system to smooth out the swings in the business cycle. Hence, a successful monetary policy is to a large extent a matter of understanding the behavior of both depositors and borrowers. In this paper, we examine the sensitivity of depositors' behavior to interest rate changes in Islamic banks. Specifically, we compare Islamic deposit accounts and conventional deposit accounts *vis-à-vis* their responses to monetary policy shocks. In our analysis, we first categorize Islamic and conventional bank depositors by the amount funds that they deposit in their banks. Then, we examine whether the size of deposits alters depositors' incentive to withdraw their funds when interest rates go up. In doing so, we are able to observe how a

change in opportunity costs affects the behavior of Islamic and conventional bank depositors differently. The findings of this paper show that both Islamic and conventional banks react to interest rate changes in aggregate terms, which is in line with the literature. However, when we take a closer look at the behavior of different depositor categories, we observe that Islamic bank depositors, in almost all deposit categories, are sensitive to interest rate changes, whereas this is only true in the upper category for conventional bank depositors. Our results indicate that Islamic bank depositors react even more strongly to interest changes than conventional bank depositors.

Comparing Islamic banks and conventional banks is a worthy attempt on many grounds since the main pillar of Islamic banking is the prohibition of interest (*riba*). The direct reflection of this prohibition is that a deposit account cannot pay a formally fixed rate of return. In theory, Islamic banks operate similarly to equity-based companies in which depositors are treated as if they are quasi-shareholders (Khan and Mirakhor, 1989; Aysan et al., 2016). From this perspective, the paradigm of profit and loss sharing (PLS) is the basis for Islamic financing. Since interest is prohibited, Islamic banks treat depositors as investors rather than creditors. Under the PLS arrangement, the terms of financial transactions ideally reflect a symmetrical risk-return distribution between counterparties (El-Hawary et al., 2007; Askari et al., 2010). In this arrangement, the financial intermediary and depositor explicitly enter into business by pledging to share any loss or profit in the investment. In addition to Kuran (1986) who presents many flaws in the PLS paradigm, a number of studies notes that Islamic finance relies primarily on non-PLS models in practice. While funding activities are mainly carried out through PLS, Islamic banks tend to follow their conventional counterparts in creating their assets through non-PLS methods (Çokgezen and Kuran, 2015; Cevik and Charap, 2015; Khan, 2010; Chong and Liu, 2009; Dar and Presley, 1999). These non-PLS assets mainly include markup financing and a guaranteed profit margin that is based on deferred obligation contracts, which shed doubt on the uniqueness of Islamic banking.

Given the logic of operations embedded in interest-free banking practices, Islamic banks'

depositors should be unresponsive to interest rate changes. This expectation is also supported by the view that Islamic bank customers are captive despite the higher costs their banks impose on them (El-Gamal, 2006, 2007). El-Gamal (2006) argues that the fear of receiving interest returns from other intermediaries makes Islamic bank customers captive to their banks. As the author contends, Islamic banks operate in a demand-driven (prohibition-driven) market in which participants pay for *Shariah*-board-approved licenses. This relation renders participants captive despite inherent inefficiencies in their banks that arise from additional legal fees. The author names this mechanism *Shariah* arbitrage, since Islamic banks can remain profitable by exploiting the arbitrage created by *Shariah* licenses. Going forward, we argue that if the belief in sterilization from interest is the main reason behind Islamic depositors' purchasing of *Shariah*-compliant products and services, then the rationale suggests that these depositors would be unresponsive to the opportunities created by changes in interest rates. This state of unresponsiveness renders Islamic bank customers captive to their banks despite changes in monetary conditions.

Nevertheless, recent research has uncovered substantial evidence that Islamic banks and their customers mimic their conventional counterparts. For instance, Islamic banks and conventional banks are similarly affected by and have common responses to monetary policy (Haron and Ahmad, 2000; Kassim et al., 2009; Zainol and Kassim, 2010; Ergeç and Arslan, 2013). In general, Islamic banks try to manage displaced commercial risk to compete with conventional banks. Displaced commercial risk refers to the partial transfer of risk from deposit holders to bank shareholders. A dual banking system pressures Islamic banks into absorbing excess losses that would ideally be shared between banks and deposit holders as the PLS suggests. However, Islamic banks must pay higher returns than actually earned to their depositors to compete with their conventional counterparts. Islamic banks, which in theory should offer actual profits/losses to their depositors, fear losing depositors who would earn more by depositing at conventional banks. Empirical evidence has indeed shown that Islamic banks are subject to this pressure and, as a consequence, Islamic deposit accounts

offer similar rates to those of conventional deposits (Khan, 2010; Ergeç and Arslan, 2013; Chong and Liu, 2009).

The similarity between Islamic and conventional banking is also induced by the behavior of depositors. Specifically, Islamic bank depositors may have typical patterns in bank runs when banks are at risk of failure. Based on the codification of Islamic principles, the reasonable expectation is that Islamic bank depositors are ready to share the losses of their banks during a downturn. However, concerns remain that Islamic depositors will be as responsive as their conventional counterparts to increased bank risk, and this in turn would lead to deposit withdrawals (Aysan et al., 2017). Actual experience during Islamic bank failures also demonstrates that Islamic bank depositors do not significantly differ from conventional bank depositors. Had the PLS been the mechanism that Islamic banks and their depositors agreed on, as argued by critics of the traditional view of Islamic finance (see e.g. Khan, 2010; Çokgezen and Kuran, 2015), Islamic banks could have stayed buoyant by sharing investment losses with their depositors during a downturn. During the collapse of *İhlas Finans Kurumu* (İhlas Finance House)—a finance house operated on Islamic principles in Turkey that collapsed during the 2000–2001 domestic financial crisis, depositors enacted a classic bank run with instant deposit withdrawal rather than sharing the losses that the bank recorded (Henry, 2004; Çokgezen and Kuran, 2015). This bank run undeniably exacerbated the bank’s insolvency and triggered its collapse. Although some *İhlas Finans* depositors might have strictly followed the PLS based on religious commitments, the majority opted to withdraw their deposits according to what rationality suggested.

In an attempt to uncover potential behavioral differences between Islamic and conventional bank depositors, this paper contributes to the literature in several ways. First, Turkey in particular provides an interesting case study because Islamic banks operate side by side with conventional banks. Although each of these two banking schemes serves a specific *clientèle*, the clients indeed have very much common in their business practices. Having a greater understanding of how policy rate changes propagate throughout a dual banking sys-

tem is a critical requirement for the success of monetary policies. Second, to the best of the authors' knowledge, this is the first paper to directly measure the reaction of Islamic bank depositors to monetary policy shocks among different deposit groups. This is of particular importance since distinguishing deposits by their size provides richer insights into the degree of captivity in Islamic deposit markets. Our final contribution is related to our method. We examine the response of bank depositors to interest rate changes by using a panel vector autoregression (panel-VAR) framework that controls for bank level heterogeneity. The research examines aggregate deposits, while neglecting the differences between banks.

The rest of this paper proceeds as follows. Section 2 reviews the previous literature and discusses the motivation behind the study. Section 3 gives a concise history of Islamic banking in the dual banking system of Turkey. Section 4 presents the empirical research question with related data and method. This section also discusses the main findings and robustness checks. Based on the findings, Section 5 discusses whether religiosity or rationality is the main driver for Islamic bank depositors. Section 6 presents the potential reasons behind the finding that Islamic bank depositors are more sensitive to interest changes. We conclude in Section 7.

## **2 Literature Survey and Motivation**

The research has empirically well established that monetary policy transmits its influence on real macroeconomic variables through different channels. In their seminal work, Bernanke and Blinder (1992) argue that innovations to fund rates are effective through the credit channel by influencing the level of deposits and loans thereafter. The credit channel emphasizes that when a central bank adopts contractionary policy through increasing interest rates, the reserves in the banking system drain steadily. Banks reduce their loans because funding the gap through other sources would be costly and timely. The inherent assumption in the credit

channel is that bank reserves are imperfect substitutes for external funding.<sup>1</sup> The monetary transmission mechanism leads to a drainage of deposits when central banks raise the interest rate and consequently the level of deposits declines in response to the corresponding interest rate hike. This is explained by the rational behaviour of depositors who search for alternative instruments for their savings against the rising opportunity cost of holding deposits in their accounts.

The monetary transmission can be effective for conventional banks, yet its effect on Islamic bank depositors is uncertain. From a theoretical perspective, the transmission can be ineffective because Islamic banking prohibits the charging of interest on loans and paying interest on deposits. As argued by Khan (1991), Islamic law only recognizes the time value of money as part of a real economic transaction in Islamic banks. Islamic banks function as investment companies and depositors act as quasi-shareholders who earn dividends for their investment. In this business model, banks share their earnings with their depositors according to a pre-agreed rate of return. Islamic bank depositors can deposit their money in their bank to abstain from interest returns, and hence interest rate changes might not affect them. Nonetheless this explanation still needs verification, as this study intends, since Islamic bank depositors might show a rational response to monetary policy changes by assessing the opportunity cost of holding deposits in their banks. Although this might be a violation of the PLS contract, it might not be unexpected if they withdraw their deposits and divert them to alternative investments. Alternative investment opportunities are not necessarily the ones that are directly interest bearing, for example, real estate investments. Therefore, monetary transmission can also be operational in Islamic banks.

The withdrawal risk in Islamic banks is not unique to episodes of monetary policy changes but is also a phenomenon during bank failures. The overall functioning of Islamic deposit

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<sup>1</sup>Carpenter and Demiralp (2008) posit that in developed financial markets, “managed liabilities” fund bank loans. These liabilities are not subject to reserve requirements. Under these conditions, the credit channel of the monetary transmission mechanism is not functional. However, Demiralp (2008) argues that this channel is still functional in less developed countries since external sources do not compensate for the drainage of reserves.

markets in Turkey, after the *İhlas Finans* failure, showed that depositors primarily assess the value of their assets themselves without having absolute loyalty to their banks.<sup>2</sup> Even though the depositors of *İhlas Finans* had a clear demand for interest-free products, certain types of bank and depositor characteristics could explain why withdrawals from Islamic banks are real and devastating.

Poor regulatory treatment and challenges in corporate governance partially clarify why the withdrawal risk is a serious threat for Islamic banks. Regulations in a country have an indisputable impact on Islamic bank depositors' behavior. The depositors' stance with their banks is implicitly influenced, if not supported, by regulations. Due to the lack of deposit insurance on Islamic bank deposits in Turkey before the collapse of *İhlas Finans*, bank regulators accepted that Islamic banks did not have a "bank" status. The lack of deposit insurance had put monitoring duties entirely on depositors that left them totally sensitive to poor bank performance. Moreover, a poor record of corporate governance had instigated much misconduct in Islamic banks. Islamic scholars argue that Islamic banks are immune to any misconduct since the moral code of Islam induces stakeholders to behave ethically.<sup>3</sup> However, the short history of Islamic finance shows that Islamic banks do have much in common with conventional banks, such as collusion of the board with management, external and internal audit failures, neglect of minority shareholders' interests, imprudent lending, and excessive risk taking by management (Grais and Pellegrini, 2006).

The sociology of Muslim societies provides some additional clues about why some depositors prefer Islamic banks. As the core of Islamic finance suggests, the ultimate goal of Islamic

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<sup>2</sup>Farooq and Zaheer (2015) find that the Islamic banks in Pakistan that provide both conventional and Islamic operations showed greater resilience during the 2008 financial panic. The authors support their argument with a survey that showed Islamic bank depositors were more loyal to their banks during the 2008 financial crisis. Their study however does not provide any clear information about the operations of different windows (conventional and Islamic) in the same brand name. As *Shariah* rules strictly reject dual operations in a single balance sheet, the resilience might not be attributable to the religious orientation of depositors. Despite having the same brand name, state-owned Islamic banks in Turkey, for instance, have totally different balance sheets. Since Islamic banks are well-capitalized and have higher asset quality (Beck et al., 2013), depositors' seemingly loyal behaviour might indeed be a positive response to better bank performance.

<sup>3</sup>See Kuran (2004) for an excellent overview on the foundations of this line of thought.



banking is to promote an Islamic society through providing financing to their customers with an equitable share of return and loss without interest. Yet, fierce competition in modern economies and several constraints of the religion on economic life portray hybrid compositions in Islamic finance. The only viable option that Islamic actors have is to stay obedient to Islamic rules while reconciling with universal motives such as profit maximization.

Anatolian entrepreneurs, the so-called Anatolian tigers who symbolize the newly emergent capitalist elite, are the prototype of Islamic actors in Turkey (Demir et al., 2004). This new class has been loyal to religious values but open to change along with rational investment decisions. Although they do not yet have financial strength comparable to the giant conglomerates in the country, they are quite outward-looking and have close business ties with foreign business circles. Since there is no clear-cut consensus on what is *Shariah*-compliant and what is not, the current Islamic banking operations reveal a somewhat perplexing scenario. In Turkey, the rising Anatolian entrepreneurs, who at the same time have religious identity and mode of life, have actual free market practices and beliefs in rationalism (Demiralp, 2009; Demiralp and Demiralp, 2015). Whilst some scholars in the literature argue that free markets and rationalism contradict Islamic principles, the Turkish case presents a hybrid structure where customers live both of them. Borrowing the analogy from Demiralp and Demiralp (2015), these unique characteristics render Islamic bank customers as *rational* actors in essence.

The coexistence of economic rationality and religious constraints makes Islamic bank depositors an interesting case to show the dominance of these two opposite forces: economic rationality versus religious commitments. The test for monetary transmission in Islamic banks provides useful insights into this relation. The literature intensely investigates monetary transmission after the papers of Bernanke and Blinder (1988) and Bernanke and Blinder (1992). However, the impact of monetary policy on Islamic banks is largely unknown. The relationship between interest rate changes and Islamic bank deposits has been examinable for several countries that accommodate both conventional and Islamic banks. For instance,

Takayasu (2013) investigates Malaysian banking and finds that Islamic rates of return and conventional interest rates co-move in the Malaysian deposit market. He interprets these results as evidence of strong competition between Islamic and conventional deposit markets. Interestingly, the author finds that Islamic rates of return have more impact on the formation of short-term interest rates than conventional interest rates. Ergeç and Arslan (2013) examine the Turkish banking system and find that rates in conventional banks and Islamic banks respond similarly to monetary policy shocks. Cevik and Charap (2015) compare Turkish and Malaysian dual banking systems and find similar results. Mohd Yusof et al. (2009) compare two countries' banking systems and find that the deposits in Bahrain's Islamic banks are relatively more sensitive to monetary policy changes compared to deposits in Malaysia's Islamic banks in the long run. That study also provides evidence that Islamic bank depositors in these countries co-move with monetary aggregates and interest rates.

Although a few relevant papers in the literature stress that Islamic bank deposits respond to interest rate changes, they conduct their analyses by solely using deposits at the aggregate level. This limitation hinders the extraction of patterns from different depositor groups. Up to now, we still know very little about whether deposit size does indeed matter. We try to fill this gap in the literature by classifying depositors by the size of their deposits. By doing so, we attempt to complement the literature by providing background insights for the finding that Islamic bank deposits respond to interest rate changes. The classification of deposits in terms of their size illustrates the behavioral aspects of depositors. The results will uncover to what degree Islamic bank depositors are responsive to monetary policy. The comparison between conventional and Islamic bank depositors will highlight this difference.

### **3 Conventional versus Islamic Banking in Turkey**

Until the 1980s, the dual banking system in Turkey was nonexistent, and banks in the sector operated under conventional banking rules. Particularly after the early 1960s, com-

mercial banks as well as state-owned development banks became the toolkits of planned industrialization policies. State involvement was substantial in the banking sector, and included, *inter alia*, interest rate controls, directed credit programs, high reserve requirements as well as entry restrictions. While these financial and regulatory policies were not unique to Turkey and were partially successful in its development process, they put a significant burden on the banking system by reducing competition and efficiency (Denizer, 1997).

At the beginning of the 1980s, the scheme that governed the banking system needed restructuring. Starting in June 1980, Turkey implemented liberal and deregulatory measures in the financial system as part of an overarching stabilization and structural adjustment program. The reforms aimed at enhancing efficiency and were arguably successful during the liberalization period. Isik and Hassan (2002) and Zaim (1995) report efficiency gains in the Turkish banking system after the 1980 liberalization program. Thus, the Turkish banking system became more integrated with the global financial system and improved its financial technology and human capital (Denizer, 1997). At the same time, the liberalization of cross-border fund flows enabled the banking system to borrow in foreign currencies that the government had previously restricted. Related with the scope of this study, the relaxation of regulatory barriers has attracted a significant number of banks to the system, including Islamic banks. The introduction of Islamic banks has also been conducive to the deepening of the sector because it has attracted more funds from religiously conservative citizens.

Islamic banks in Turkey have continued to operate in the Turkish banking system, though the status of these banks had been controversial. Aysan et al. (2013) report that, after the enactment of a governmental decree, *Albaraka Türk Finans Kurumu* (Albaraka Turk Finance House) and *Faisal Finans Kurumu* (Faisal Finance House) entered the Turkish banking system in 1984. *Kuveyt Türk Finans Kurumu* (Kuwait Turkish Finance House) followed these and joined the system. By 1991 three new banks, *Anadolu Finans Kurumu* (Anadolu Finance House), *İhlas Finans Kurumu* (Ihlas Finance House), and *Asya Finans Kurumu* (Asya Finance House) were opened with 100 percent domestic capital. As the name

“*Finans Kurumu*” (Finance House) suggests, these institutions did not have the same status as conventional banks. Until late 2005, these banks remained subject to different statutory and regulatory arrangements that led to different rights, which covered solely conventional banks but not the others. For instance, Aysan et al. (2013) convey that Islamic banks were not fully covered by a deposit guarantee, although a comprehensive scheme was used to cover conventional deposits. In line with global trends, Turkey has introduced several favorable regulatory changes to Islamic banks as interest in Islamic banking gained further momentum. Legislative changes in late 2005 have eliminated deprivations and provided a more constructive environment for Islamic banks. Perhaps most importantly, Islamic banks eventually gained legal “bank” status and started to operate without any discrimination.

## **4 Empirical Search for Depositors’ Sensitivity in a Dual Banking System**

The similarity between the rates that Islamic and conventional banks offer to their depositors vanishes during monetary policy changes. The prohibition of interest in Islamic banks inhibits the swift change of returns paid to their depositors. There has to be a certain period of adjustment that these banks need to match their rates with interest rates in conventional banks. Demiralp and Demiralp (2015) argue that the period of adjustment creates a conflict for Islamic bank depositors, though temporarily, where they have to choose between two options: either stay at their banks or withdraw their deposits. We investigate whether depositors in a dual banking system withdraw their deposits or not during this state of conflict. The withdrawal of Islamic bank deposits will mean that Islamic bank depositors are not ready to share the burden of monetary policy changes as the PLS directly suggests. The classification of deposits by their size also constitutes a unique opportunity for the purposes of our analysis which measures the degree of sensitivity of Islamic and conventional bank depositors.

The use of aggregate deposit data conceals differences in different deposit groups, because depositors' responses to interest rate changes can vary depending on deposit size. We collect quarterly deposit data on Islamic banks and conventional banks for the period of September 2004 to December 2012. Although interest rate hikes increase the opportunity cost of holding money in an account, small deposit holders might not find enough incentive to withdraw their money. However, when the deposit size gets larger, the opportunity cost of holding money as deposits can become unbearable. Martinez Peria and Schmukler (2001) study market discipline across different deposit sizes and stress the impact of size on depositors' discipline. They posit that the disciplining role of depositors changes based on the amount of funds in their banks. As the deposit size gets larger, they monitor their banks against risk more closely. In this study, we argue that a threshold exists at which the opportunity cost of holding deposits against monetary policy changes becomes unbearable. The behavioral differences across deposit groups have valuable information content about Islamic and conventional bank depositors' sensitivity to monetary policy shocks.

## 4.1 Data

We split deposits into insured and uninsured to remove the impact of banks' credit risk on the relation between monetary policy and deposits. When a government authority provides insurance, depositors know that their deposits will be paid back at a predetermined ratio by the authority in case of a bank failure. During the sample period, the deposit insurance authority in Turkey (Savings Deposit Insurance Fund, *Tasarruf Mevduatı Sigorta Fonu* in Turkish) provided insurance up to 50,000 Turkish Liras. Funds over this amount were deposited at the depositors' own risk. Among those insured, we differentiate deposits by their amounts. We study five different groups of depositors both at Islamic banks and conventional banks. The groups are classified according to the amount of deposits in banks at the end of each quarter of the sample year. The smallest deposit group is composed of depositors whose funds are less than 10,000 Turkish Liras. The second, third, fourth, and

fifth groups are populated by depositors whose funds are, more than 10,000 but less than 20,000, more than 20,000 but less than 30,000, more than 30,000 but less than 40,000, and more than 40,000 but less than 50,000 Turkish Liras, respectively (see Table 1).

As a proxy for monetary policy, we use the Central Bank of Turkey’s overnight money market rate. We compute the average overnight rates per quarter during the sample period and use the differences between consecutive quarters to represent interest rate changes.

[INSERT TABLE I ABOUT HERE]

Table 1 presents the summary statistics for the deposit groups, total insured deposits, total uninsured deposits, and the total deposits in the system. Consistent with our expectations, banks collect the most funds from uninsured depositors. Among insured deposits, the largest contribution comes from the largest deposit group. However, the smallest deposit group is the second largest group to contribute to the deposit base of banks. This finding might show the widespread outreach of conventional banks, although Islamic banks also show considerable success in reaching smaller depositors.

## 4.2 Methodology

We use a panel vector autoregression (panel-VAR) methodology which fits the purpose of this paper. This method extends the traditional VAR approach to a panel setting and allows us to control for bank level heterogeneity. As in the traditional VAR approach, the variables in the system are treated as endogenous. We specify our model of order  $s$  as follows:

$$Z_{i,t} = \Gamma_0 + f_i + \Gamma_1 Z_{i,t-1} + \Gamma_2 Z_{i,t-2} + \dots + \Gamma_s Z_{i,t-s} + \varepsilon_{i,t}. \quad (1)$$

In this specification the variables *Deposit*, *Interest* denote different deposit groups and overnight money market rates, respectively. These variables are the components of a two-variable vector  $Z$  in the VAR system for bank  $i$  and time  $t$ . In all estimations, we control for

bank level heterogeneity by incorporating  $f_i$  as proposed by Holtz-Eakin et al. (1988). We used forward mean-differencing, known as the “Helmert procedure” which allows us to use lagged dependent variables as instruments for identification (Love and Zicchino, 2006). The  $f_i$  are eliminated by subtracting the means of each variable calculated for each bank-quarter.<sup>4</sup>

To analyze the potential effects of interest rate shocks, *Interest*, on deposits, *Deposit*, we generate impulse response functions to the interest rate shock for each deposit group, where shocks to other variables are held constant. To do so, we decompose the residuals so that they are orthogonal. This decomposition can be accomplished by ordering the variables, namely Choleski ordering, to allocate any correlation between two variables to the variable that comes ahead of it in the ordering. Choleski ordering means that variables that enter into the VAR system earlier affect the following variables contemporaneously and with a lag, while later variables affect the variables that entered earlier with a lag (Hamilton, 1994).

### 4.3 Empirical Findings

We infer the sensitivity of depositors to interest rate changes by comparing the responses of each deposit group in Islamic and conventional banks. Our main assumption is that the decision of withdrawing deposits is closely dependent on deposit size. By increasing amount of deposits, depositors are expected to show significant responses. The smallest deposit group<sup>5</sup> which shows statistically significant response to interest rate changes is the threshold beyond which depositors give up holding their deposits in their banks.

We first conduct a unit-root test on all the variables used in the analysis. To this end, we check whether the selected variables are stationary or not. In the panel-VARs we use the Helmert transformed variables. The use of Helmert transformation contributes to the stationarity of the variables used in the models (De Haan and Van den End, 2013). We

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<sup>4</sup>The  $f_i$  can be removed by mean-differencing, but mean-differencing in panel estimation leads to biased estimates. Due to the mentioned weakness of the mean-differencing procedure we use forward mean-differencing, known as the “Helmert procedure”. This transformation satisfies the orthogonality assumption between transformed variables and lagged regressors (Love and Zicchino, 2006).

<sup>5</sup>Throughout the paper, we use shorthand definition of smallest/largest group to identify the group of people holding the smallest/largest amount of deposits as defined earlier.

use Fisher’s test statistics for the presence of panel unit root (see e.g. Maddala and Wu, 1999), since this test, unlike the Im–Paseran–Shin test proposed by Im et al. (2003), does not require a balanced panel. According to our test results, the null hypothesis of unit roots is rejected either at their level or differences for all variables used in our analysis.<sup>6</sup>

[INSERT TABLE II ABOUT HERE]

Table 2 reports the estimated coefficients for the two–variable VAR of the banking system once the fixed effects are removed. We generate estimation results for the deposit groups, insured deposits, uninsured deposits, and all deposits in the system. What we observe from Table 2 is that depositors holding higher than 40,000 but lower than 50,000 Turkish Liras have a robust and significantly negative response to shocks in the interest rates. The panel–VAR results confirm our main assumption that increasing amounts of deposits are closely related to the significance of responses.

[INSERT TABLE III ABOUT HERE]

To compare conventional and Islamic bank depositors’ responses to interest rate shocks, we run the same regressions for the restricted samples of conventional and Islamic banks. The estimation results in Table 3 yield similar results as those obtained from the entire banking system. This is probably due to the dominance of conventional banks in the system, i.e. deposits are mainly held in conventional banks. According to the panel–VAR results, only the largest deposit group responds negatively to interest rate shocks. Since this group dominates the total insured deposits (around 45% of aggregate deposit), the significantly negative response of insured deposits in conventional banks is mainly driven by the largest group’s response.

[INSERT TABLE IV ABOUT HERE]

In the same fashion, we obtain regression results for Islamic bank depositors. Table 4 displays the results for the Islamic bank sample. Interestingly, except for the smallest deposit group, all deposit groups in Islamic banks have a significantly negative response to positive

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<sup>6</sup>We do not report the results for unit root test, which are available on request.



shocks to interest rates. We derive two clear conclusions. First, Islamic bank depositors do not differ from conventional bank depositors in the sense that both types assess the opportunity cost of monetary policy. The naïve expectation that Islamic bank customers do not respond to interest rate changes is proven to be invalid, which confirms the findings of Khan (2010), Ergeç and Arslan (2013), and Chong and Liu (2009). Second, the results in this paper show that Islamic bank depositors' responses are even more robust than conventional depositors.

[INSERT FIGURE I ABOUT HERE]

[INSERT FIGURE II ABOUT HERE]

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We check the validity of the panel-VAR results by generating impulse response functions (IRFs). If the error bands span the zero line, we interpret the responses as insignificant, that is, failing to reject responses that are different from zero. The graphs are presented with their 5% error bands which are generated by Monte-Carlo simulations. Figures 1 and 2 display IRFs for the banking system and conventional banks, respectively. These figures corroborate the panel-VAR results presented in Tables 2 and 3. The responses are only significant for the largest deposit group of the conventional bank sample, which indicates that the size of deposits is closely associated with significant responses. Figure 3 displays the IRFs for Islamic banks. This figure shows that the responses are only insignificant in the smallest deposit group of the Islamic bank sample. This finding is also observed in Table 4.

Overall, the results indicate that Islamic bank depositors are more sensitive to changing monetary conditions. When we classify deposits into five categories based on multiples of 10,000 Turkish Liras, the findings show that the significant responses of conventional bank deposits mainly originate from the largest group. The other groups in conventional banks do not significantly react to interest rate changes. On the other hand, all Islamic bank depositors, excluding the ones who are in the smallest deposit group, significantly react to interest rate changes. These results mean that depositors who have the smallest amount of

deposits in Islamic banks do not find enough gain when they withdraw their money. This threshold is 40,000 Turkish Liras in conventional banks.

#### 4.4 Robustness Checks

We check our results with two robustness tests. As an initial robustness check, we estimate an extended model with spillovers. The research assumes that monetary policy affects macroeconomic variables through several spillovers (Bernanke and Blinder, 1992). There is a contemporaneous spillover from the exchange rate to inflation that affects the general economy. This assumption is valid because the foreign exchange rate is influential in an import-dependent economy. We first apply the following Choleski ordering to reestimate the model: Interest rate  $\rightarrow$  foreign exchange rate  $\rightarrow$  inflation  $\rightarrow$  deposits. We then reorder the variables in the system (see e.g. Grossmann et al., 2014; Lof and Malinen, 2014; Kim and Lee, 2008, for similar sensitivity analysis). The main results of the extended panel-VAR specification and different Choleski orderings confirm the previous findings.<sup>7</sup>

Second, we test the robustness of our findings on a reduced sample of conventional bank observations whose characteristics are more akin to those of the Islamic bank observations (see, e.g., Saunders and Steffen, 2011, for a similar exercise). In this way, we aim to reduce the self-selection bias and heterogeneity across the full sample. In doing so, we ensure that the variations in the bank fundamentals among the two groups of banks can be attributed to whether they are Islamic or not. We first obtain matched pairs for each Islamic bank observation and identify their banks with propensity score matching. We then reestimate the models with a reduced sample that includes the Islamic banks and their matched banks. The regression results with the reduced sample provide exactly the same findings, which indicates that Islamic bank depositors are more responsive than conventional bank depositors.<sup>8</sup>

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<sup>7</sup>An in-depth discussion accompanied with estimation results can be found in Appendix A.

<sup>8</sup>A more detailed discussion about propensity score matching and additional results can be found in Appendix B.

## 5 The Islamic Bank Depositor’s Dilemma

Whether the actions of an Islamic bank are genuinely Islamic or not is mainly discussed from the bank’s perspective. It is however at least equally important to investigate how Islamic bank customers behave in their relations with their banks. Harsh criticism laments that Islamic banks in their operations are failed counterfeits of conventional banks. The asset creation, bond issuance, and credit card operations of Islamic banks resemble very much those of conventional banks (Khan, 2010; Çokgezen and Kuran, 2015). Although Islamic banks ostensibly do not operate under conventional banking rules, the ruses they derive from *Shariah* rules only disguise their compromises with conventional banking (Çokgezen and Kuran, 2015; Kuran, 1983, 1995). Although this argument reveals that Islamic banks set their policies to maximize their profits just like conventional banks, it hinges on the existence of feinted customers who are exploited by their banks. However, our study shows that Islamic bank depositors are shrewd enough not to lose their returns to their banks following an interest rate change.

One of the main findings from our analysis is that at least in Turkey, the depositors of Islamic banks are sensitive to interest rate changes just like those of conventional banks. This is interesting partly because interest rates should not matter to depositors who have religious commitments that determine their choice of a bank. The results also raise questions about the loyalty of Islamic bank depositors. The literature in consumer choice finds a strong relation between consumer’s religiosity and consumption related choices. This relation significantly influences store loyalty and complaint intentions (Swimberghe et al., 2009). From this reasoning, we expect that the relation between a depositor’s religious commitment and choice of a bank is significant, which specifies that a depositor’s religious commitment significantly influences loyalty and suppresses complaint intentions (Swimberghe et al., 2009). In Islamic banking, however, religiosity does not induce Islamic bank depositors to have such a significant attachment to their banks.

Our results show that depositors of Islamic banks demonstrate a rational response to

interest rate changes. Islamic bank depositors might make a strong pledge by parking their deposits at Islamic banks, but the gratification of following the depositors' moral deeds is not enough to cover the cost of any loss incurred by their religious preferences. As the critics of Islamic banking suggest, this situation confronts the basic pillar of Islamic banking that puts PLS at the center of their operations (Khan, 2010; Çokgezen and Kuran, 2015). Accordingly, a pious Muslim behaves in ways contrary to the patterns that neoclassical economics attributes to *homo economicus*. As further formulated by the theoreticians of Islamic economics, a Muslim is primarily motivated to live an Islamic life and to contribute to an Islamic society.<sup>9</sup> The characterization of the Muslim actor, namely *homo Islamicus*, substantially differs from *homo economicus* by preferring a moral economy over pragmatic benefits (Kuran, 1986, 1995, 2004). However, the pattern that Islamic bank deposits portray during interest rate changes indicates that Islamic bank depositors blend Islamic beliefs with so-called rationality (Demiralp and Demiralp, 2015).

The findings of this study call into question the claim that the prohibitions of Islamic finance make Islamic bank customers captives of their banks. The foregoing analysis points to the opposite conclusion as the results show that the Islamic deposit market in Turkey is not a captive market. For the deposit market, at least, Islamic bank customers assess their benefits (utilities) and make their decisions accordingly, as the rationality would suggest. Once conditions do not bring better outcomes for Islamic bank depositors, they do not hesitate to withdraw their deposits. Hence, this recalculation of utility in different monetary conditions dissipates Islamic banks' rents from *Shariah*-arbitrage. This exposition contradicts the observation of El-Gamal (2006) who reports that the provision of similar financial products in dual banking systems create arbitrage opportunities for Islamic banks. *Shariah*-compliant

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<sup>9</sup>The promoters of Islamic economics regard Islam not as a set of moral preaching only, but an ideology spanning the whole life. In this interpretation, daily economic affairs should be inspired by the rules set by Islam. Since Islam forbids selfishness for the welfare and order of the whole community, the representative agent in Islamic economics is totally different from *homo economicus*. We refer interested readers to Kuran (1983) for a review on Islamic economics with an extensive critique about the applicability of its rules. Ebrahim and Safadi (1995), in their comment to Kuran (1983), try to nullify its arguments by presenting good practices in ancient Islam civilizations, but Kuran (1995) argues that Islamic economics without any modern standards would fail to meet the demands of modern societies.

labels attract religion-motivated customers, even if they have to pay higher commissions for them. Although this observation might hold for a limited group of pious Muslims, on balance, Turkish Islamic bank depositors seem to not be captive to their banks and to show more pragmatism by reconsidering their behavior if the otherwise preferred option becomes too costly.

The results also show that Islamic banks are under significant displaced commercial risk. Even at smaller amounts of deposits, depositors are inclined to withdraw their deposits and switch elsewhere. The rationality of Islamic bank depositors causes them to monitor and discipline their banks in order to achieve a competitive rate of return. Our results indicate that, to safeguard their depositors, Islamic banks need to mitigate the effects of displaced commercial risk through higher capital buffers. The need for higher capital buffers is a significant challenge for Islamic banks since capital and liquidity opportunities for these banks are scarce.

In sum, the results show that Islamic bank depositors are more sensitive to interest rate changes because they withdraw their deposits regardless of size. Our findings confirm Demiralp and Demiralp (2015) who argue that many Islamic bank depositors pursue self-interest just like their non-Islamic counterparts. Likewise, we find that Islamic bank depositors do not hesitate to reconsider their behavior if depositing at their banks becomes too costly. Nonetheless, our main contribution to the literature is demonstrating the presence of stronger rationality among Islamic bank depositors even if the deposited funds are not large. The finding that Islamic bank depositors are more sensitive to interest rate changes means that these depositors are more pragmatic in calculating their utilities.

## **6 Why are Islamic Bank Depositors So Responsive?**

The traditional conceptualization of the association between monetary policy and deposits asserts that central banks are able to directly influence the level of deposits through

their control of bank reserves and the money multiplier mechanism (see e.g. Bernanke and Blinder, 1988; Kashyap and Stein, 1995). According to this view, following a tight monetary policy action, a contraction in the loan supply takes place as the central bank drains reserve deposits from the system through open market sales. Another interpretation relies on portfolio substitution arguments which suggest that the portfolio preferences of households change after a policy rate change. A policy rate alters the return differentials between asset classes hence depositors may at least partly reinvest in different assets other than deposits after a policy rate change (Kishan and Opiela, 2000; Ehrmann et al., 2001). Either way, policy tightening seems to affect deposits of both conventional and Islamic banks. However, our results show that Islamic banks are in fact more sensitive to policy shocks. Although this finding seems perplexing, we propose a number of explanations why this is the case.

Due to the nature of their operations, Islamic banks are slower in adjusting their rates of return, which makes them more vulnerable to policy shocks. This inertia originates from *ex-post* return payments to depositors in Islamic banks. During periods of declining interest rates, this strategy yields competitive returns which lead to an expansion of the deposit base. On the other hand, since it widens the wedge between the rates of return offered by Islamic and conventional banks, increasing interest rates can result in sharp reductions in the deposit base of Islamic banks. This argument is confirmed by previous research (see, e.g., Kassim et al., 2009). Although there is no definite evidence about where displaced deposits are reinvested, Gerrard and Cunningham (1997) provide evidence that interest rate shocks lead to deposit flows from Islamic banks to conventional banks in dual banking systems.

In practice, Islamic banks in general do not discriminate across different depositor clusters nor do they provide investment accounts with different risk–return profiles. In conventional banking operations, banks may offer different interest rates to their customers. For instance, Egan et al. (2017) investigate different deposit rates in insured and uninsured deposit markets. In such differentiated deposit markets, uninsured deposits are offered higher interest rates in the absence of deposit insurance, whereas insured deposit holders accept lower in-

terest rates depending on the deposit insurance coverage. Banks also offer different rates to reach a wider depositor base at minimum cost. Anderson et al. (2014) investigate the impact of deposit account age on deposit rates. Their findings show that, when switching is unlikely, depositors with higher loyalty receive lower interest rates. The findings of Anderson et al. (2014) are confirmed by the findings of Carbo-Valverde et al. (2011) who study the Spanish deposit market and argued that while loyal depositors are offered lower interest rates, potential new depositors are offered relatively higher interest rates. Related directly to size effects, Martinez Peria and Schmukler (2001) find evidence that deposit size is an important factor in disciplining performance. Poorly performing banks offer higher rates to larger deposit holders to persuade them not to leave the bank. Islamic banks nonetheless have limited tools to differentiate deposits. Whilst Islamic banks can offer favorable profit shares to larger deposit holders by forgoing some of their profits, these concessions in general are not enough to cover potential returns that these depositors otherwise would earn in conventional banks. This practice may account for the difference in depositors' sensitivity between the two banking groups. Given the more competitive conventional banking market, conventional bank depositors have greater bargaining power and can negotiate with bank officials to earn higher returns.

The recent research examines the influence of shareholders in maintaining corporate governance, particularly how the size of shares impact this disciplinary role. Admati and Pfleiderer (2009) show that due to information asymmetry and free rider problems only the exit of large shareholders has a disciplinary impact. However Edmans and Manso (2011) argue that small shareholders also have disciplinary power over share prices, even if they can not reinforce their demands with the threat of exit. Having mentioned that depositors can engage in rate bargaining in conventional banks and conventional bank depositors have considerable power in setting deposit rates against changing macro and monetary conditions, the only reaction that Islamic bank depositors can show might be their exit (Aysan et al., 2017). Unsatisfied Islamic bank depositors can transfer their deposits to investments that

are not interest bearing once their bank's rates become substantially lower after an interest rate change. Alternatively, Islamic bank depositors might have multiple accounts both at Islamic and conventional banks, as conventional banks provide more outreach and diverse banking products. Having multiple accounts can introduce some flexibility to Islamic bank depositors to bring their deposits to conventional banks when the returns at Islamic banks are not satisfactory.

We consider that the lack of mechanisms in Islamic banks to promptly change deposit rates (inertia) might create considerable deposit losses following policy rate hikes. In contrast, conventional banks can sharply tailor deposit rates to respond to policy rate hikes. The flexibility of interest rate alignments also creates incentives to attract larger deposit holders with higher rates. The lack of bargaining on deposit rates hinders Islamic banks in retaining larger deposit holders when policy rates are hiked. Finally, when return differentials between Islamic and conventional banks spread wide enough against policy rate hikes, deposits might flow to alternative investments. All these constraints can indicate behavioral differences between different customer stereotypes in a dual banking system. The dissimilarities potentially lead to Islamic bank customers becoming more risk averse players. We propose that the regulations in a dual banking system should be more focused on these comparative differences. The regulations could then be successful in containing the volatility of Islamic bank deposits that may otherwise be a threat for financial stability and customer benefits.

## **7 Concluding Remarks**

There is an active controversy in the banking literature over the extent to which Islamic bank customers are similar to conventional bank customers. The academic debate swings between religious commitment and rational preference, and whether or not religious doctrines prevent Islamic bank customers from using financial products and services in which



interest rates are embedded. While it is expected that Islamic bank customers are not affected by changes in interest rates, the existing evidence shows a conflicting relation. This study examines how Islamic bank and conventional bank depositors respond to interest rate changes to observe whether religious commitment is a key factor in Islamic bank depositors' economic decisions. Whilst the literature provides convincing evidence that, in aggregate terms, both conventional bank and Islamic bank depositors react to interest rate changes, how this relation varies depending on the size of deposit is unknown. To disentangle the behavior of different depositors who have different amounts of deposits, the depositors are grouped under five categories by the amount of money deposited in their accounts. Then, we analyze the responses to interest rate shocks in each group.

The panel-VAR results confirm the previous findings that both Islamic and conventional bank depositors respond negatively to interest rate shocks. These findings show that, when central banks adopt contractionary policy, the opportunity costs of deposit accounts increase. We obtain more interesting results when the depositors are categorized. We find that conventional bank depositors are relatively less sensitive to interest rate changes compared to Islamic bank depositors, since only the largest depositor groups are significantly responsive to interest rate shocks. All Islamic bank depositors, except for the ones in the smallest depositor group, are significantly sensitive. The results are robust in relation to different panel-VAR specifications and the effects of self-selection bias.

Our results have important policy implications. First, we show that Islamic bank depositors are more sensitive to interest rate changes. The only non-sensitive Islamic bank depositors are those in the smallest deposit group. Therefore, policies promoting Islamic bank outreach are of utmost importance for the stability of deposit levels in these banks. Wide branch coverage can help Islamic banks to mitigate interest rate shocks by reaching small depositors' money. Second, we find that interest rate sensitivity might not be the outcome of adherence to conventional banking principles, since interest rate sensitivity among conventional bank depositors is not very robust across different depositor groups. We ex-

plain this finding on the basis of operational differences between conventional and Islamic banks. Conventional bank depositors are able to negotiate on deposit returns, whereas Islamic banks have limited capacity to differentiate their depositors. Whilst Islamic banks often forgo their profits and offer favorable profit sharing to larger deposit holders, when the size of deposit gets higher in Islamic banks, the loss arising from keeping deposits at Islamic banks might not be covered by these concessions. To partly overcome the vulnerability of Islamic banks, Islamic banks might introduce different depositor accounts with an attainable set of risk–return combinations that reflect the spirit of PLS. This exercise might also be conducive to proper risk management in Islamic banks, which is deemed to be one of the drawbacks of current Islamic banking practices (see, e.g., Akkizidis and Khandelwal, 2008).

This paper provides an initial but crucially important contribution on a highly debated topic. Further research will provide further insights on the impact of religious commitment on Islamic bank depositors by studying province–level bank data. The geographical distribution of deposits will broaden our understanding on the relation between religiosity and depositor behavior, as religiosity in the country might have a spatial dimension.

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## 8 Tables and Figures

Table 1: Summary Statistics

Group	Deposits	Obs.	Mean	Std. Dev.	Min.	Max.
<i>Banking System</i>						
1 <sup>st</sup> group	0–10 thousand TL	1000	789.70	1,421.75	0.04	7,115.13
2 <sup>nd</sup> group	10–20 thousand TL	1000	602.57	1,049.39	0.01	5,635.55
3 <sup>rd</sup> group	20–30 thousand TL	1000	488.56	833.08	0.02	4,633.19
4 <sup>th</sup> group	30–40 thousand TL	1000	404.92	672.15	0.03	3,772.47
5 <sup>th</sup> group	40–50 thousand TL	1000	1,864.49	3,042.67	0.13	18,647.99
	Insured deposits	1000	4,150.24	6,897.82	0.44	38,771.06
	Uninsured deposits	1000	5,077.39	7,999.28	0.01	41,718.17
	All deposits	1000	9,227.63	14,500.00	0.62	77,335.34
<i>Conventional Banks</i>						
1 <sup>st</sup> group	0–10 thousand TL	869	861.26	1,511.37	0.04	7,115.13
2 <sup>nd</sup> group	10–20 thousand TL	869	646.42	1,117.75	0.01	5,635.55
3 <sup>rd</sup> group	20–30 thousand TL	869	523.83	886.93	0.02	4,633.19
4 <sup>th</sup> group	30–40 thousand TL	869	434.55	715.12	0.03	3,772.47
5 <sup>th</sup> group	40–50 thousand TL	869	2,011.04	3,232.56	0.13	18,647.99
	Insured deposits	869	4,477.11	7,333.64	0.44	38,771.06
	Uninsured deposits	869	5,539.99	8,469.69	0.01	41,718.17
	All deposits	869	10,000.00	15,400.00	0.62	77,335.34
<i>Islamic Banks</i>						
1 <sup>st</sup> group	0–10 thousand TL	131	315.01	142.99	74.63	672.50
2 <sup>nd</sup> group	10–20 thousand TL	131	311.65	149.81	55.82	721.93
3 <sup>rd</sup> group	20–30 thousand TL	131	254.61	132.57	40.24	602.24
4 <sup>th</sup> group	30–40 thousand TL	131	208.34	111.65	30.98	492.66
5 <sup>th</sup> group	40– 50 thousand TL	131	892.32	525.84	169.61	2,127.86
	Insured deposits	131	1,981.94	1,039.97	463.85	4,527.40
	Uninsured deposits	131	2,008.73	1,354.01	263.67	5,983.17
	All deposits	131	3,990.67	2,368.10	727.52	10,510.57

Note: The deposit amounts are in million Turkish Liras. The quarterly observations for insured deposits are classified by the amount of deposits. The smallest group contains depositors who have up to 10,000 Turkish Liras and the largest group is the group populated by depositors who have between 40,000 to 50,000 Turkish Liras. Insured deposits (sum of deposits in each deposit group) are the funds that are insured by the insurance authority in Turkey. Uninsured deposits are the remaining deposits which are not covered by any insurance scheme. All deposits cover both insured and uninsured deposits.

Table 2: Panel VAR Results– Banking System Depositors’ Response to Interest Rate Changes

<i>Responses to</i>	<i>Responses of</i>						
	Deposit			Interest			
		$\beta$	Std. error	T-stat	$\beta$	Std. error	T-stat
All deposits	Deposit(-1)	0.91	0.02	58.71 ***	0.00	0.00	0.78
	Interest(-1)	-34.90	9.73	-3.59 ***	0.94	0.01	71.33 ***
Uninsured deposits	Deposit(-1)	0.91	0.02	46.76 ***	0.00	0.00	0.96
	Interest(-1)	-29.32	8.45	-3.47 ***	0.95	0.01	70.91 ***
Insured deposits	Deposit(-1)	0.91	0.01	65.47 ***	0.00	0.00	0.55
	Interest(-1)	-8.41	2.61	-3.23 ***	0.94	0.01	70.92 ***
5 <sup>th</sup> group (40-50 thousand TL)	Deposit(-1)	0.91	0.02	55.74 ***	0.00	0.00	0.70
	Interest(-1)	-6.38	2.00	-3.20 ***	0.94	0.01	68.88 ***
4 <sup>th</sup> group (30-40 thousand TL)	Deposit(-1)	0.91	0.02	48.13 ***	0.00	0.00	0.52
	Interest(-1)	-0.55	0.39	-1.40	0.94	0.01	66.91 ***
3 <sup>rd</sup> group (20-30 thousand TL)	Deposit(-1)	0.91	0.02	39.19 ***	0.00	0.00	0.51
	Interest(-1)	-0.52	0.49	-1.07	0.94	0.01	67.32 ***
2 <sup>nd</sup> group (10-20 thousand TL)	Deposit(-1)	0.92	0.03	27.78 ***	0.00	0.00	0.47
	Interest(-1)	-0.58	0.58	-0.99	0.94	0.01	63.81 ***
1 <sup>st</sup> group (0-10 thousand TL)	Deposit(-1)	1.07	0.34	3.18 ***	0.00	0.00	0.28
	Interest(-1)	2.11	4.90	0.43	0.94	0.03	31.16 ***

Note: \*\*\*, \*\*, and \* represent significance at 1%, 5%, and 10% levels. A two-variable VAR model is estimated with a GMM. Bank-time fixed effects are removed prior to estimation. The reported numbers show the coefficients of regressing the column variables on row column variables. Standard errors are heteroscedasticity and serial correlation robust figures. The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> group represent the depositors who hold in the range of, 0-10,000 TL, 10-20,000 TL, 20-30,000 TL, 30-40,000 TL, and 40-50,000 TL, respectively. The interest rate is the Central Bank of Turkey’s quarterly average of the overnight money market rate.

Table 3: Panel VAR Results– Conventional Bank Depositors’ Response to Interest Rate Changes

<i>Responses to</i>	<i>Responses of</i>						
	Deposit			Interest			
		$\beta$	Std. error	T-stat	$\beta$	Std. error	T-stat
All deposits	Deposit(-1)	0.91	0.02	57.71 ***	0.00	0.00	0.54
	Interest(-1)	-37.29	10.53	-3.54 ***	0.94	0.01	65.69 ***
Uninsured deposits	Deposit(-1)	0.91	0.02	45.72 ***	0.00	0.00	0.71
	Interest(-1)	-32.07	9.30	-3.45 ***	0.94	0.01	64.77 ***
Insured deposits	Deposit(-1)	0.91	0.01	65.19 ***	0.00	0.00	0.32
	Interest(-1)	-8.38	2.69	-3.12 ***	0.93	0.01	66.47 ***
5 <sup>th</sup> group (40-50 thousand TL)	Deposit(-1)	0.91	0.02	55.35 ***	0.00	0.00	0.47
	Interest(-1)	-6.55	2.16	-3.03 ***	0.94	0.01	63.69 ***
4 <sup>th</sup> group (30-40 thousand TL)	Deposit(-1)	0.91	0.02	48.23 ***	0.00	0.00	0.29
	Interest(-1)	-0.46	0.42	-1.10	0.93	0.01	63.72 ***
3 <sup>rd</sup> group (20-30 thousand TL)	Deposit(-1)	0.91	0.02	39.36 ***	0.00	0.00	0.29
	Interest(-1)	-0.42	0.51	-0.83	0.93	0.01	64.45 ***
2 <sup>nd</sup> group (10-20 thousand TL)	Deposit(-1)	0.92	0.03	28.24 ***	0.00	0.00	0.25
	Interest(-1)	-0.56	0.59	-0.94	0.93	0.01	62.32 ***
1 <sup>st</sup> group (0-10 thousand TL)	Deposit(-1)	1.07	0.33	3.26 ***	0.00	0.00	0.07
	Interest(-1)	2.03	4.61	0.44	0.93	0.03	31.36 ***

Note: \*\*\*, \*\*, and \* represent significance at 1%, 5%, and 10% levels. A two-variable VAR model is estimated with a GMM. Bank-time fixed effects are removed prior to estimation. The reported numbers show the coefficients of regressing the column variables on row column variables. Standard errors are heteroscedasticity and serial correlation robust figures. The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> group represent the depositors who hold in the range of, 0-10,000 TL, 10-20,000 TL, 20-30,000 TL, 30-40,000 TL, and 40-50,000 TL, respectively. The interest rate is the Central Bank of Turkey’s quarterly average of the overnight money market rate.

Table 4: Panel VAR Results– Islamic Bank Depositors’ Response to Interest Rate Changes

<i>Responses to</i>	<i>Responses of</i>						
	Deposit			Interest			
		$\beta$	Std. error	T-stat	$\beta$	Std. error	T-stat
All deposits	Deposit(-1)	0.83	0.05	15.46 ***	0.00	0.00	1.42
	Interest(-1)	-54.13	21.85	-2.48 **	1.09	0.08	13.16 ***
Uninsured deposits	Deposit(-1)	0.86	0.07	12.81 ***	0.00	0.00	1.57
	Interest(-1)	-25.89	15.57	-1.66 *	1.08	0.07	15.35 ***
Insured deposits	Deposit(-1)	0.78	0.05	16.09 ***	0.00	0.00	1.23
	Interest(-1)	-30.30	8.51	-3.56 ***	1.12	0.12	9.52 ***
5 <sup>th</sup> group (40-50 thousand TL)	Deposit(-1)	0.80	0.04	18.31 ***	0.00	0.00	1.31
	Interest(-1)	-15.16	4.23	-3.59 ***	1.11	0.10	10.72 ***
4 <sup>th</sup> group (30-40 thousand TL)	Deposit(-1)	0.77	0.07	11.12 ***	0.01	0.01	1.20
	Interest(-1)	-3.40	1.31	-2.60 ***	1.14	0.14	8.14 ***
3 <sup>rd</sup> group (20-30 thousand TL)	Deposit(-1)	0.78	0.07	11.29 ***	0.01	0.01	1.16
	Interest(-1)	-3.76	1.50	-2.50 **	1.12	0.13	8.49 ***
2 <sup>nd</sup> group (10-20 thousand TL)	Deposit(-1)	0.77	0.09	8.98 ***	0.01	0.01	1.08
	Interest(-1)	-4.01	2.03	-1.97 **	1.14	0.15	7.48 ***
1 <sup>st</sup> group (0-10 thousand TL)	Deposit(-1)	0.84	0.21	4.03 ***	0.01	0.01	1.01
	Interest(-1)	-1.76	3.84	-0.46	1.17	0.20	5.85 ***

Note: \*\*\*, \*\*, and \* represent significance at 1%, 5%, and 10% levels. A two-variable VAR model is estimated with a GMM. Bank-time fixed effects are removed prior to estimation. The reported numbers show the coefficients of regressing the column variables on row column variables. Standard errors are heteroscedasticity and serial correlation robust figures. The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> group represent the depositors who hold in the range of, 0-10,000 TL, 10-20,000 TL, 20-30,000 TL, 30-40,000 TL, and 40-50,000 TL, respectively. The interest rate is the Central Bank of Turkey’s quarterly average of the overnight money market rate.

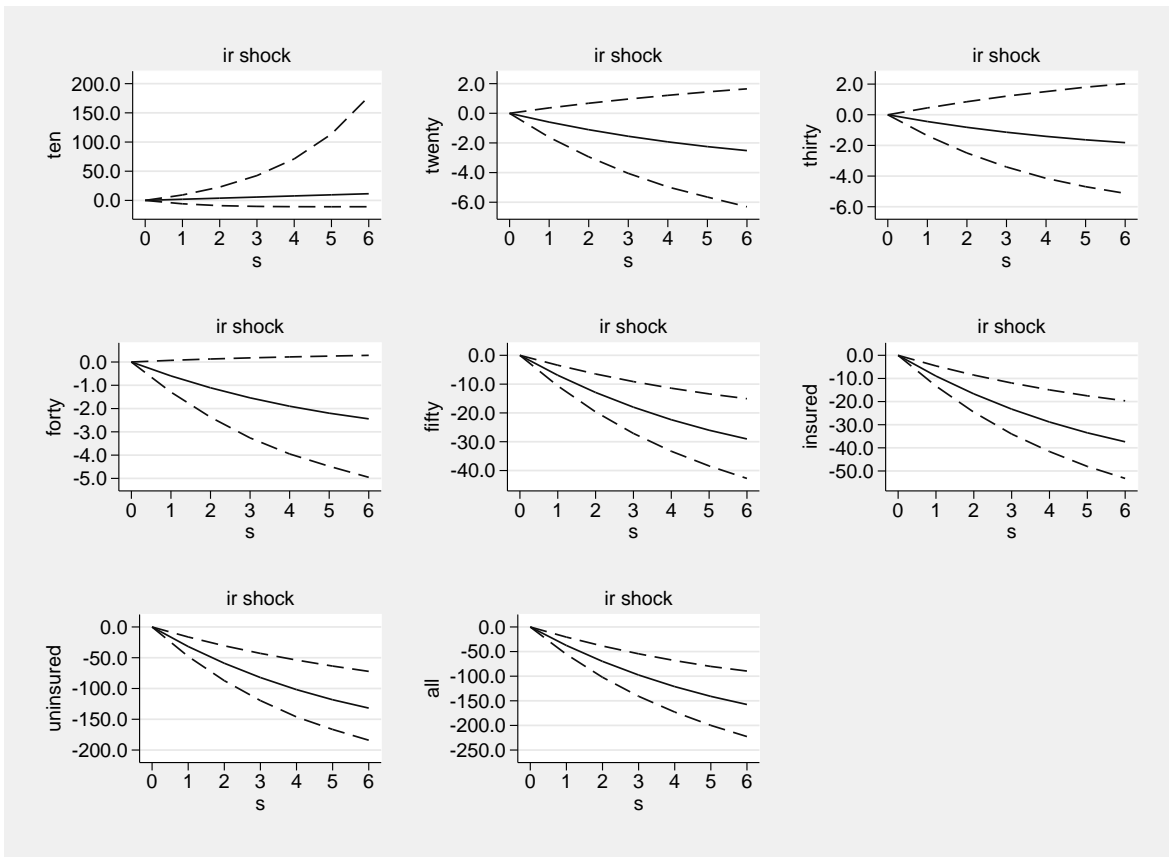


Figure 1: Impulse Responses of Two-Variable VAR for the Banking System

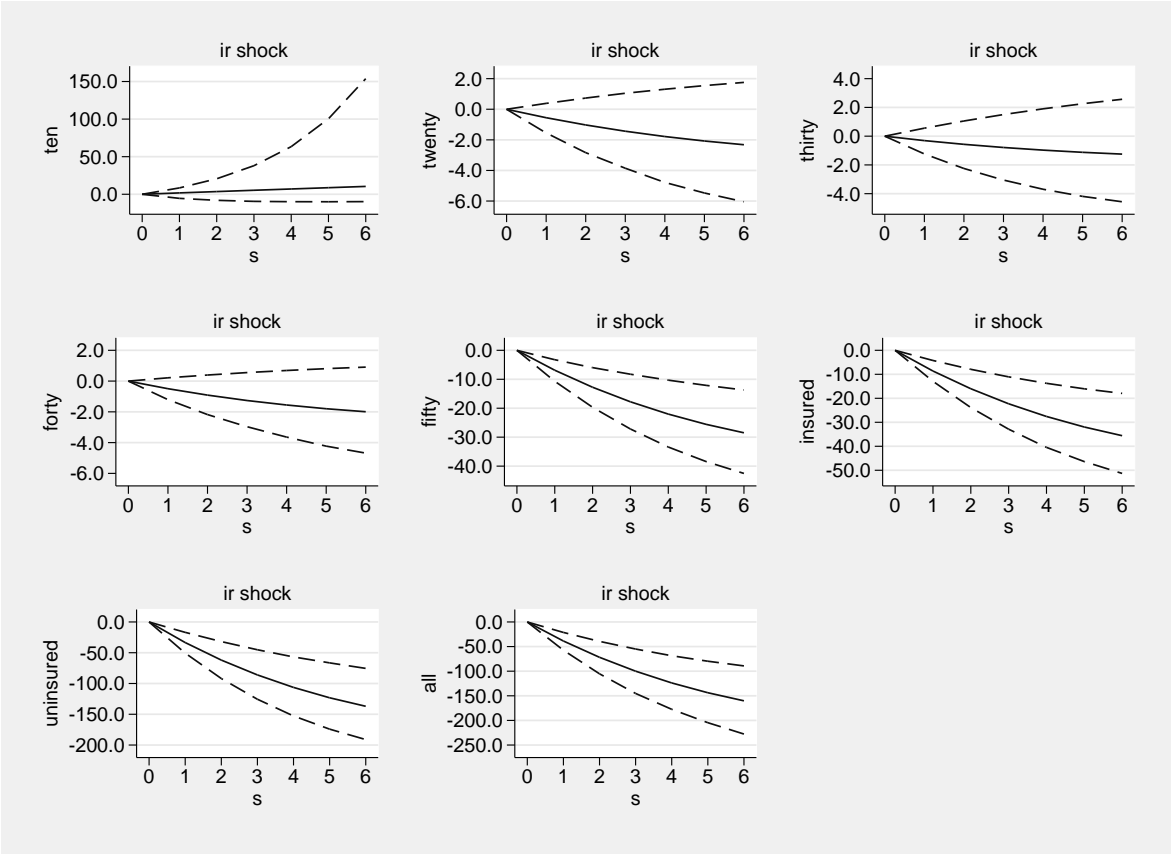


Figure 2: Impulse Responses of Two-Variable VAR for the Conventional Banks

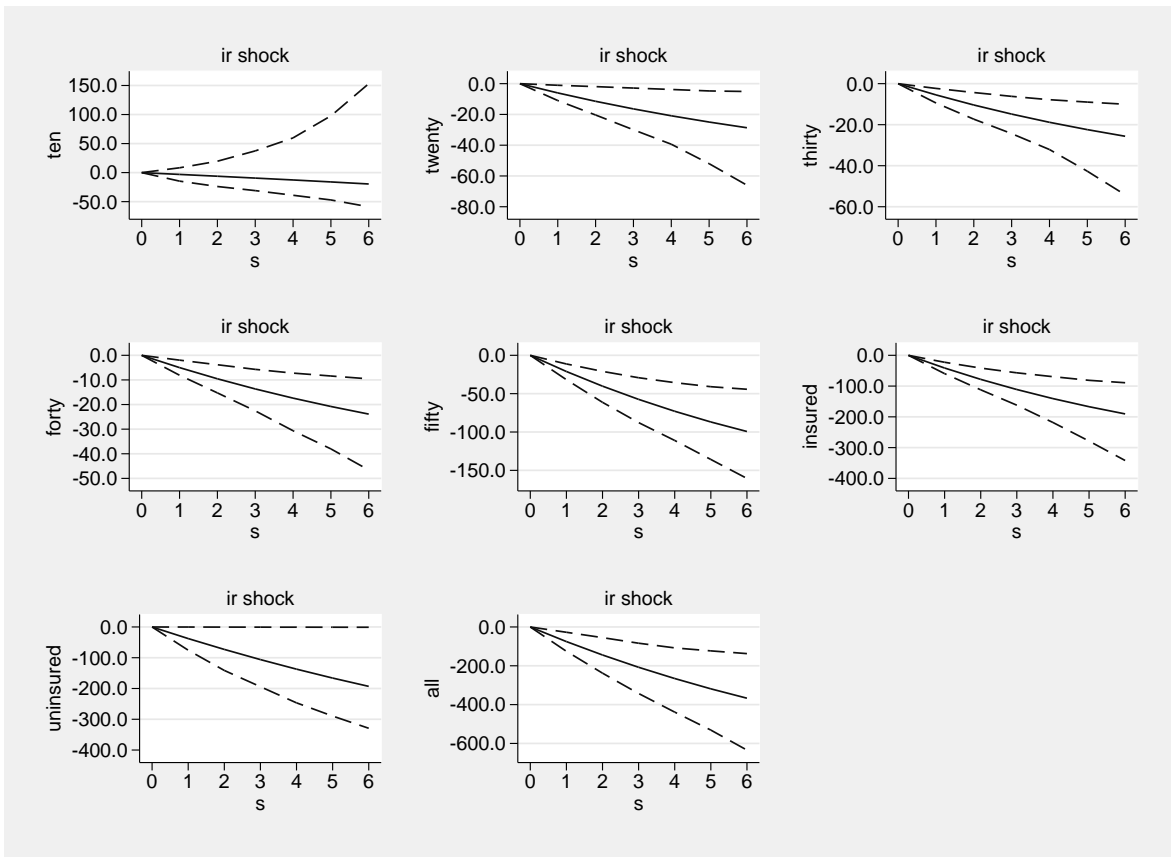


Figure 3: Impulse Responses of Two-Variable VAR for the Islamic Banks



# Appendices

## A Different Panel–VAR Estimations

The research assumes that monetary policy affects macroeconomic variables through several spillovers (Bernanke and Blinder, 1992). There is a contemporaneous spillover from the exchange rate to inflation that affects the general economy. This assumption is valid because fluctuations in the foreign exchange rate is influential on an import-dependent economy through the level of inflation. We first apply the following Choleski ordering: Interest rate  $\rightarrow$  foreign exchange rate  $\rightarrow$  inflation  $\rightarrow$  deposit as a robustness check. We use US Dollar/Turkish Lira exchange rates and consumer price indices for the new setup. To check the sensitivity of our results to the Choleski ordering, we alter the inside of the ordering and reestimate the panel–VARs (see, e.g., Grossmann et al., 2014; Lof and Malinen, 2014; Kim and Lee, 2008, for similar sensitivity analysis). The main results of the extended panel–VAR specification and the different Choleski ordering confirm the previous findings. We solely report the VAR results for the banking system to show the unchanged results (Table A1). We are able to observe that the results are unchanged over the IRFs that consider spillover effects (Figure A1).

It is worth mentioning here that deposits in most of the clusters are responsive to foreign exchange shocks, which we deem reasonable in an emerging market country where foreign exchange fluctuations change depositors' investment preferences. In an additional exercise, we decompose deposits in different deposit groups as foreign (USD) and domestic (TRY) currencies to observe how foreign exchange shocks drive depositors' currency preferences. The panel–VAR results for this exercise show that a positive foreign exchange shock (depreciation of domestic currency) leads to withdrawals from domestic currency and penetrations of foreign currency deposits. Therefore, the results addressing the spillovers are consistent

for the foreign exchange rate.<sup>10</sup>

[INSERT TABLE A1 ABOUT HERE]

[INSERT FIGURE A1 ABOUT HERE]

## B The Impact of Self-Selection Bias

In this section, we test the robustness of our findings on a reduced sample of conventional bank observations whose characteristics are more similar to those of Islamic bank observations. In this way, we aim to reduce the self selection bias and heterogeneity across the full sample.

There are several bank characteristics that can differentiate Islamic banks from conventional banks in terms of depositor behavior. For instance, larger banks have operated for many years in the system. This fact could create “too big to fail” perceptions among depositors and enhance their loyalty to their banks. Since the depositors of larger banks can be more loyal and might have fewer incentives to withdraw their money under changing interest rates, the results found earlier can be misleading. Moreover, several conventional banks have operated for over 100 years in the same country and have extensive branch coverage, enabling them to reach remote rural areas. On the other hand, Islamic banks have operated for a mere 30 years or so and their branch coverage is still developing. The empirical evidence shows that the bank’s age has a significant influence on the perception of depositors. Iyer and Puri (2012) test the relation between bank runs and bank age for the Indian banking system and find that bank–depositor relationships, as measured by account age and loan linkages, are important factors in mitigating the propensity of bank runs. Similarly, Önder and Özyıldırım (2008) argue that experience in the Turkish banking system is an important factor in depositors’ behavior, since experienced banks could attract more deposits even though they have less capital and keep fewer liquid assets.

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<sup>10</sup>We do not report the results for domestic and foreign currency deposits to keep the coherence of this research, but they are available on request.

An accurate comparison requires that bank observations share the same identification so that differences among the characteristics of the two different banking schemes can be attributed to their “Islamic” status. We are aware of the fact that Islamic and conventional banks can differentiate in their fundamentals.

The classification of all banks by imposing a comparison as conventional and Islamic may not be acceptable, this is addressed in the literature as “sample selection bias”. Hence, before comparing these two groups of banks, we need to ensure that the Islamic and conventional bank descriptors that we analyze share the same characteristics such that variations in the bank fundamentals among the two groups of banks can be attributed solely to their brand name, that is, Islamic or not.

To address these concerns, we use matching models, namely the propensity score matching (PSM) proposed by Rosenbaum and Rubin (1983), and identify a subset of banks among the conventional banks whose main characteristics are close to those of Islamic banks. This procedure involves the estimation of propensity scores, that is, a bank’s propensity to be “Islamic” over a set of bank characteristics. A conventional bank is then selected as a match to the Islamic bank by using specific approaches to matching, for example, radius matching, kernel matching, and nearest neighbour matching.

In the first stage, the propensity to be “Islamic” is estimated by using probit and logit models. In the second stage, each Islamic bank observation is then matched to a conventional bank with a similar propensity score. For this analysis we consider the nearest-neighbour matching where each Islamic bank observation is paired with its conventional bank counterpart that has the closest propensity score. We also estimate this matching within a given threshold distance called caliper (Becker and Ichino, 2002; Dehejia and Wahba, 2002).

[INSERT TABLE A2 ABOUT HERE]

The covariates that we used to estimate the propensity scores for each observation are the bank variables frequently used in previous studies that compare conventional and Islamic banking. Empirical evidence shows that the capital and liquidity management of Islamic

banks are different from that of their peers in the system (Abedifar et al., 2013; Beck et al., 2013). Therefore, we define the liquidity and capital adequacy measures. We consider that loan loss provisioning in Islamic banks may be different due to their earnings management strategies for income smoothing purposes (Elnahass et al., 2014; Farook et al., 2014). We use operational cost and loan loss provisions of the banks to encapsulate this difference. The Islamic banks under consideration are relatively small players in the system. Since a small number of banks own the greater stake of assets in the system, we use total assets of the banks. Once we adopt the variables based on this reasoning, we argue that a bank’s propensity to be “Islamic” is associated with its capital and liquidity management, loan loss provisions and operational cost, and its size. We use probit and logit estimates to generate propensity scores to select the matched pairs. Table A2 presents the results of the probit and logit models. Our results show that Islamic banks in Turkey are associated with higher loan loss provisions and lower operational costs. Islamic banks are poorer in terms of equity per total assets but rich in terms of liquidity. As said Islamic banks are relatively young and own only a small portion of the total assets in the banking system, Islamic banks tend to manage smaller assets.

[INSERT TABLE A3 ABOUT HERE]

By using the propensity score estimates of conventional bank observations that are closer to those of Islamic bank observations, we create a subsample of conventional banks that contains matched pairs of Islamic bank observations. For our analysis, the matched pairs are assigned using the nearest–neighbour matching algorithm (Becker and Ichino, 2002). The results for nearest neighbour matching with a caliper equal to 0.030 yield similar results.<sup>11</sup> The results of the balancing tests are presented in Table A3, and these tests do not reject the hypothesis that the mean of each covariate is equal across the control and treatment groups. An important assumption underlying the matching technique is the conditional independence assumption (or CIA) that cannot be tested *per se* (Becker and Ichino, 2002).

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<sup>11</sup>The results are not reported here but are available on request.

The empirical specification of both probit and logit models are satisfactory based on the Hosmer–Lemeshow test for the goodness of fit and the test for the empirical specification validity of the probit and logit models (see Table A2).

The matched sample consists of 248 observations (51.6% of the observations are in the treated group and the rest are in the non–treated group) representing 30 banks in total and 25 conventional banks. We observe that large banks leave the sample. Indeed, the mean of the total assets in the subsample equals 7.28 billion Turkish Liras whereas in the full sample this figure was 20.6 billion Turkish Liras. The descriptive statistics on the matched sample are presented in Table A4 as well the results of the t-tests on the difference in the means of each variable between conventional and Islamic banks.

[INSERT TABLE A4 ABOUT HERE]

Table A4 demonstrates that Islamic banks are able to attract more deposits than their conventional counterparts at a statistically significant level. This finding does not change after matching. Islamic banks have weaker fundamentals in terms of asset quality. Specifically, we can argue that Islamic banks show lower asset quality based on the ratio of NPLs to total credits. The difference is insignificant and negative and means that a higher asset quality for Islamic banks before matching, whereas in the matched subsample the difference switches signs and gains significance. Perhaps more importantly, the profitability of Islamic banks is significantly different from their conventional counterparts that indicates higher performance. However, before matching, the sign was negative that indicates lower profitability for Islamic banks. Overall, the results show that Islamic banks benefit from having relatively ample deposits.<sup>12</sup> Yet their asset quality is poor, since Islamic banks generate larger

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<sup>12</sup>Although it may seem puzzling, higher deposit attraction despite lower asset quality can be associated with branding and political issues. The evidence in the literature finds that Islamic banks are more willing to lend to SMEs which is also the case in Turkey (Shaban et al., 2014; Abedifar et al., 2015; Shaban et al., 2016). Since SMEs are more prone to economic and monetary shocks, SME credits are more likely to default. As our results also indicate, Islamic banks in Turkey generate higher profits but at the expense of higher NPLs. In the last decade, government support for Islamic banking via regulations, as discussed earlier, might have created an impression that there is an implicit government support for these banks. Additionally, these banks have some affiliations with the banks in the Middle East. These factors in combination can satisfy depositors’ concerns about the safety of their deposits despite major weaknesses their banks have.

NPLs with respect to their asset size. We observe that Islamic banks manage to cover their losses from NPLs with other sources of revenues, since the ROA measure indicates higher profitability for Islamic banks even with lower asset quality.

[INSERT TABLE A5 ABOUT HERE]

Since only the largest depositor group is sensitive to interest rate changes, we check the results by studying a sample of smaller conventional banks that is similar to the Islamic bank observations. Based on the matched conventional banks obtained by PSM, we estimate the responses of different depositor groups to interest rate changes. We pursue the following strategy: we first obtain matched pairs of each Islamic bank observation and identify their banks. Regardless of the number of matched observations, we include all observations belonging to that bank. The conventional bank subsample is reduced to 609 bank–quarter observations after this strategy. As discussed, the larger banks in the system are excluded from the subsample since none of their observations are matched to the Islamic bank observations. The regression results with the reduced sample provides us with exactly the same findings, which means that Islamic bank depositors are more responsive than conventional bank depositors to interest rate changes (Table A5).

## C Tables and Figures in Appendices

Table A1: Panel VAR Results– Banking System Depositors’ Response to Interest Rate Changes through Spillovers

<i>Responses to</i>		<i>Responses of</i>		
		Deposit		
		$\beta$	Std. error	T-stat
All deposits	Deposit(-1)	0.93	0.01	67.38 ***
	Interest(-1)	-47.46	11.94	-3.97 ***
	Foreign Exchange(-1)	-1023.40	187.04	-5.47 ***
	Inflation(-1)	-0.29	1.58	-0.18
Uninsured deposits	Deposit(-1)	0.92	0.02	53.19 ***
	Interest(-1)	-36.17	9.99	-3.62 ***
	Foreign Exchange(-1)	-703.69	142.48	-4.94 ***
	Inflation(-1)	-0.15	1.18	-0.12
Insured deposits	Deposit(-1)	0.92	0.01	75.13 ***
	Interest(-1)	-11.22	3.54	-3.17 ***
	Foreign Exchange(-1)	-312.85	67.55	-4.63 ***
	Inflation(-1)	0.25	0.52	0.48
5 <sup>th</sup> group / 40–50 thousand TL	Deposit(-1)	0.93	0.02	59.40 ***
	Interest(-1)	-7.98	2.64	-3.02 ***
	Foreign Exchange(-1)	-257.88	70.59	-3.65 ***
	Inflation(-1)	0.35	0.43	0.82
4 <sup>th</sup> group / 30–40 thousand TL	Deposit(-1)	0.91	0.02	52.96 ***
	Interest(-1)	-0.59	0.45	-1.33
	Foreign Exchange(-1)	-17.05	13.20	-1.29
	Inflation(-1)	0.03	0.07	0.46
3 <sup>rd</sup> group / 20–30 thousand TL	Deposit(-1)	0.92	0.02	42.21 ***
	Interest(-1)	-0.43	0.55	-0.78
	Foreign Exchange(-1)	-16.54	16.20	-1.02
	Inflation(-1)	0.04	0.10	0.43
2 <sup>nd</sup> group / 10–20 thousand TL	Deposit(-1)	0.93	0.03	28.30 ***
	Interest(-1)	-1.06	0.63	-1.67 *
	Foreign Exchange(-1)	-25.01	19.99	-1.25
	Inflation(-1)	-0.03	0.10	-0.29
1 <sup>st</sup> group / 0–10 thousand TL	Deposit(-1)	1.08	0.32	3.34 ***
	Interest(-1)	-1.50	2.01	-0.75
	Foreign Exchange(-1)	7.56	44.52	0.17 *
	Inflation(-1)	-0.64	1.01	-0.63

Note: \*\*\*, \*\*, and \* represent significance at 1%, 5%, and 10% levels. A two-variable VAR model is estimated with a GMM. Bank-time fixed effects are removed prior to estimation. The reported numbers show the coefficients of regressing the column variables on row column variables. Standard errors are heteroscedasticity and serial correlation robust figures. The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> group represent the depositors who hold in the range of, 0-10,000 TL, 10-20,000 TL, 20-30,000 TL, 30-40,000 TL, and 40-50,000 TL, respectively. The interest rate is the Central Bank of Turkey’s quarterly average of the overnight money market rate. Foreign exchange is the quarterly average of the foreign exchange rate of the US Dollar against the Turkish Lira. Inflation is the quarterly consumer price index.

Table A2: Propensity to “Islamic” – Binary Response Model Results

Variable	Definiton	Logit Model		Probit model	
		Coef.	T-stat	Coef.	T-stat
<i>prov</i>	Provisions	0.016	2.18*	0.009	2.2 *
<i>opcost</i>	Operational costs	-0.002	-2.28*	-0.001	-2.38*
<i>capadq</i>	$\frac{\text{shareholder equity}}{\text{total assets}}$	-0.014	-5.19**	-0.008	-5.25**
<i>liqdt</i>	$\log(\text{assets} - \text{credits} - \text{fixed assets})$	0.393	2.66**	0.233	2.72**
<i>assts</i>	Total assets	0.000	-3.61**	0.000	-3.6**
<i>constant</i>		-2.263	-2.37*	-1.375	-2.46**
Observation		1183		1183	
Chi-squared ( <i>p</i> – value)		0.00		0.00	
Hasmer-Lemeshaw test ( <i>p</i> – value)		1.00		1.00	

Note: \*\* and \* represent significance at the 1% and 5% levels. The dependent variable is a dummy variable taking the value of one for banks which are Islamic banks. The t-statistics are computed by using standard errors clustered around each bank. The Hosmer–Lemeshaw test for the goodness of fit statistic is computed as the Pearson chi-square from the contingency table of observed and expected frequencies.



Table A3: Covariates Statistics – Balancing Tests

Variable	Definition	Mean Treated	Mean Control	Bias %	Bias red. %	T-stat
<i>prov</i>	Provisions	10.9	25.7	-34.9		-2.83*
		Unmatched				
<i>opcost</i>	Operational costs	10.9	7.1	9.0	74.2	1.93
		Unmatched				
<i>capadq</i>	$\frac{Shareholder\ equity}{Total\ assets}$	183.8	425.2	-49.6		-4.03*
		Matched				
<i>liqdt</i>	$\log(assets - credits - fixed\ assets)$	183.8	159.7	4.9	90.0	1.11
		Unmatched				
<i>assts</i>	Total assets	116.1	202.8	-63.9		-5.14*
		Matched				
		116.1	117.1	-0.7	98.9	-0.35
		Unmatched				
		7.5	7.7	-13.4		-1.12
		Matched				
		7.5	7.3	9.4	30.1	1.20
		Unmatched				
		7657.6	22215	-55.5		-4.47*
		Matched				
		7657.6	6170.6	5.7	89.8	1.96

Note: \* represents significance at the 1% level. The first row of corresponding variables presents the difference between all conventional and Islamic banks. The second row represents the difference when being “Islamic” is taken as a treatment. The table reports the difference between the treated and non-treated observations.

Table A4: Summary Statistics with Propensity Score Matching

Variable	Definition	Sample	Treated	Controls	Difference	Std. Error	T-stat
Leverage	$\frac{\text{deposits}}{\text{total assets}}$	Unmatched	0.292	0.107	0.185	0.008	22.45**
		Average Treatment	0.292	0.138	0.154	0.012	12.92**
Asset quality	$\frac{NPLs}{\text{total credits}}$	Unmatched	0.016	0.152	-0.137	0.098	-1.39
		Average Treatment	0.016	0.011	0.005	0.002	2.97**
Profitability	$\frac{\text{profits}}{\text{total assets}}$	Unmatched	0.007	0.008	-0.001	0.003	-0.21
		Average Treatment	0.007	0.005	0.002	0.001	2.09*

Note: \*\* and \* represent significance at the 1% and 5% levels. The first row of corresponding variables presents the difference between all conventional and Islamic banks. The second row represents the difference when being “Islamic” is taken as a treatment. The table reports the difference between the treated and non-treated observations.

Table A5: Panel VAR Results– Matched Conventional Bank Depositors’ Response to Interest Rate Changes

<i>Responses to</i>		<i>Responses of</i>					
		Deposit			Interest		
		$\beta$	Std. error	T-stat	$\beta$	Std. error	T-stat
All deposits	Deposit(-1)	0.92	0.02	53.66 ***	0.00	0.00	0.60
	Interest(-1)	-13.63	4.47	-3.05 ***	0.94	0.01	71.27 ***
Uninsured deposits	Deposit(-1)	0.92	0.02	40.17 ***	0.00	0.00	0.67
	Interest(-1)	-10.74	4.09	-2.63 ***	0.94	0.01	70.03 ***
Insured deposits	Deposit(-1)	0.93	0.02	58.03 ***	0.00	0.00	0.51
	Interest(-1)	-3.23	1.30	-2.48 **	0.94	0.01	74.01 ***
5 <sup>th</sup> group / 40–50 thousand TL	Deposit(-1)	0.92	0.02	49.49 ***	0.00	0.00	0.66
	Interest(-1)	-2.83	1.10	-2.58 ***	0.94	0.01	71.38 ***
4 <sup>th</sup> group / 30–40 thousand TL	Deposit(-1)	0.93	0.02	45.88 ***	0.00	0.00	0.43
	Interest(-1)	-0.15	0.18	-0.86	0.94	0.01	72.93 ***
3 <sup>rd</sup> group / 20–30 thousand TL	Deposit(-1)	0.92	0.02	39.40 ***	0.00	0.00	0.47
	Interest(-1)	-0.09	0.17	-0.53	0.94	0.01	71.85 ***
2 <sup>nd</sup> group / 10–20 thousand TL	Deposit(-1)	0.98	0.04	25.41 ***	0.00	0.00	0.35
	Interest(-1)	-0.14	0.18	-0.76	0.94	0.01	73.76 ***
1 <sup>st</sup> group 0–10 thousand TL	Deposit(-1)	0.94	0.06	16.86 ***	0.00	0.00	0.25
	Interest(-1)	0.04	0.30	0.13	0.94	0.01	75.48 ***

Note: \*\*\*, \*\*, and \* represent significance at 1%, 5%, and 10% levels. A two-variable VAR model is estimated with a GMM. Bank-time fixed effects are removed prior to estimation. The reported numbers show the coefficients of regressing the column variables on row column variables. Standard errors are heteroscedasticity and serial correlation robust figures. The 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> group represent the depositors who hold in the range of, 0-10,000 TL, 10-20,000 TL, 20-30,000 TL, 30-40,000 TL, and 40-50,000 TL, respectively. The interest rate is the Central Bank of Turkey’s quarterly average of the overnight money market rate.

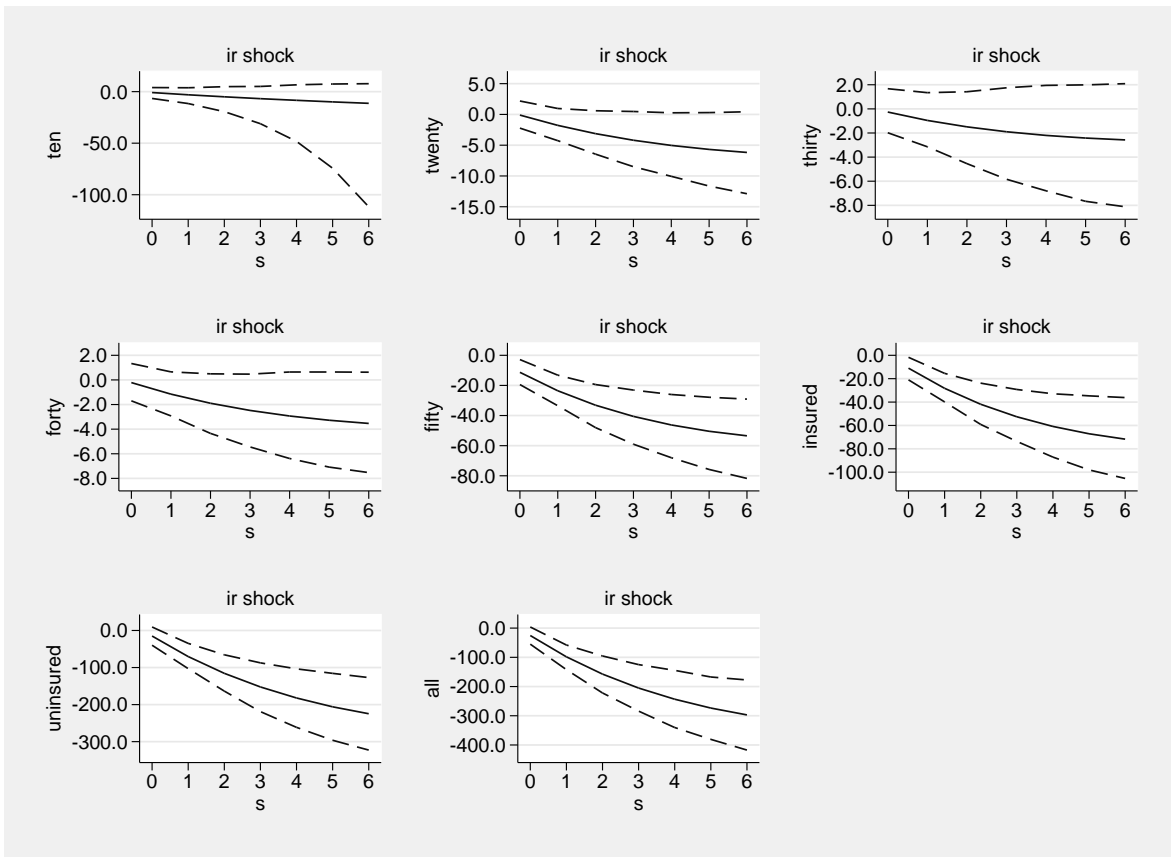


Figure A1: Impulse Responses of Two-Variable VAR for the Banking System with Spillovers