WORKING PAPER

Bank Lending Channel in a Dual Banking System: Why Are Islamic Banks So Responsive?

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May 30, 2017

Abstract

We examine the interest rate sensitivity of both deposits and credits at Islamic and conventional banks in Turkey. We find that the bank lending channel is especially operative for Islamic banks. Impulse responses for conventional and Islamic banks reveal that Islamic bank depositors' sensitivity to policy rate changes are substantially larger than that of conventional bank depositors. Next to heavily dependence on deposit funding, we consider that inertia in Islamic bank deposit rates impedes these banks to keep those depositors who consider the opportunity cost of monetary policy rates is unbearable. At the lending side, we obtain similar results, implying that tight monetary policy leads to a larger contraction in Islamic bank credits. This finding is a reflection of the favorable attitude of Islamic banks towards SME financing. When similar relationships are analysed for currency and inflation shocks, we again find larger responses for Islamic banks showing the cyclical nature of SME credits.

Keywords: Lending channel, Monetary transmission, Islamic banks, SMEs.
JEL Code: E44; E51; E52; G21.

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1 Introduction

The bank lending channel posits that central banks –at least in part– can control banking sector's ability to lend by adjusting the reserve supply via open market operations. On a contractionary policy, open market operations of central banks drain reserves and hence deposits from the banking system. If banks are not able to find alternative sources of funding to compensate for this deposit withdrawal, the supply of bank loans will decrease. Although this spillover chain is well established for varying size (Kashyap and Stein, 1995; Stein and Kashyap, 2000), liquidity (Stein and Kashyap, 2000; Ashcraft, 2006) and capitalization (Kishan and Opiela, 2000) of banks; there is still lack of evidence on how this mechanism works for different bank types. Studying the monetary transmission mechanism for different bank types is relevant because it may have different impacts on bank lending. This is especially important to identify how effectively central banks can influence the level of reserves (deposits) and, as a consequence, bank lending (credits). In this study, we empirically compare the bank lending channel in a dual banking system where Islamic and conventional banks operate side by side. Since the bank lending channel incorporates the behavior of customers and creditors in a single transmission mechanism, we will be able to understand different behavioral patterns of both of these groups in different banking schemes.

Although Islamic and conventional banks fulfill similar intermediary roles, moral foundations of Islamic banking make Islamic banks and their depositors distinct from those of conventional banks. From a customer's perspective, Islamic banks contribute to financial inclusion by attracting religiously motivated customers into the system (e.g. Kumru and Sarntisart, 2016). Islamic banks may represent a morally appealing alternative for those customers whose financial preferences are driven by religious beliefs. Religiosity also appears to be a major determinant for consumer choice behavior (Essoo and Dibb, 2004), irrespective of the religion the individual is attached to (see e.g. Wilkes et al., 1986). For instance, Miller and Hoffmann (1995) report a negative correlation between religiosity and attitudes towards risk at individual level. Similarly, Hilary and Hui (2009) find that firms located in US counties with high levels of religiosity tend to exhibit lower risk exposure as measured by the variances in returns on assets or equity. In a similar vein, as argued by Abedifar et al. (2013), Islamic bank depositors are more sensitive to bank performance and macroeconomic

shocks and demonstrate greater withdrawal risk than their conventional counterparts.

From the bank's perspective too, whether or not having a religious affiliation might have an influence on the willingness to supply credit. Since Islamic banks employ several unique financial models and contracts, the customer portfolios of Islamic and conventional banks may substantially vary. Further, recent research suggests that conventional banks put more weight on collateral in their credit allocation decisions (e.g. Shaban et al., 2014; Aysan et al., 2016b). Because of their opaque nature, especially the small and medium–sized enterprises (SMEs) segment of the market seems to face credit constraints from this practice (Carpenter and Petersen, 2002). Islamic banks, on the other hand, may be more attractive to SMEs since they substantially relieve collateral requirements by making use of *murabaha* contracts. Moreover, in a dual banking system, conventional banks are generally more established houses and have solid relations with larger firms who have "hard" information. Islamic banks, which still hold marginal shares in the banking systems, may fulfill SMEs' credit demand by relying on "soft" information. Despite their strong growth, Islamic banks still do not hold a significant place in the banking industry, which forces them to target the untapped SME market. Recent empirical results using data from Indonesia (Shaban et al., 2014) and Turkey (Aysan et al., 2016b) show that Islamic banks' willingness to finance SMEs is significantly higher than that of conventional banks. However, given the growing body of evidence that small businesses are more exposed to economic and policy shocks (see e.g. Berger and Udell, 2002; OECD, 2012; ECB, 2016), it can be argued that Islamic bank lending is more sensitive to monetary and economic shocks.

Especially since the outbreak of the global financial crisis, Islamic banking has emerged as a viable complementary scheme in the global banking system. Parallel to the rising visibility of Islamic banking sector, growing academic attention has resulted in a wide range of research foci. A number of studies have focused on the efficiency differences between Islamic and conventional banks (e.g. Samad, 1999; Abdul-Majid et al., 2010; Srairi, 2010), while others have documented operational differences between them (e.g. Iqbal, 2001; Beck et al., 2013; Elnahass et al., 2013; Daher et al., 2015; Ibrahim, 2016). Another stream of research has explored the resilience of Islamic banks with the outbreak of the 2008 global financial crisis (Cihàk and Hesse, 2010; Hasan and Dridi, 2011; Abedifar et al., 2013; Rajhi and Hassairi, 2013). Closer to this study, there is a growing literature

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that examines the impact of monetary policy and several transmission channels in a dual banking environment. Among these studies, for instance, Sukmana and Kassim (2010) and Zulkhibri and Sukmana (2016) examine, respectively, the behavior of Malaysian and Indonesian Islamic banks in the monetary transmission process. Both of these studies conclude that Islamic financial institutions play a significant role in the monetary transmission. Zaheer et al. (2013) study the differences of banks' responses to monetary shocks across bank size, liquidity and bank type in Pakistan. They find that Islamic banks' reaction to monetary shocks is relatively limited, and conclude that the bank lending channel may weaken when Islamic banking grows in relative importance. In line with the above–mentioned literature, this paper first separately examines the presence of the bank lending channel for the transmission of monetary policy through Islamic and conventional banks in Turkey. We then provide an in–depth discussion of the observed differences, and explore the potential reasons for this discrepancy by conducting additional exercises and robustness checks.

This study contributes to the strand of literature that investigates the behavioral differences between Islamic and conventional finance (Abdelsalam et al., 2014; BinMahfouz and Hassan, 2012). While the influence of monetary shocks is frequently discussed for conventional banks, research in examining the role of Islamic banks in the monetary transmission process is still very limited. We focus on the change in depositing and lending behavior at Islamic and conventional banks as a response to monetary shocks. In doing so, this paper contributes to the literature in a number ways. First, Turkey presents a fertile testing ground since Islamic banks operate side by side with conventional banks for over thirty years. Subsequent government initiatives have gradually allowed Islamic banking to expand their business activities. Especially the reforms and regulations in the last decade have effectively removed some discriminatory regulations against Islamic banks. The dual structure of the Turkish banking allows us to conduct a comparative analysis on the impact of monetary policy shocks between Islamic and conventional banks, both of which are now subject to the same regulation and supervision. Hence, the lack of different regulatory treatment leads us to attribute any different response to operational and behavioral differences between these two banking modes. Second, by making use of a complementary dataset, we point to the role of SME lending as one of the major reasons behind the different responses to monetary shocks. SMEs are recognized as the engines of economic growth and key contributors to employment, but face

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significant barriers to access to external finance. By introducing the SME segment of the credit market into our analyses, we are able to reveal whether the different effects of monetary policy on lending between Islamic and conventional banks are driven by these banks' differences in SME financing behavior. As a final contribution, we examine depositors' and creditors' responses to policy rate changes using a panel vector autoregression (panel–VAR) framework, which controls for the rarely addressed bank–level heterogeneity in bank lending channel studies.

Our results support the existence of the bank lending channel in Turkey. In response to a policy rate increase, banks are confronted with deposit withdrawals since customers seek alternative investment opportunities with higher returns. This decline in deposits, in turn, decreases the volume of bank lending. We, however, observe that responses of deposits and credits to monetary shocks are larger for Islamic banks. Impulse responses for conventional and Islamic banks reveal that Islamic bank depositors' sensitivity to policy rate changes is substantially larger than their conventional counterparts. As a response to one standard deviation policy rate increase, deposit withdrawals at Islamic banks exceeds 5% at the end of six quarters, whereas this is only around 2% for conventional banks. We find similar results vis–á–vis lending activities, indicating that the demand for credits is more affected in Islamic banks following an policy rate change. We discuss the potential reasons how and why deposits and credits in Islamic banks respond more pronouncedly to policy rate changes.

The rest of this paper proceeds as follows. Section 2 reviews the previous literature and presents the motivation. Section 3 briefly introduces the dual–banking system in Turkey. Section 4 introduces the data and methodology. Section 5 discusses the main findings and presents some robustness checks. Finally, Section 6 concludes.

2 Brief Literature Survey and Motivation

This study examines the presence of the bank lending channel by verifying the responses of bank loans and deposits to changes in monetary policy stance. In their seminal work, Bernanke and Blinder (1992) argue that reserves in the banking system drains steadily following an increase in the policy rate. In a chain reaction, a deposit shock triggered by a monetary policy change

impacts bank lending. Since it will be costly and timely to complement the withdrawn deposits through other sources, banks accordingly tune their lending.

How this transmission mechanism works for Islamic banks is not clear. The transmission can be ineffective among Islamic banks since Islamic banking operations ideally should not be linked to interest rates. An *a priori* proposition would suggest that Islamic banks and their depositors are insensitive to policy rate changes since the main pillar of Islamic banking is the prohibition of *riba* (interest). Islamic banks operate like equity–based companies where depositors are treated as quasi–shareholders (Khan and Mirakhor, 1989; Aysan et al., 2016a). In this business model, banks share their earnings with their depositors according to a pre–agreed rate of return. The ideal mode of Islamic financing which is based on profit–and–loss sharing (PLS) may hint that conventional monetary policy tools should not be operational on Islamic banks.

Although Islamic banking strictly prohibits interest, the monetary transmission mechanism may still be operational in these banks based on several grounds. First, contrary to the propositions of the PLS paradigm, it is known that the current Islamic banking practice primarily relies on the non–PLS model (Khan, 2010). Indeed, empirical evidence suggests that Islamic deposit rates are closely pegged to conventional deposit rates (Dar and Presley, 1999; Chong and Liu, 2009; Cevik and Charap, 2015). Alam and Parinduri (2017) explore the possible reasons why Islamic banks mostly prefer non–PLS instruments as opposed to the wisdom in Islamic finance that suggests risk sharing. By hypothesizing that one of the reasons is the poor contracting environment, the authors investigate whether Islamic banks shift to PLS instruments with increasing quality of contracting environment. The findings of their study indicate that Islamic banks' tendency of non–PLS instruments is not driven by the quality of contracting environment. As Alam and Parinduri (2017) conclude, the policies for enhancing contracting environment are unlikely to change Islamic banks' asset preferences. Hence, because of the prevalence of non–PLS products and inefficacy of policies to encourage PLS products, it is possible that depositors and creditors in Islamic banks may also respond to policy rate changes. Second, the argument that Islamic bank depositors are expected not to leave their banks as a response to policy rate changes is hard to defend.[1] Islamic

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[1] Demiralp and Demiralp (2015) argue that period of adjustment following a monetary policy action in Islamic banking constitutes a conundrum between religious convictions and optimal return judgments for Islamic bank depositors.

bank depositors may reconsider their investment at their banks as policy rate changes potentially make alternative *Shariah*–compliant investment opportunities more attractive, e.g. real estate investments. Therefore, it is hard to decisively argue that Islamic banks are not responsive to monetary policy. Third, Islamic banks may not be as successful as conventional banks to restore the level of deposits after a positive policy rate shock. Conventional banks are better positioned to adjust their deposit interest rates quickly to attract displaced deposits, while Islamic banks react more sluggishly. This adjustment delay may hinder these banks to collect efficiently the withdrawn deposits. While some pious individuals will keep their money in Islamic banks no matter what the policy rate is, the others may "arbitrage".[2] Fourth, Islamic banks have reduced access to (*Shariah*–compliant) non–deposit funding sources which amplify the lending channel through these banks. When deposits are reduced as a response to monetary shocks, Islamic banks often have limited capacity to compensate these withdrawn deposits. Finally, the favorable attitude of Islamic banks towards largely bank–dependent companies (or SMEs) may be another reason for why the bank lending channel may be amplified through these banks. Monetary and macroeconomic shocks impact SMEs more severely than larger firms in their demand for credits.

The impact of monetary policy in a dual banking system has been examined in a number of studies. Ito (2013), for example, examines the Malaysian banking sector and finds that Islamic deposit returns and conventional interest rates co–move in Malaysia. The author interprets this finding as the existence of significant commons in Islamic and conventional banks. Likewise, Ergec and Arslan (2013) examine Turkish banking system and find that the impact of monetary shocks on Islamic and conventional deposits are similar. Likewise, El Hamiani Khatat (2016) discusses key issues for conducting monetary policies in countries where Islamic banks and conventional banks coexist. Having underlined similarities and differences, there is almost a consensus among researchers that Islamic banking should be taken as an autonomous process in conducting monetary policy. Sukmana and Kassim (2010) imply the necessity of a dual monetary policy formulation, as their findings raise the importance of Islamic banks in the monetary transmission in dual banking systems. The dual policy formulation is also underlined by Haron and Nursofiza Wan Azmi (2008) who investigate the impact of selected economic variables on deposits in the Malaysian dual banking

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[2]We thank the anonymous referee for suggesting us this explanation for a possible reason.

system. The authors find that deposits respond differently at Islamic and conventional banks and discuss the role of religious beliefs in depositors' banking decisions.

Despite some evidence on the relation between monetary policy and several return rates in Islamic banking, hitherto analysis did not explore the underlying reasons for why the bank lending channel works differently in these two different banking schemes. In this paper, we seek to better understand the role of operational differences in the explanation of different monetary transmissions between Islamic and conventional banks.

3 A Brief History of Dual Banking in Turkey

Turkey's banking history is closely in resemblance with other emerging economies. The absence of adequate resources and the need for rapid industrialization instigated policymakers to use the banking system as a pool of financing for development. The government control over the banking system, where only conventional banks were operating, was substantial till the 1980s. Along with stiff entry barriers, interest rate controls, and directed credit programs, the competition and efficiency in the Turkish banking system were hampered to such degree that, by the 1980s, heavy government involvement had relaxed significantly (Denizer, 1997).

Beginning from June 1980, more deregulatory and liberal measures were adopted in the Turkish banking system. The initial outcome of these measures was relatively positive during this period. It is reported that efficiency gains were remarkable after the implementation of various deregulatory measures (Isik and Hassan, 2002; Zaim, 1995). It is also claimed that the integration process of the Turkish banking system to global finance brought about enhanced financial technology and better–equipped human capital (Denizer, 1997). The deregulatory measures allowed cross–border fund flows that the country was in need of, and specifically lifted entry barriers to the banking system. Related with the scope of this study, the adoption of deregulatory measures have attracted a significant number of banks into the system, including Islamic banks. While the early motivation for the establishment of Islamic banks in Turkey was to attract foreign capital to the country, stimulated partly by the growing awareness of the Muslim population, Islamic banking have increasingly formulated itself as an alternative to the conventional banking model.

Turkey's Islamic finance debuted in 1985 with the Bahrain–based Al–Baraka Turk Finance House (*Albaraka Türk Finans Kurumu* in Turkish) and Saudi–based Faisal Finance House (*Faisal Finans Kurumu* in Turkish). Kuveyt Turk followed these ones and joined the system in 1989. In the 1990s, Anadolu Finance House, Ihlas Finance House, and Asya Finance House (*Anadolu Finans Kurumu, İhlas Finans Kurumu,* and *Asya Finans Kurumu* in Turkish, respectively) entered the market with 100 percent domestic capital. As the name "Finance House" suggests, these institutions did not enjoy the same status as conventional banks. Until late 2005, these banks remained subject to discriminatory regulations which introduced certain rights to conventional banks but not to the finance houses. For instance, Aysan et al. (2013) convey that Islamic banks were not fully covered by a deposit guarantee scheme, although a comprehensive scheme was used to cover conventional deposits.

In line with the interest globally towards Islamic banking, Turkey has introduced several favorable regulatory changes to Islamic banks. The legislative changes in late 2005 have eliminated the deprivations and provided a more constructive environment for Islamic banks. Islamic banks eventually gained a legal "bank" status that led to equal regulatory treatment. Finally, signalling the governments' favorable attitude, since 2015, two more banks, Ziraat and Vakif Participation banks (*Ziraat Katılım Bankası* and *Vakıf Katılım Bankası* in Turkish, respectively) have been authorized to operate as the first state–owned Islamic banks.

Newly established state–owned Islamic banks may be encouraging for the future of the Islamic banking in the country, however the capacity of Islamic banks to use various financing sources is still limited. The single formulation of monetary policy and binding constraints in Islamic banking originating from Islamic principles lead to certain challenges for these banks. While documenting the deficiencies in the Turkish Islamic banking, Okumuş (2016) notes the lack of a time deposit scheme having less than thirty days maturity. The author informs that especially those corporate clients needing their money in less than thirty days accounts for their liquidity management are left out with no viable option. As Okumuş (2016) argues, the options they have in hand are mostly interest–bearing. They either go to a conventional bank for an overnight or some other shorter maturity date repurchase (repo) agreement, or for a time deposit account maturing in a chosen time period, or for a liquid/short–term bond and bills; or they put the money in checking accounts

of a participation bank with no return. Having pointed out that recent regulations treat Islamic banks equally with conventional banks, regulatory arrangements and monetary policy formulation toward banks in the Turkish dual banking system is also uni–shaped. Reserve requirements that were introduced as an active tool in addition to the traditional policy instrument of the one–week repo auctions rate, for instance, do not discriminate Islamic banks in anyway. However, the issuance of *sukuk*, an Islamic fixed income instrument, introduced certain flexibility for the government and corporations to raise funds. The growing *sukuk* market also allows Islamic banks to access short–term liquidity funding, as the Central Bank of Turkey (*Türkiye Cumhuriyet Merkez Bankası* in Turkish) began accepting *sukuk*s as an eligible collateral in open market operations.

4   Data and Methodology

We compare Islamic and conventional banks in their responses to monetary shocks. To do this, we use an unbalanced panel data set from the Central Bank of Turkey for the period of 2004Q3–2012Q4. The unbalanced panel comprises 35 conventional banks and four Islamic banks. Balance sheet and income statement information for conventional banks are derived from the Banks Association of Turkey, and those of Islamic banks are from the Participation Banks Association of Turkey.

[INSERT TABLE 1 ABOUT HERE]

We estimate a panel–VAR model with quarterly data for Turkey. We then obtain impulse response functions (IRFs) to measure the response of deposits and credits to monetary shocks in conventional and Islamic banks.[3] In the panel–VAR methodology, the key assumption is that the variables that enter the system earlier affect the following variables contemporaneously and with a lag, while the variables that come later affect the previous variables only with a lag (Love and Zicchino, 2006). This implies that the variables that enter earlier are more exogenous and the later ones are more endogenous. We use the following variables in the listed Choleski ordering: policy rate (ir), US Dollar/Turkish lira exchange rate (fx), consumer price index (cpi), total deposits ($deposits$), and total credits ($credits$).

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[3]Islamic banks in Turkey are named as Participation Banks.

Table 1 presents the summary statistics for the variables used in our analysis. The main variables in the table are credits and deposits which are presented for the whole sample and for conventional and Islamic banks separately. We log–transform credits and deposits data (*credits* and *deposits*), and use the others on their levels.[4] We use overnight money market rate of the Central Bank of Turkey as the policy rate, (*ir*). We compute the average overnight rates per quarter during the sample period to proxy for policy rates. The quarterly average of US Dollar/Turkish lira exchange rate is used as the foreign exchange variable (*fx*).

The deposits data in our analysis comprises those deposits which are covered by the deposit insurance scheme. Next to the fact that insured deposits constitute the bulk of total deposits, insured deposit holders may display different behavior than uninsured deposit holders with respect to monetary shocks (Demirguc-Kunt and Kane, 2002; Karas et al., 2013). Andries and Billon (2010), for instance, theoretically show that deposits under insurance exhibit a more stable pattern in response to a monetary shock. In case of increasing bank risk and corresponding monetary policy interventions, for instance, uninsured deposit holders' response to monetary shocks is augmented with the risk of bank failure. Deposit insurance therefore eliminates these possibilities and enables us to concentrate on the relationship among monetary policy, credit provision and deposits.

We use the panel–VAR methodology which extends the traditional VAR approach to a panel setting 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:

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

In this specification the variables ir, fx, cpi, *deposits* and *credits* are the components of a vector Z in the VAR system for bank i and time t. Since the time dimension of our panel is small, we estimate a one–lag panel–VAR to investigate the depositors' and creditors' responses to policy rate changes. In all estimations, we control for bank level heterogeneity by incorporating f_i as proposed by Holtz-Eakin et al. (1988). We exploit "Helmert procedure" that uses forward

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[4]See Demiralp and Demiralp (2015) and Love and Turk Ariss (2014) for similar variable transformations in their VAR framework.

mean–differencing. In this procedure, the fixed effects (f_i) are eliminated by the transformation in deviations from forward means.

Let $\bar{z}_{im}^k = \frac{\sum_{s=m+1}^{T_i} z_{is}^k}{T_i - m}$ denotes the means obtained from the future values of a variable z_i^k, a variable in the p–variable vector $Z_i = (z_i^1, z_i^2, ..., z_i^k, ..., z_i^p)'$, at $t = m$. T_i denotes the last period of data available for a given bank series. Let $\bar{\varepsilon}_{im}^k$ denotes the same transformation for ε_{im}^k, where $\varepsilon_i = (\varepsilon_i^1, \varepsilon_i^2, ..., \varepsilon_i^k, ..., \varepsilon_i^p)'$. Hence we get following variables after Helmert transformation, $\tilde{z}_{im}^k = \delta_{it}(z_{im}^k - \bar{z}_{im}^k)$ and $\tilde{\varepsilon}_{im}^k = \delta_{it}(\varepsilon_{im}^k - \bar{\varepsilon}_{im}^k)$ where $\delta_{it} = \sqrt{\frac{T_i - m}{T_i - m + 1}}$. The final transformed model is thus given by:

$$\tilde{Z}_{i,t} = \Gamma_0 + f_i + \Gamma_1 \tilde{Z}_{i,t-1} + \Gamma_2 \tilde{Z}_{i,t-2} + ... + \Gamma_s \tilde{Z}_{i,t-s} + \tilde{\varepsilon}_{i,t}. \tag{2}$$

This transformation satisfies the orthogonality assumption between transformed variables and lagged regressors. Therefore, we can use lagged dependent variables as instruments and estimate the coefficients by system GMM (Love and Zicchino, 2006).

To analyse the potential effects of monetary shocks (ir) on deposits and credits ($deposits$ and $credits$), we generate impulse response functions for each variable to show how each variable responds to individual shocks of other variables in the system. In this approach, the response of a variable to the shock of transmitted from another variable is estimated where shocks to other variables in the system are held constant. To do so, it is necessary to decompose the residuals so that they are orthogonal which can be accomplished by ordering the variables, namely Choleski ordering (Hamilton, 1994).

5 Results

5.1 Empirical Findings

We initially conduct a unit–root test on all the variables used in the analysis to address concerns about the presence of unit roots. We use Fisher's test statistics for panel unit root (see Maddala and Wu, 1999), since this test does not require a balanced panel unlike the Im–Paseran–Shin

test proposed by Im et al. (2003). Table 2 presents the results of the Fisher Augmented Dickey–Fuller and Fisher Phillips–Perron unit root tests, where the null hypothesis is that all series are non–stationary and the alternative hypothesis is that at least one of the series in the panel is stationary. Since panel–VAR employs Helmert–transformed variables, we present the results for the original variables and their Helmert transformations. Panel unit root test results suggest that both Fisher Augmented Dickey–Fuller and Fisher Phillips–Perron reject the presence of unit roots at conventional significance levels. We therefore consider all variables as stationary based on the test results and use Helmert–transformed variables in the panel–VARs.

[INSERT TABLE 2 ABOUT HERE]

[INSERT FIGURE 1 ABOUT HERE]

[INSERT FIGURE 2 ABOUT HERE]

Before discussing the Panel–VAR results, we draw scatter plots of deposits and credits on the policy rate for both Islamic and conventional banks. Figure 1 and 2 fit a simple regression line to have an idea whether the expected outcome of monetary shocks is observable on raw credits and deposits data. These two figures demonstrate that, regardless of the bank type, deposits and credits are negatively associated with policy rates. The slopes of figures pertaining to Islamic banks are, however, steeper, mimicking the larger response of Islamic banks' customers to monetary shocks.

[INSERT FIGURE 3 ABOUT HERE]

[INSERT FIGURE 4 ABOUT HERE]

Since the IRFs are constructed from the estimated coefficients in panel–VAR models, the standard errors of estimated coefficients need to be calculated. Monte Carlo simulations are used for generating confidence intervals for the IRFs. This is conducted by taking random draws of the models' coefficients, using the estimated coefficients and their variance-covariance matrix. We take 500 draws. The 5th and 95th percentiles of the results are used to interpret on the confidence intervals of the impulse responses. If the confidence intervals do not span the zero line, we interpret the results are significant, i.e. rejecting the hypothesis that impulse responses are zero.

We report how credits and deposits respond to monetary, foreign exchange and inflation shocks.[5]

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[5]All impulse response functions are provided in Figure 11 and 12 in the Appendix. We discuss main findings derived from the responses of credits and deposits to the shocks in economic and monetary variables.

We first display the conventional and Islamic bank deposit responses to monetary shocks in Figure 3. The results suggest that depositors in both Islamic and conventional banks respond negatively to monetary shocks. When we are interested in the degree of sensitivity, we observe that Islamic bank depositors respond more strongly to monetary shocks. Deposits' response to a shock in policy rates is larger than in conventional banks: a one standard deviation policy rate shock is associated with a 5% withdrawal after two quarters in Islamic banks, whereas in conventional banks the withdrawal could only reach to 2% at the end of four quarters. Higher sensitivity of Islamic bank depositors can be explained by the prohibition of interest in Islamic banks. Monetary changes create a period of adjustment in Islamic bank rates as Islamic banks distribute ex–post returns, whereas conventional banks can more abruptly accommodate policy rate changes. Demiralp and Demiralp (2015) argue that this adjustment process is a good laboratory setting to explore whether Islamic bank depositors are loyal to their banks. As our results suggest, during the time of adjustment Islamic bank depositors may withdraw their deposits once the returns offered by alternative investments are higher at the new monetary condition.

Figure 4 demonstrates the credits' response to monetary shocks. Similar to the responses in deposits, Islamic banks' response in credits to monetary shocks is again larger than the one observed in conventional banks. While the negative response to a positive policy rate shock exceeds 5% after three quarters in Islamic banks, conventional bank credits do not respond significantly to policy shocks. Our findings thus support the view that the existence of a lending channel is particularly relevant for Islamic banks.

We explain above findings both from supply and demand side of lending. Regarding the supply side of lending, all these results suggest that Islamic banks were worse in complementing deposit withdrawals with alternative sources of funds. These findings are related to those of Carpenter and Demiralp (2009) and Demiralp (2008) who argue that banks in emerging countries may not be capable of finding alternative sources to replace deposits as the banks of advanced countries which can find funding sources via alternative borrowing instruments, like bond issuances. As Islamic banks are small and have limited access to funding, lending in these banks are more responsive to monetary shocks (Kishan and Opiela, 2000).

In view of the demand side of lending, the results show that the bank lending channel of

monetary transmission is more effective on SMEs. SMEs are more vulnerable to monetary shocks due to the shortage of available funds at a bearable cost. This is in line with the findings of Ali et al. (2012) and Hubbard et al. (2002) who find that SMEs disproportionately share the burden of a monetary shock. Although a strong relationship with a bank may save SMEs from monetary shocks to some extent (Zaheer et al., 2013), long–lived monetary shocks hit SMEs more severe than large businesses. Moreover, larger firms are less affected by the higher cost of policy rate changes through recourse of alternative funding sources. This is especially true when the firms' expected future profits from the projects for which they are applying credit are well above the burden of monetary shocks. Our findings thus support the view that the existence of the bank lending channel is particularly relevant for SMEs as they are more vulnerable to monetary shocks (Kishan and Opiela, 2000).

<div align="center">[INSERT FIGURE 5 ABOUT HERE]</div>

<div align="center">[INSERT FIGURE 6 ABOUT HERE]</div>

Although our main research focus is the examination of the impact of monetary shocks on deposits and credits, the panel–VAR framework we build also combines the interrelations between macroeconomic variables and bank–level variables. We hereafter explore how various macroeconomic shocks affect bank–level variables. It is worth noting before discussing the IRFs of bank–variables to macroeconomic shocks that the IRFs pertaining to Islamic banks are larger and most of them are close to significance at 95% level, while the IRFs of conventional banks are smaller in magnitude and often insignificant, which confirms more responsiveness of Islamic banks.

Figures 5 and 6 plot the responses of credits and deposits in Islamic and conventional banks to inflation shocks. Both credits and deposits in Islamic banks respond negatively to inflation shocks. Credits and deposits in conventional banks also respond similarly, but the response of deposits at the initial quarters is positive and then turns out to be negative afterwards. The responses are larger and significant in Islamic banks similar to those responses to monetary shocks. The findings suggest that depositors demand higher interest against higher inflation and thus shrinking net return. Once their higher return demand is not met by the banks, depositors consider switching to other banks or withdrawing their deposit to invest in other investments or keep it in cash. Since Islamic banks can not alter their rates paid on deposits swiftly to offset net return losses, Islamic bank depositors

<div align="center">15</div>

become more disadvantageous relative to conventional bank depositors. The credits response to inflation is explicable from changing supply and demand conditions of lending at different inflation regimes. Due to uncertainty created by positive inflation shocks, credit supply and demand face with significant deterioration (Basci, 2006; Brooks, 2007). Banks' preference to credits is reduced by higher returns offered by other assets, e.g. government bonds. Moreover, SMEs' demand for credit shrinks due to higher capital expenditure and increased cost of production for goods. Larger businesses are generally better positioned to bear the brunt of inflation, as the burden can be offset by savings generated by economies of scale. SMEs, however, often take a direct hit on margin from inflation shocks. The end result is the more reduction of credit demand in Islamic banks.

[INSERT FIGURE 7 ABOUT HERE]

[INSERT FIGURE 8 ABOUT HERE]

The responses to foreign exchange shocks is depicted in Figures 7 and 8. These figures, in line with previous IRFs, suggest a negative relationship between foreign exchange rate and deposits and credits. This is especially important since the appreciation of the foreign currency leads to decline in deposits and credits. Levy-Yeyati et al. (2010) examine the role of various macroeconomic factors on depositor behavior. The authors find that macroeconomic factors are important drivers of depositor behavior in times of upheavals, sometimes even dominating the role of bank–specific characteristics. During times of macroeconomic and monetary changes, bank portfolios may be severely hit by the shocks (Brooks, 2007; Levy-Yeyati et al., 2010). The depositor discipline literature suggests that depositors punish or reward their banks based on their performance at these times (see e.g. Martínez-Pería and Schmukler, 2001). Islamic banks are in general more liquid and better capitalized to absorb these shocks however less capable to shield their loan portfolios from monetary shocks. These banks are often constrained by limited sources of funds while conventional banks can use larger pools of financing. This incapability is also related to the size of these banks, as argued by Kashyap and Stein (1995) and Stein and Kashyap (2000), since small banks may find it relatively more difficult to raise external funds in times of monetary tightening. The funding constraints may thus hit Islamic banks more severely than conventional banks. The greater response of Islamic bank depositors to foreign exchange shocks may also be due to limited investment opportunities at Islamic banks, while these can be mitigated by various conventional instruments that

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introduce hedging against currency risks. Hence, a possible explanation for the larger decline in Islamic bank deposits may be that depositors divert their deposits to foreign currency denominated investments for hedging purposes as a response to the appreciation of foreign currencies (Blejer et al., 2002).

Regarding the credits' response, the rise in the foreign exchange rates, i.e., the appreciation of the US dollar against domestic currency, is having a debilitating effect on SMEs. It could be argued that export oriented SMEs enjoy the rise in foreign exchange rate, however SMEs face with surging costs of energy in an oil dependent country and rising prices in intermediate goods. Additionally, it is a common trend in emerging market countries that SMEs borrow in cheaper foreign currency, although their cash inflows are mainly in domestic currency. When it is considered that hedging practices against foreign currency risk is still at low levels in emerging economies, credit demands are more often rejected due to heightened risks of the firms. This issue was underlined by Basci (2006) who states that cheaper external borrowing coupled with the appreciation of domestic currency spurred borrowing abroad in Turkey. The author however notes that customers often did not hedge against currency risk, the end results of which is translated into sizeable credit risk for the banking sector.

5.2 Robustness Checks

5.2.1 Alternative Estimations with Restricted Samples

We present two robustness tests with alternative estimations to check the validity of our results. Bernanke and Blinder (1992) propose that monetary policy is transmitted through several stages. There is a spill–over from exchange rate to the inflation rate and that affects the general economy. This assumption is valid for Turkey since foreign exchange fluctuations affect inflation with some delay through the foreign trade channel. As an import–dependent economy with sizeable current account deficits, the level of inflation in the country is closely dependent on foreign exchange rate. However, due to complex interactions between the variables, we check the sensitivity of our results with alternative orderings as the first robustness check (see e.g. Grossmann et al., 2014; Lof and Malinen, 2014; Kim and Lee, 2008, for similar sensitivity analysis). We try several other orderings

and re–estimate the panel–VAR. The main results remain unchanged. As we run various orderings, the results are not reported here to save space but are available upon request from the authors.

During the inspection of the bank observations, it is noticeable that the heterogeneity in the conventional bank sample is significant. For instance, several conventional banks operate for over a century and have an extensive branch coverage. On the other hand, some of the conventional banks operate around thirty years and their branch coverage is still expanding. The characteristics of banks, e.g. size, age, branch coverage, can directly have an impact on the behavior of bank deposits and credits. Although we consider cross sectional heterogeneity by employing the panel–VAR framework, we study a more restricted but matched sample of conventional banks as the second robustness check. As a benchmark, we focus on the average asset size of the banks during the sample period. We arbitrarily select those banks whose average asset size is larger than 10 billion Turkish Lira and obtain a restricted bank sample that are more comparable with Islamic banks in terms of their asset size. In doing so, the number of conventional banks is reduced to fifteen banks.

The estimation results and impulse responses do not change by restricting the sample. In the restricted sample, we obtain significant responses for credits which have been insignificant in the whole sample.[6] The composition of credit portfolio in Islamic banks is the main reason why credits respond significantly and largely to monetary and macroeconomic shocks in Islamic banks. Since small banks are more specialized in SME lending (Hubbard et al., 2002; Shaban et al., 2014), credits' responses in the restricted sample turn out to be significant.

5.2.2 The Impact of Portfolio Composition

Our final robustness test is about our explanation on the larger responses of credits to monetary and macroeconomic shocks in Islamic banks. While discussing the larger responses of credits in Islamic banks to monetary and corresponding macroeconomic shocks, we emphasized the compositional differences in credit portfolios between Islamic and conventional banks. Our main argument was that Islamic banks are more inclined to finance SMEs which are more vulnerable to monetary and macroeconomic shocks. To test the validity of this argument, we solely employ SME credits

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[6]See Figure 13 in the Appendix.

of both conventional and Islamic banks. By restricting the credits sample to only SME credits, we are able to check the robustness of our argument whether or not the composition of credit portfolio is an important factor in the relationship between monetary policy and credits.

We take the SME definition of Turkish Statistical Institute as a baseline to identify SME credits. According to the Turkish Statistical Institute (*Türkiye İstatistik Kurumu* in Turkish), micro–sized enterprises are those having less than 10 employees or annual sales of less than 1 million Turkish Liras, whereas small enterprises are the businesses having 10–49 employees or annual sales of 1–5 million Turkish Liras. Finally, medium–sized enterprises have 50–249 employees or annual sales of 5–25 million Turkish Liras. The credits in a bank portfolio is named as SME credits if they are extended to any of these enterprises. To check how SME credits in conventional banks and Islamic banks respond to policy rate changes, we estimate a bivariate VAR model which incorporates SME credits instead of total credits.

[INSERT FIGURE 9 ABOUT HERE]

[INSERT FIGURE 10 ABOUT HERE]

As an initial exercise for the final robustness check, we do not only estimate the bivariate model for Islamic banks, but also for different conventional bank ownership forms. Figure 9 presents the responses of SME credits to policy rate changes in private banks, foreign banks, state banks and Islamic banks. This classification enables us to explore any differences in the responses once it is considered that SME credit responses in different bank ownerships, i.e. foreign banks and state–owned banks, can be totally different. The evidence supports the claim that foreign banks are expected to shy away from SME lending (De Haas et al., 2010; Detragiache et al., 2008; Clarke et al., 2006; Beck and Demirguc-Kunt, 2006), on the other hand state–owned banks can be used as a special vehicle to support development and alleviate the burden of crisis on SMEs (World Bank, 2012). The bivariate VAR results show that except for foreign banks, SME credits respond significantly to policy rate changes in all bank types. The response of SME credits in Islamic banks is the largest which is in line with our previous findings. However, the response of SME credits in state–owned banks is the smallest which may suggest that these banks are mandated to support SME financing. When SMEs are hit by monetary and macroeconomic shocks, state–owned banks would be the likely ones which would be more likely to continue lending to SMEs as expanding

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access to finance is often among their top objectives (Behr et al., 2013; De Haas et al., 2010). We also estimate the same bivariate VAR model for conventional (private and state banks) and Islamic banks. Figure 10 suggests that SME credits in conventional and Islamic banks are both responsive to monetary shocks. Overall, our findings deliver a strong support for the finding that large and significant response of credits' response in Islamic banks is largely due to their tendency towards financing SMEs.

6 Concluding Remarks

There is a growing debate on the differences between Islamic and conventional banking. This paper provides new insights for why the bank lending channel works differently for Islamic banks compared to their conventional counterparts. Our main finding is that Islamic banks' credits and deposits are significantly more responsive to policy rate changes, indicating the significance of the balance sheet channel through these banks in the transmission of monetary policy.

Possible explanations for this finding are related to deposits and credits in both banking schemes. At the liabilities side, we highlight Islamic depositors' risk aversion and the inertia of rates at Islamic banks behind the stronger response of Islamic deposits. Religiosity is generally associated with higher risk aversion that might lead to larger deposit withdrawal against a positive monetary shock. Further, Islamic banks are highly dependent on deposit–funding which makes them more responsive to monetary shocks. The prohibition of interest in Islamic banking prevents them to adjust their deposit rates swiftly. Islamic banks can only change their rates through some indirect manipulations and with some delay during which depositors may withdraw their deposits. At the assets side, we emphasize that Islamic banks' tendency towards SMEs financing is one of the fundamental reasons for why credits in Islamic banks are more responsive to policy rate changes. This demonstrates that monetary transmission is more effective through Islamic banks and those small–sized conventional banks having strong relations with SMEs.

In the context of high growth expectations for the Islamic banking industry worldwide, it is crucial for regulators to understand whether Islamic banking has desirable outcomes or some unintended side effects on financial stability and real economy. We find that monetary transmission is

more effective through Islamic banks which helps policymakers to manage economy in a smoother way. Since SMEs add significantly to labour force participation in domestic economies and Islamic banks have certain advantages in SME lending, central banks' control over employment and domestic output can be facilitated through Islamic banking. However, since Islamic banks are more responsive to monetary and macroeconomic shocks–and so do SMEs, central banks should be aware that monetary contractions might have repercussions on unemployment and growth through Islamic banks.

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7   Tables and Figures

Table 1: Summary Statistics

Variable	Definition	Obs	Mean	Std. Dev.	Min	Max
Banking System						
credits	Total credits	975	14.81	2.44	6.11	18.52
deposits	Total deposits	986	13.39	2.71	6.10	17.47
Conventional Banks						
credits	Total credits	847	14.74	2.60	6.11	18.52
deposits	Total deposits	858	13.25	2.87	6.10	17.47
Islamic Banks						
credits	Total credits	128	15.27	0.71	13.70	16.54
deposits	Total deposits	128	14.38	0.55	13.05	15.33
Macroeconomic and Monetary Variables						
fx	US Dollar/Turkish lira exchange rate	986	1.49	0.19	1.17	1.86
cpi	Quarterly change in consumer price index	953	3.16	2.28	-0.58	10.76
ir	Policy rate	986	11.45	5.81	1.50	21.48

Note: The deposit and credit amounts are in thousand Turkish Liras and are log–transformed. The policy rate is the quarterly average of overnight money market rate. Consumer price index is the quarterly change in consumer price index. Foreign exchange rate is the quarterly average of US Dollar/Turkish lira exchange rate.

Table 2: Panel Unit Root Tests

Variable	Definition	Augmented Dickey–Fuller	Phillips–Perron
Conventional Banks			
credits	Total credits	147.34***	78.90**
h–credits	Helmert–transformed total credits	161.76***	115.90***
deposits	Total deposits	89.92***	161.75***
h–deposits	Helmert–transformed total deposits	84.90***	141.03***
Islamic Banks			
credits	Total credits	27.64***	14.90*
h–credits	Helmert–transformed total credits	24.94***	14.74*
deposits	Total deposits	23.37***	25.13***
h–deposits	Helmert–transformed total deposits	19.01**	14.90*
Macroeconomic and Monetary Variables			
fx	US Dollar/Turkish lira exchange rate	92.08**	96.17**
h–fx	Helmert–transformed US Dollar/Turkish lira exchange rate	277.18***	85.31*
cpi	Quarterly change in consumer price index	710.88***	941.97***
h–cpi	Helmert–transformed quarterly change in consumer price index	680.35***	965.84***
ir	Policy rate	92.08**	96.17**
h–ir	Helmert–transformed policy rate	178.95***	127.50***

Note: The deposit and credit amounts are in thousand Turkish Liras and are log–transformed. The policy rate is the quarterly average of overnight money market rate. Consumer price index is the quarterly change in consumer price index. Foreign exchange rate is the quarterly average of US Dollar/Turkish lira exchange rate. "h–" represents the Helmert–transformation that is used in the panel–VARs.
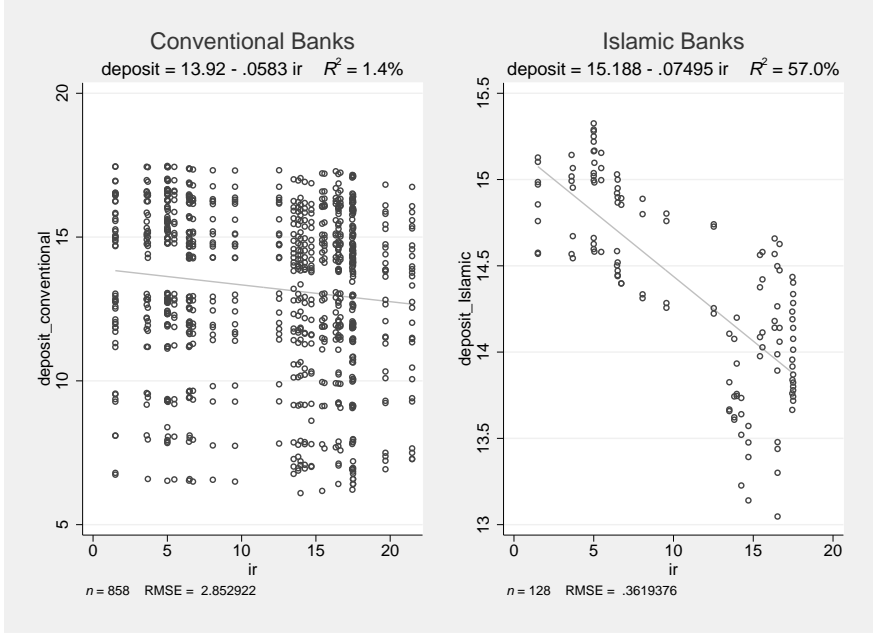
Figure 1: Relationship between Deposits and Policy Rates: Conventional versus Islamic Banks
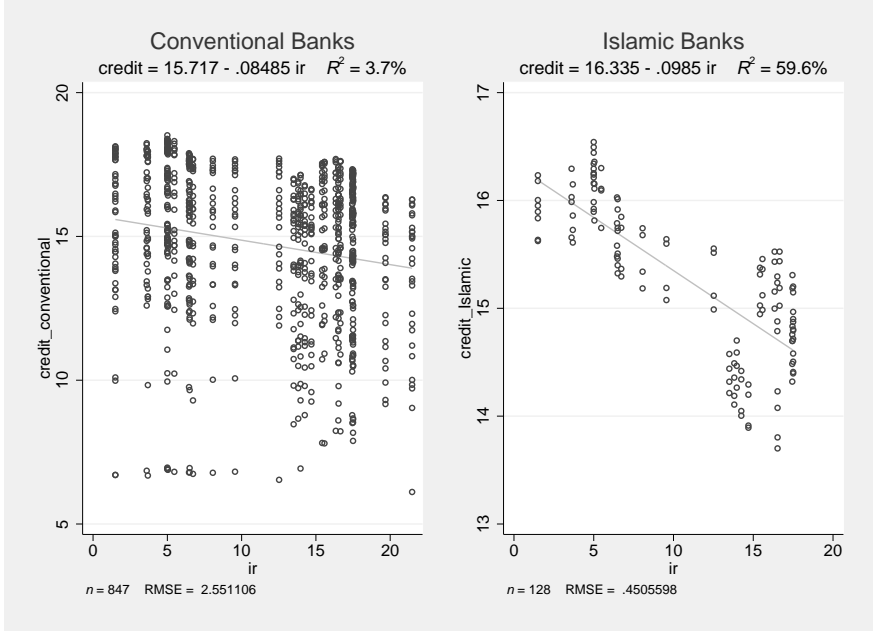

Figure 2: Relationship between Credits and Policy Rates: Conventional versus Islamic Banks
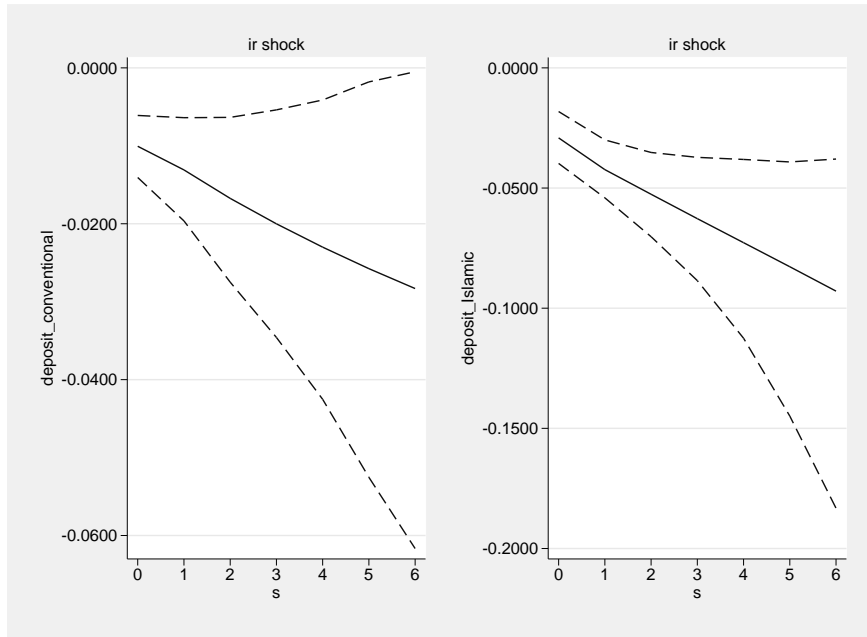
Figure 3: Impulse Responses of Deposits to Policy Rate Shocks: Conventional versus Islamic Banks
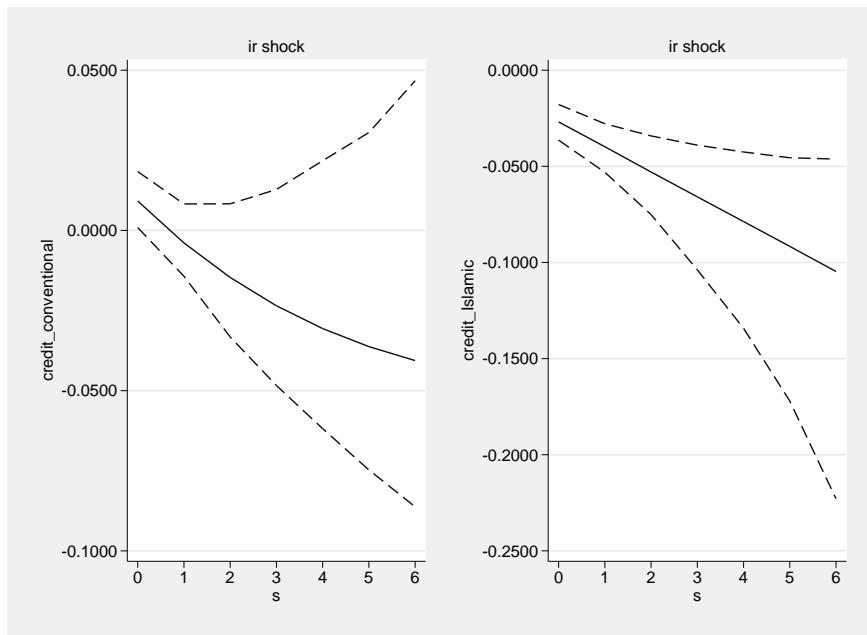

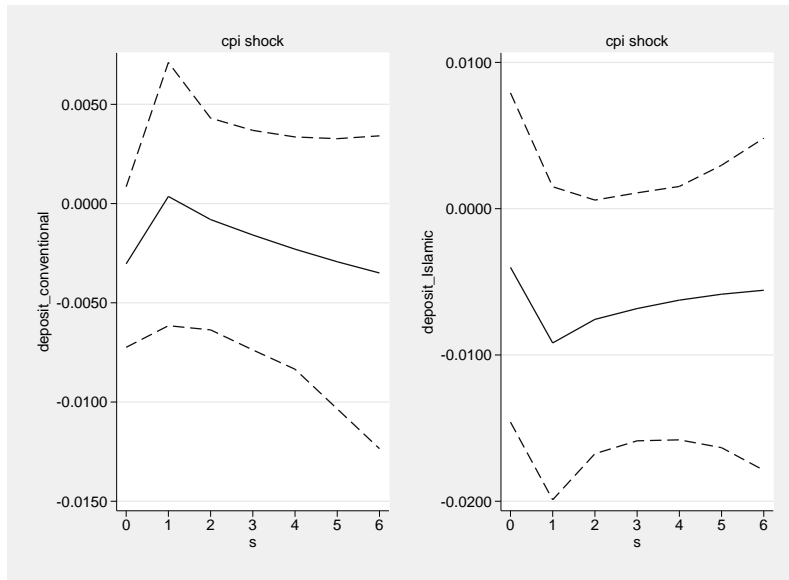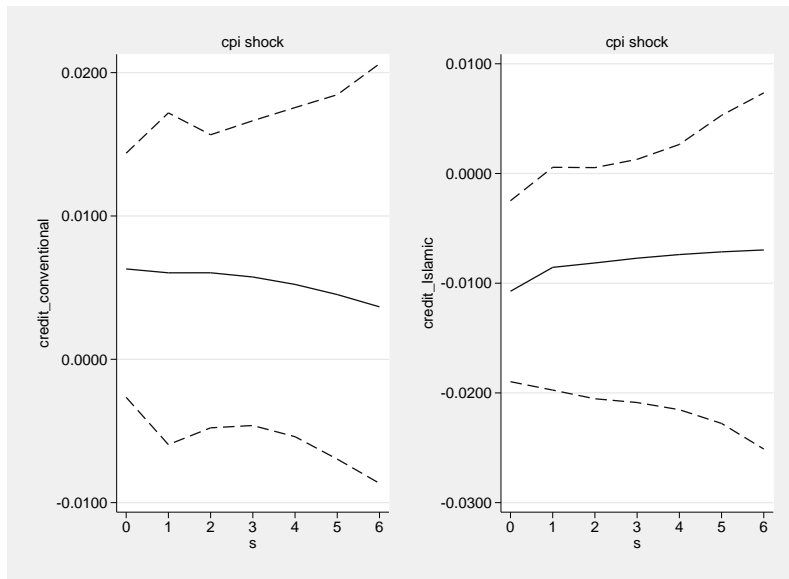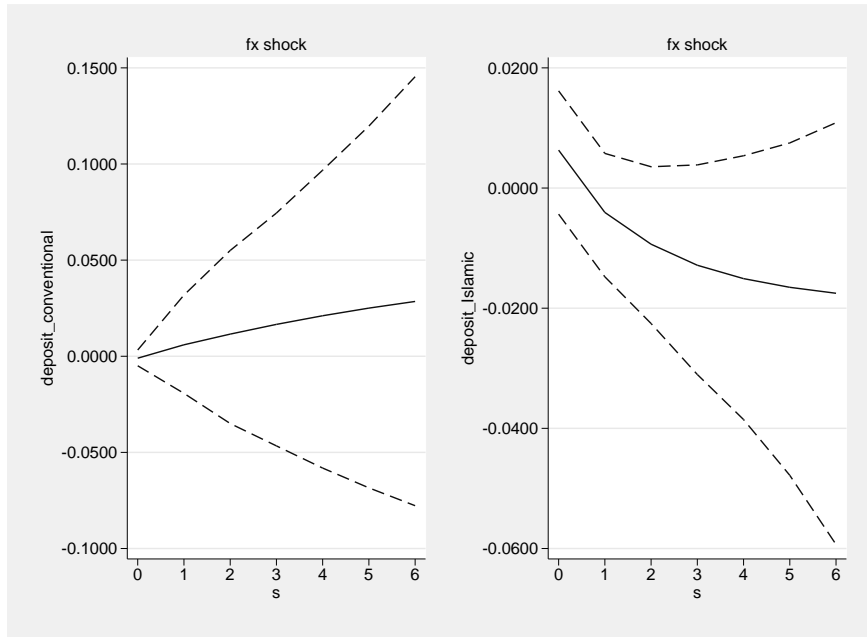Figure 4: Impulse Responses of Credits to Policy Rate Shocks: Conventional versus Islamic Banks

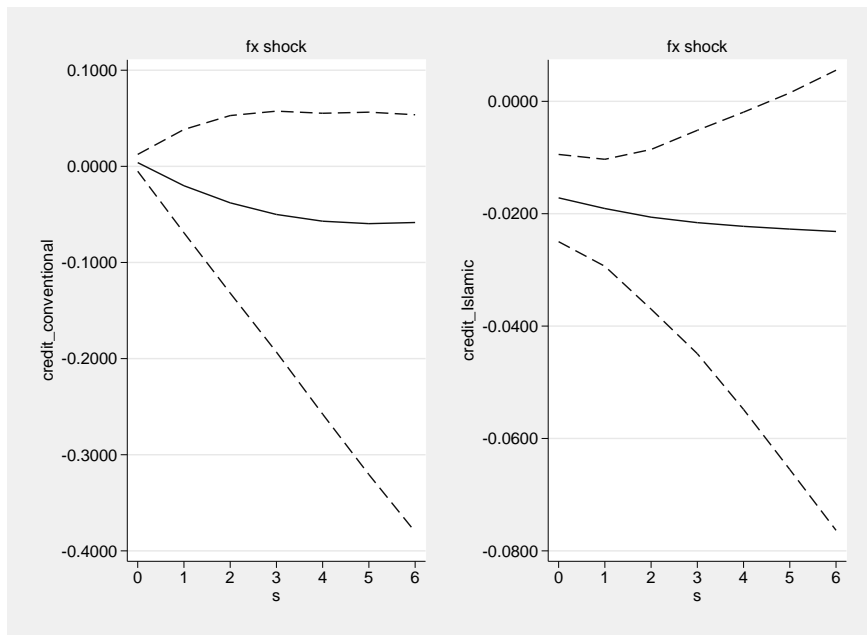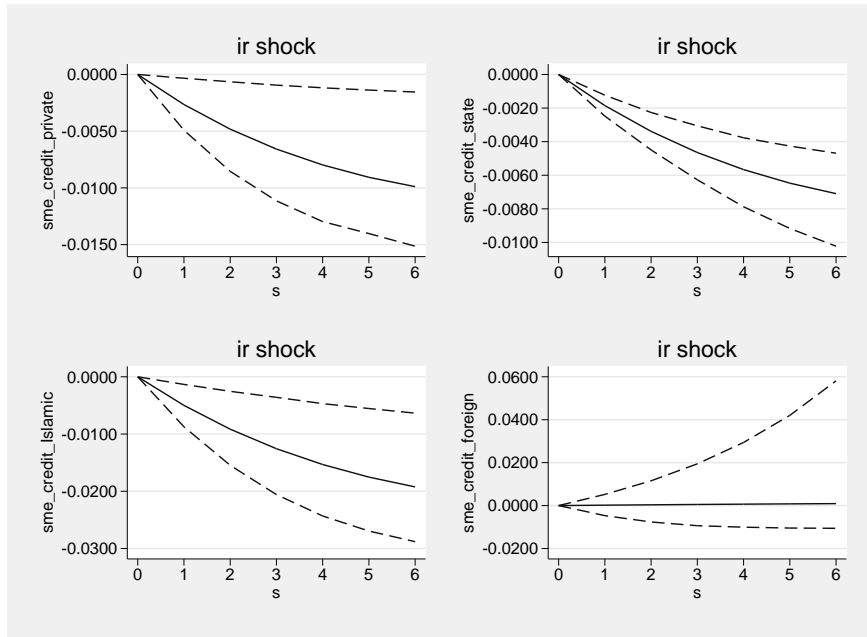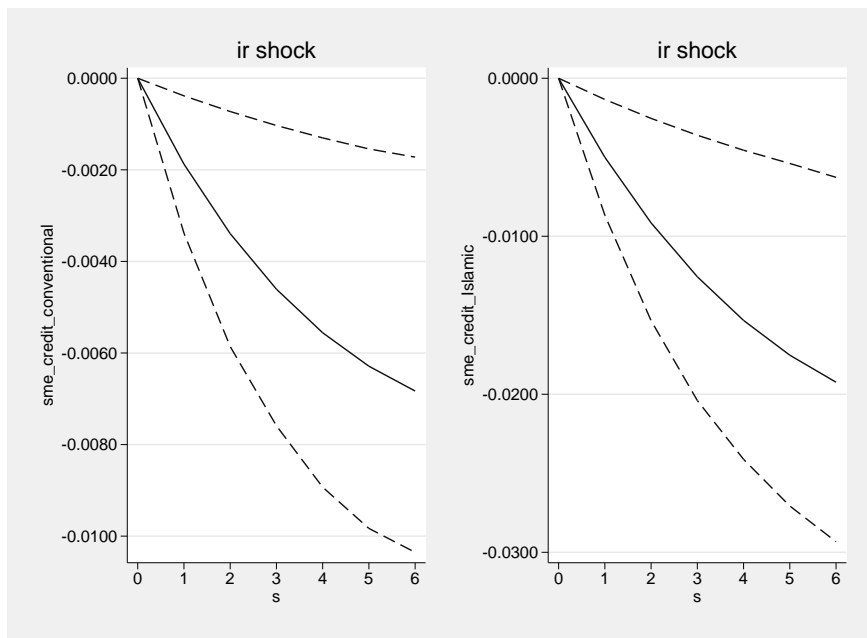Figure 5: Impulse Responses of Deposits to Inflation Shocks: Conventional versus Islamic Banks

Figure 6: Impulse Responses of Credits to Inflation Shocks: Conventional versus Islamic Banks

Figure 7: Impulse Responses of Deposits to Foreign Exchange Shocks: Conventional versus Islamic Banks

Figure 8: Impulse Responses of Credits to Foreign Exchange Shocks: Conventional versus Islamic Banks

Figure 9: Impulse Responses of SME Credits to Policy Rate Shocks: Different Bank Types

Figure 10: Impulse Responses of SME Credits to Policy Rate Shocks: Conventional versus Islamic Banks
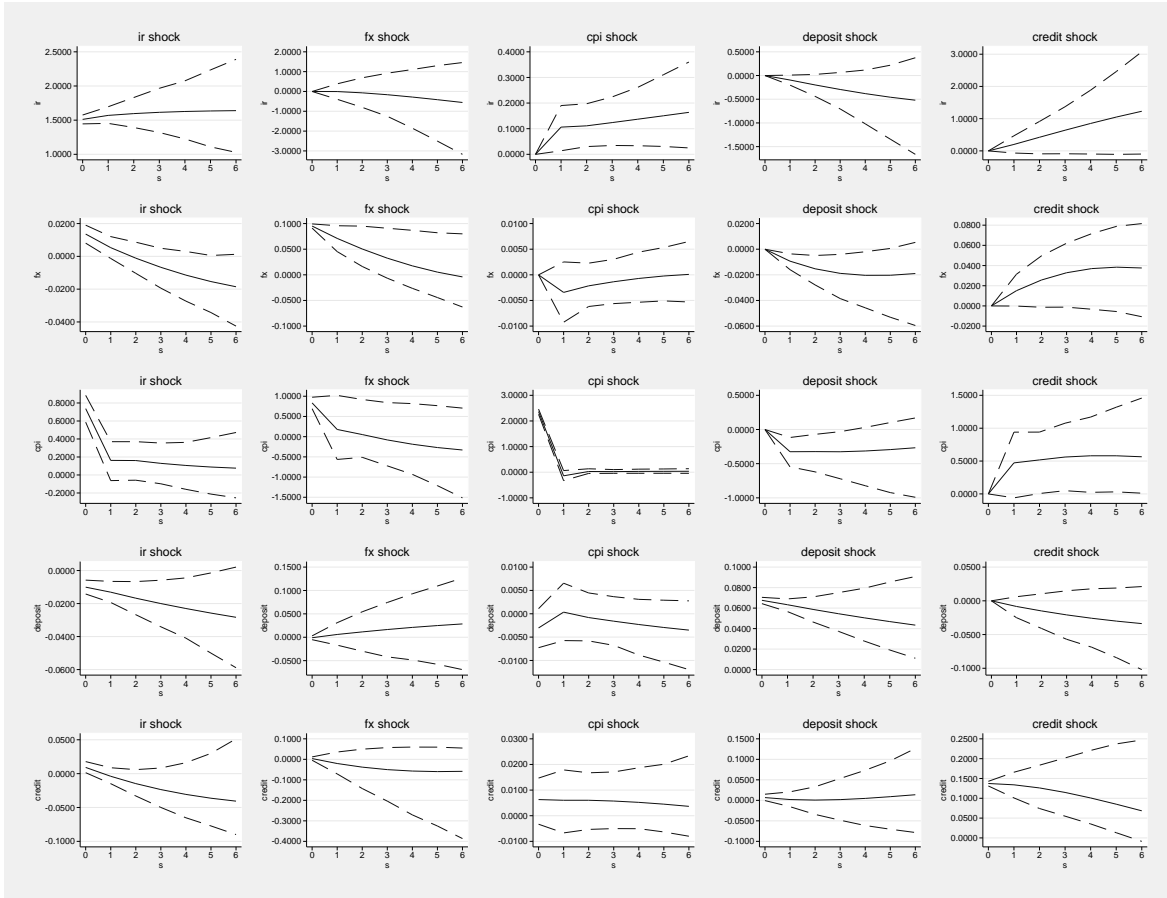
8   Appendices

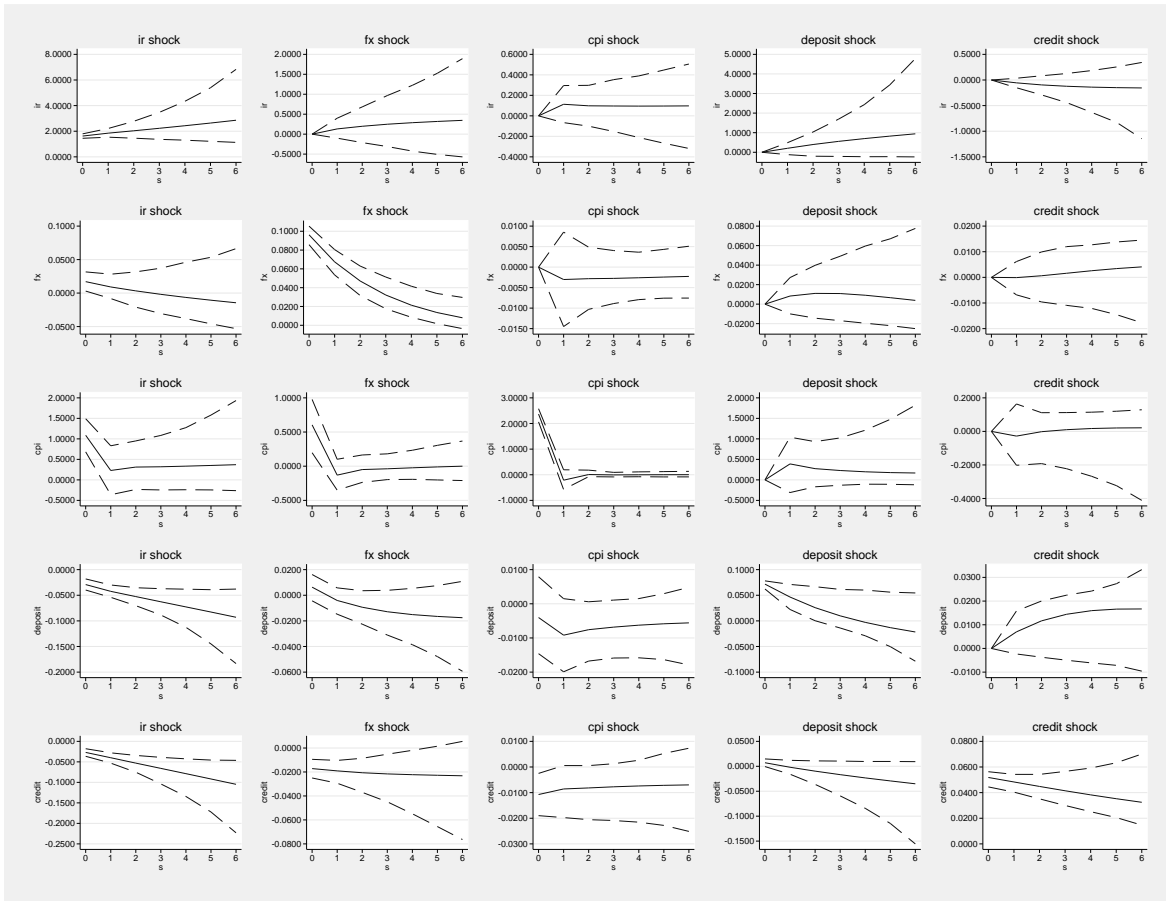Figure 11: Impulse Responses for Conventional Banks
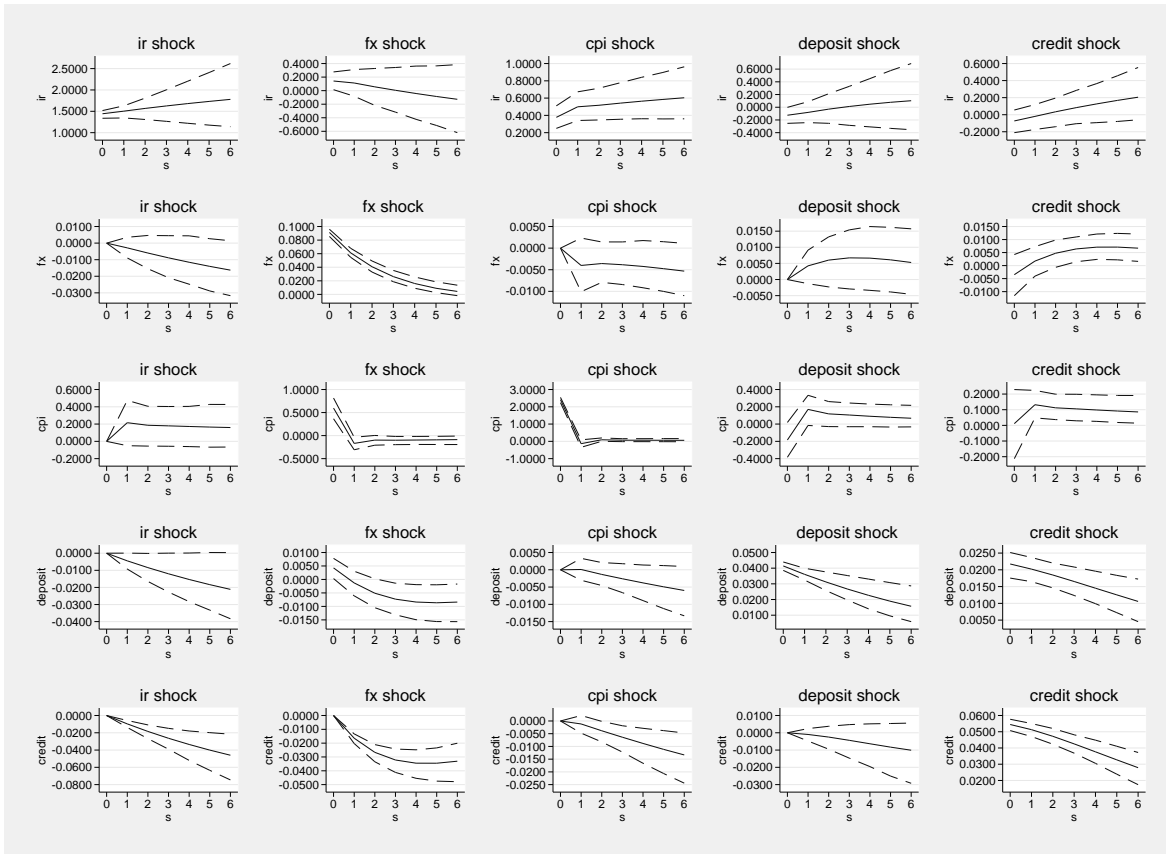
Figure 12: Impulse Responses for Islamic Banks

Figure 13: Impulse Responses for Restricted Conventional Banks