Evaluation of non-performing financing of non-oil sectors: a case of Bahraini Islamic banks

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Abstract: This study investigated the speed of adjustment of non-performing financing in several sectors in Bahrain. This study used ANOVA, Johansen cointegration, and VEC models. The equality of mean test showed the mean difference between economically contributing financing and non-performing financing in Bahrain. The Johansen cointegration result revealed evidence of one (1) cointegration between each sector under consideration, supporting the weak-form efficiency market hypothesis. The findings revealed that some non-performing financing in Bahraini non-oil sectors made greater efforts to re-establish equilibrium in the face of a short-run shock. In contrast, some others adjusted at a relatively slow pace. However, some non-performing financing showed no indication of the rate of adjustment. These findings were further illustrated graphically using the Impulse response function graph. The findings suggested that the Bahrain Islamic finance industry should reduce non-performing financing even further because most of the speeds of adjustment are either slow or non-existent.

Keywords: evaluation; non-performing financing; non-oil sectors; Bahrain; Islamic banks.

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1 Introduction

Financing provisions made available to several sectors, especially Islamic banking, are to fulfil the redistribution of wealth through economically contributing *Shariah*-compliance financing (ECSCF$_t$). In other words, the provision is to support several individuals or companies with great ideas but are financially incapable. Despite the economically essential role of making financing available, non-performing financing is arising (Boora and Jangra, 2019) and becoming significant (Goswami, 2021). Therefore, individual banks must identify potential non-performing financing to minimise the risk of financing some projects (Yanenkova et al., 2021). Such would not have raised much concern if the speed of adjustment was faster. Unfortunately, the speed of adjustment is poor in some cases and even not adjusting in many cases. The implication may be serious if shock due

to short-run deviation is poor or severe if the speed of adjustment is not adjusted. Hence, the deviation would be permanent, and the study variables would not have long-run relationships. This has posed challenges, necessitating Islamic banking to strategise its financing policy by reducing non-performing financing. Nothing that the Gulf Cooperation Council (GCC) is the world centre for Islamic finance (Ibrahim et al., 2012) since the region is the origin of the Islamic religion. As a result, efficient wealth redistribution is expected from Islamic banks in the GCC. For instance, the lowest non-performing financing to non-oil sectors in 2014Q4 in Bahrain's full-fledged Islamic banks was documented to be US$965.3M (US Dollar) and the highest non-performing financing to non-oil sectors was $1959.75Billion in 2019Q2 (IFSB, 2019) within the period of this study.

This implies that non-performing is substantial to create financial relief to the life of the poor majority and allow Islamic banks to meet their *Shariah-related* objectives. *Shariah* is to promote the well-being of all humanity, including their wealth (*mal*) (Bennett and Iqbal, 2013). Striving to reduce non-performing financing might reduce the risk associated while increasing the efficiency of using investors' money and attracting more international investors. However, investors in Islamic finance industries are concerned about adhering to Islamic values without compromising their expectation of gaining more wealth from their capital investment (Lusyana and Sherif, 2017).

The internationalisation score of Bahrain is among the highest in GCC countries (Saberi and Hamdan, 2019), attracting the development of headquarters for several multinational companies (Ahmed and Suliman, 2020). Therefore, Islamic banks in Bahrain may have significant international investors that would be more willing to invest, provided their investment is considered safe. Lusyana and Sherif (2017) argued that investors are more willing to invest in *Shariah* investment due to their concern for ethical investment. As a result, the authority and Islamic finance institutions are encouraged to proactively deal with non-performing financing in non-oil sectors to attract more global opportunities. Knowing that Bahrain's Vision 2030 is to become "a cutting-edge infrastructure", "a world-class infrastructure", and an increasing level of sophistication and innovation", which aims to improve the quality of public services and cut down expenses (Saxena and Al-Tamimi, 2018).

This study focused on Islamic banks for two main reasons: firstly, the operation of Islamic banks is regarded as an alternative to conventional banks and is gaining the attention of investors with the belief that financial matters would be handled differently because *Shariah* (Islamic law) guides the operation. *Shariah* considers Islamic banks to be custodians responsible for safeguarding depositors' funds. Secondly, Islamic banks aim to make efficient wealth redistribution to narrow the gap between the rich and the poor. With a huge amount of non-performing financing, that objective may take time to attain. Thirdly, the Gulf countries' internalisation record and the Vision 2030 of Bahrain made it more appropriate for this study since the finding would be worth discussing from the perspective of local and international investors. To achieve this, the speed of adjustment of non-performing financing is essential to ensure the risk involved in Islamic banks' operations. Similarly, there are several studies on non-performing loans of conventional banks, while studies on non-performing loans of Islamic banks are relatively few. Those studies on non-performing financing do not examine sectors in-depth; they provide general findings on non-performing financing.

Previous studies established that non-performing financing impairs banking efficiency, and banks are the barometer of economic efficiency. This implies that any shock to the banks would have different impacts across several sectors and might affect the economy as a whole. According to Abel (2018), non-performing financing has a greater implication on the wellness of the banking industry. Furthermore, a study by Hussain and Al-ajmi (2012) found that Islamic banks faced significantly higher risks than conventional banks. Profit and loss sharing financing expose Islamic banks even more to risk than conventional banks due to misuse of trust by the debtor (Nugraha and Setiawan, 2018). Therefore, financing readjustment may mitigate the risk associated with non-performing financing.

Could minimising *Shariah*-compliant non-performing financing in several sectors make Bahrain's Vision 2030 on a cutting-edge infrastructure achievable? This question is essential as a study by Jolevska and Andovski (2015) found that non-performing loans significantly affect economic development and constrain growth. Similarly, Hryckiewicz (2014) in Ata (2019) study established that banking healthiness significantly impacts economic and development growth. Meanwhile, inefficient banking deteriorates the country's financial system, while adjusting non-performing financing may be required to mitigate the negative effects and increase the efficiency of *Shariah*-compliance financing.

This study examines the linkage between economically contributing *Shariah*-compliance financing and non-performing *Shariah*-compliance financing across several sectors in Bahrain. As documented, the proportion of the Bahraini economy's reliance on non-oil sectors has increased, which comprises manufacturing (21%); public administration (18%); finance and real estate (17%); trade activities (11%); and transport and communication (11%) (Islam, 2003). Therefore, understanding the speed of adjustment of the non-performing *Shariah*-compliant financing sector (NPSCFt) is essential to educate the public on whether the sectors being financed by Islamic banks in Bahrain are contributing to the efficiency of Islamic banks' operational activities or not by evaluating non-performing *Shariah*-compliance financing.

Brief findings from this study reveal that mining and quarrying are the only sectors with a moderate speed of adjustment. In contrast, other sectors, except real estate, have a very low speed of adjustment for economically contributing to *Shariah* compliance. It found that the value of non-performing financing provided by Islamic banks in Bahrain is increasing every quarter over the period examined in this study, and none of the speeds of adjustment of the non-performing *Shariah*-compliance financing is adjusting faster or moderately. Rather they are either adjusting slowly or not adjusting at all, or struggling to adjust. This implies that some sectors financed by Islamic banks in Bahrain are not contributing to the efficiency of Islamic banks' operations in Bahrain. This is because when the economy was relatively stable, a significant amount of the financing provided for some sectors ended up as non-performing. This indicates that the amount that is supposed to have been made available for the better use of other sectors is withheld beyond a considerable period. This might distort the efficiency of wealth redistribution and is considered an inefficient way of handling investors' funds. Table 1 presents a continuous increase in non-performing financing over this study as in Figure 1.

**Table 1** Economically contributing to Shariah compliance and non-performing financing from 20014Q1–2019Q2

Period	Finance	AF	MQ	M	C	WRT	TS	IC	FI	RE	HF
						Values in Million US$ Dollars					
2014Q1	ECSCF$_t$	2.80	0.40	464.20	540.50	1067.50	111.00	87.80	1668.90	2279.70	1350.90
	NPSCF$_t$	0.00	0.00	49.40	172.60	160.80	7.30	12.40	161.70	348.40	87.30
2014Q2	ECSCF$_t$	9.40	36.00	396.60	530.70	1093.60	108.60	34.60	1763.80	2262.20	1535.40
	NPSCF$_t$	4.20	0.00	35.10	137.00	137.00	7.30	32.70	160.80	226.60	257.00
2014Q3	ECSCF$_t$	12.50	34.00	415.20	561.10	1080.80	97.60	34.10	1769.00	2385.20	1627.30
	NPSCF$_t$	2.40	0.00	41.40	200.40	253.10	26.50	14.80	173.30	206.30	225.80
2014Q4	ECSCF$_t$	9.70	33.40	381.10	619.80	1125.30	92.40	80.00	1769.00	2355.20	1730.10
	NPSCF$_t$	2.30	0.00	21.90	78.20	219.60	5.30	16.30	206.80	271.30	69.10
2015Q1	ECSCF$_t$	14.70	46.50	340.30	641.60	1154.30	114.90	88.80	1559.20	2422.10	2074.30
	NPSCF$_t$	2.30	0.00	26.90	164.70	234.40	4.70	16.70	176.80	266.00	159.20
2015Q2	ECSCF$_t$	10.30	42.80	302.40	520.30	2512.00	123.30	73.60	1354.60	2123.60	1323.90
	NPSCF$_t$	2.30	0.00	15.60	113.90	403.30	5.50	0.30	147.90	207.70	138.40
2015Q3	ECSCF$_t$	10.30	51.30	309.30	623.60	1111.60	105.10	53.70	1551.00	2436.90	2156.10
	NPSCF$_t$	3.60	0.00	128.10	157.20	198.50	3.90	12.40	148.20	300.50	151.80
2015Q4	ECSCF$_t$	7.00	43.20	283.10	620.30	1156.40	66.00	54.90	1835.90	2598.60	2188.60
	NPSCF$_t$	3.60	0.00	125.10	156.60	185.80	2.60	12.40	144.90	392.50	156.30
2016Q1	ECSCF$_t$	12.00	43.90	437.30	806.00	1283.60	128.80	66.90	2027.80	2998.70	2552.00
	NPSCF$_t$	3.60	0.00	169.40	191.00	199.00	7.00	14.80	207.40	415.60	189.90
2016Q2	ECSCF$_t$	11.80	42.80	502.10	711.40	1260.70	120.90	73.30	1498.40	3093.70	2660.00
	NPSCF$_t$	3.50	0.00	170.30	218.50	219.30	8.70	18.50	138.00	444.60	197.80
2016Q3	ECSCF$_t$	10.50	44.90	558.20	597.70	1298.70	165.40	72.10	1388.80	3149.00	2835.60
	NPSCF$_t$	1.10	0.00	163.90	186.60	213.10	11.70	12.90	134.50	445.50	127.20
2016Q4	ECSCF$_t$	11.40	41.10	563.00	614.30	1176.00	177.50	73.80	1455.40	3212.70	2693.20
	NPSCF$_t$	2.90	26.00	179.70	181.50	214.30	8.00	12.90	101.20	376.00	133.20
2017Q1	ECSCF$_t$	23.70	59.10	875.50	663.80	1204.30	162.30	94.20	2710.30	3132.70	2931.80
	NPSCF$_t$	6.30	27.50	224.10	195.70	196.30	4.60	13.20	66.70	359.80	142.20
2017Q2	ECSCF$_t$	25.60	94.10	952.00	819.00	1275.40	168.30	96.20	2904.10	2844.00	3224.00
	NPSCF$_t$	7.40	29.00	233.00	212.00	171.00	4.60	15.70	92.60	338.50	128.60
2017Q3	ECSCF$_t$	20.60	97.90	946.80	995.60	1272.50	165.50	97.90	2859.20	2898.00	3236.40
	NPSCF$_t$	6.20	29.50	229.00	343.7	168.50	5.90	16.30	82.00	321.70	128.10
2017Q4	ECSCF$_t$	24.70	124.30	1101.70	1010.70	1243.10	122.30	140.10	3074.30	3365.10	2836.10
	NPSCF$_t$	3.90	30.00	170.50	350.20	226.90	4.50	15.60	86.00	426.60	163.90
2018Q1	ECSCF$_t$	14.80	93.40	536.00	579.10	1195.50	135.70	104.50	307020	3489.90	2794.70
	NPSCF$_t$	1.80	34.00	136.70	171.20	240.90	17.40	21.80	95.40	395.90	174.00
2018Q2	ECSCF$_t$	15.10	93.30	579.50	866.40	1278.30	106.50	94.20	3127.00	3910.70	2491.40
	NPSCF$_t$	1.80	32.20	206.40	372.00	267.60	11.10	20.70	84.60	423.00	153.60

Table 1   Economically contributing to Shariah compliance and non-performing financing from 20014Q1–2019Q2 (continued)

						Values in Million US$ Dollars					
Period	*Finance*	*AF*	*MQ*	*M*	*C*	*WRT*	*TS*	*IC*	*FI*	*RE*	*HF*
2018Q3	ECSCF$_t$	0.020	117.36	574.18	827.16	1507.55	112.95	78.52	3064.09	3784.10	2449.36
	NPSCF$_t$	1.770	32.21	204.86	351.04	230.04	20.83	6.81	128.77	342.50	142.55
2018Q4	ECSCF$_t$	15.50	160.30	568.40	837.00	1571.90	153.90	79.10	2886.30	3711.80	2454.70
	NPSCF$_t$	1.880	31.81	241.29	377.98	225.38	19.34	4.32	138.81	343.70	164.49
2019Q1	ECSCF$_t$	16.10	156.50	634.00	805.80	1770.90	160.20	78.10	2928.70	4054.50	2683.80
	NPSCF$_t$	3.480	31.24	269.49	310.85	388.55	23.73	11.70	143.34	395.48	232.90
2019Q2	ECSCF$_t$	8.80	93.00	650.50	831.90	1819.50	163.40	99.30	2837.40	3995.80	2724.20
	NPSCF$_t$	3.450	31.63	254.17	317.95	387.33	22.97	12.07	177.16	325.95	180.27

AF denotes agriculture and fishing; MQ denotes mining and quarrying; M denotes manufacturing; C denotes construction; WRT denotes wholesale and retail trade; TS denotes transportation and storage; IC denotes information and communication; FI denotes financial and insurance; RE denotes real estate; and HF denotes households financing.

Source: IFSB database

Figure 1   Economically contributing to Shariah compliance (E) and non-performing (N) financing from 20014Q1–2019Q2 (see online version for colours)
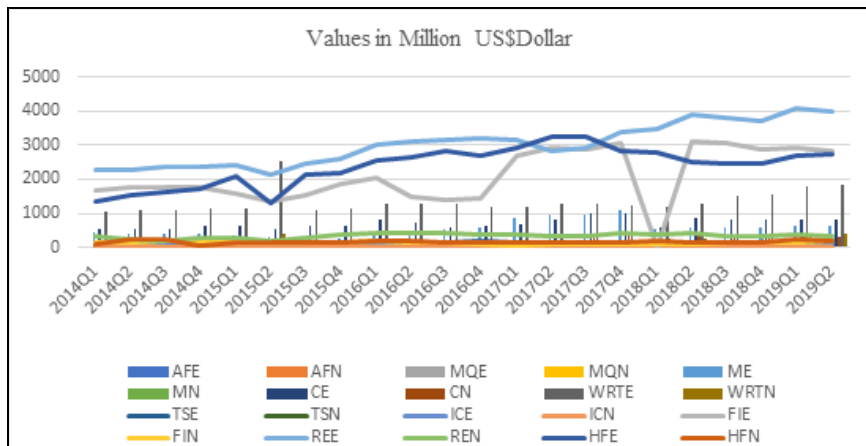
This study has six sections in all. Section 2 elaborates on banks' financing; Section 3 discusses the theoretical framework and literature review, followed by the data and methodology of this study in Section 4. Section 5 discusses the result of the findings, and finally, Section 6 concludes this study.

2   Banks' financing

Financing in the banking system could be *Shariah*-compliant or non-*Shariah*-compliant financing, and the concern about financing is the ability of the concerned sectors to fulfil

the obligation when due. Still, some sectors need help to fulfil their contractual payment. At the same time, understanding the benchmark for deciding on the speed of adjustment is essential.

2.1 Shariah-compliant financing vs. non-Shariah-compliant financing

Shariah-compliant financing is regarded as financing products and services within the permissible range of *Shariah*. Consequently, *Shariah*-compliant financing has a limited range of products and services to finance. Those products and services should not have any element of *Riba* (*Ribawi*) as well as *maysir* (speculation or gambling activities) (Ahmed, 2010) and *gharar* (uncertainty) (Lewis, 2010). *Shariah*-compliant financing aims to enhance the production of products and services that protect humanity. Promotion financing for the industry that adds value to the real economy is one of the main aims of the Islamic finance industry (Lusyana and Sherif, 2017).

However, non-*Shariah*-compliant financing is made available for any products and services that meet the terms and conditions attached to the provision of financing without considering *Shariah* rulings. Such non-*Shariah* compliant financing does not limit financing to any products and services; the motive of such financing is purely profit maximisation.

A study by Omar (2019) has raised concern about the participation of Islamic banks in Muslim-majority countries towards an inclusive financing system. Effective use of important Islamic financial instruments such as profit-loss sharing and wealth redistribution may allow those voluntarily out of the financial system due to religious reasons to be integrated into the system (Naceur et al., 2015). As a result, it has become necessary for the bank to consider previous experience and economic conditions in providing financing (Agénor and Zilberman, 2015). Quantifying the speed of adjustment of non-performing financing by sector may provide insightful evidence.

As in the case of this study, the faster adjustment of non-performing financing may not be a concern, but non-performing financing in Islamic banks in Bahrain needs to adjust or experience a better speed of adjustment. However, non-performing financing in Islamic banks in Bahrain is growing, which would have been diverted towards better economically contributing projects, and it is something to worry about if it continues, especially from the industry that is expected to minimise waste.

2.2 Benchmark for comparison speed of adjustment

Speed of adjustment is an essential part of cointegration studies because it addresses the relationship among the variables more objectively and meaningfully. It accounted for the possibility of short-run shocks that could be insignificant or significant to the relationship in the long run. Therefore, the authorities and investors in Islamic banks need to understand and pay more attention to the speed of adjustment of non-performing financing. Below is the possible interpretation of the speed of adjustment values as presented in Table 2.

3   Theoretical framework and literature review

The prohibition of interest (*riba*) is regarded as the main theoretical difference between Islamic banking and conventional banking, and the 'profit and loss' (PLS) paradigm is a unique feature of Islamic banking over conventional banking (Chong and Liu, 2009). The PLS is predominantly based on two Islamic contracting concepts: profit-sharing (*mudarabah*) and joint venture (*musyarakah*). The PLS-based mode has various uses for financing Islamic instruments (Kahf and Khan, 1992). The PLS paradigm integrates asset and liability, allowing all the contractual participants, such as borrowers (fund demanders), Islamic banks (as financial intermediaries), and depositors (fund providers), to share both profit and loss from investments. This is consistent with the sayings of the Holy Prophet (PBUH), the "*al ghurm bi al ghunm*," which means the gain is based on the assumption of responsibility (Kahf and Khan, 1992).

Table 2   Benchmark for speed of adjustment comparison

Coefficient range	Sign	Interpretation	Authors	Implications in the context of the banking activities
Speed of adjustment	+	No evidence of the speed of adjustment of non-performing financing. The financing amount is treated as bad debt	Paya and Peel (2004) and Malik et al. (2020)	Non-performing financing would be classified as bad debt, which risks the smoothness of bank activities and reduces depositors' trust
The speed of adjustment coefficient is less than 50%	–	There is evidence that shock in the short run is adjusting at a slower rate	Su (2011), Bekhet and Matar (2013), Mathuva (2014), Yusof et al. (2016), Salami and Razali (2018) and Bildirici and Gokmenoglu (2020)	The amount is regarded as a bad debt due to non-performance at the due date but only recovering slowly. This may also affect the Islamic banks' operations and activities, but not as severely as non-recovery financing
Speed of adjustment coefficient greater than 50%	–	Faster speed of adjustment	Haq and Rao (2013), Sehgal et al. (2015) and Joshua et al. (2020)	More desirable because the long-run objective of the Islamic banks may not be affected even with the evidence of short-run deviation

Because investment depositors partly bear shocks caused by loss, the PLS paradigm has been persuasively argued to allow Islamic banks to be more resilient to shocks (Srairi, 2013). In addition, the *Shariah* encourages PLS and prohibits activities considered sinful by the Holy Qur'an and Hadith (sayings and practices of the Holy Prophet Muhammad

(may the peace and the blessings of Allah be with him) (Ibrahim et al., 2012). This demonstrates that financial transactions should be based on PLS (Smolo and Hassan, 2011) and that the PLS paradigm is more favourable to depositors (Qian and Velayutham, 2017). Furthermore, Aggarwal and Yousef (2000) encouraged Islamic banks to increase the use of PLS instruments and refrain from using risk and reward sharing, which makes their activities resemble conventional banks. Increasing the use of PLS may solve the chaos in the global financial system rather than insisting on using an interest-based model (Ahmed, 2010). Al-ajmi et al. (2009) argued that even though Islamic banks have a *Shariah* advisory board or *Shariah* advisor, and their products and trade are *Shariah*-compliant, some of their practices are still being criticised. Given that, PLS is more advantageous to investment depositors (Qian and Velayutham, 2017) and that investment depositors are entitled to partial losses on investments made with Islamic banks (Srairi, 2013), this does not mean that Islamic banks should not take necessary action to address the continuous growth in the value of non-performing *Shariah*-compliance financing. Islamic bank authorities need to understand that PLS subjects Islamic banks to greater discipline because they need to distinguish good customers from bad customers, as they have more to lose than conventional banks (Chong and Liu, 2009).

3.1 Speed of adjustment

Studies on the speed of adjustment vary in scope widely. Sehgal et al. (2015) examined the speed of adjustment between spot and future Indian foreign exchange markets for the daily price ranges from February 2010 to February 2012. They concluded that the four spot markets' adjustment speed adjusts to the short-run deviation faster than in future markets.

Salami and Razali (2018) examined the speed of adjustment between commodity pricing of crude palm oil and crude palm oil futures using the VECM model with daily data ranges from June 2009 to August 2016. They concluded the low speed of adjustment before and after structural breaks of –5.32% and –2.32%, respectively.

Bildirici and Gokmenoglu (2020) concluded a low speed of adjustment of –10.38% for the short-run deviation from the long-run equilibrium relationship on the impact of terrorism on FDI in nine countries with security issues. However, Joshua et al. (2020) concluded a higher speed of adjustment of –67.56% when examining external factors leading to a growth hypothesis for the South African economy. Malik et al. (2020) found a positive significant speed of adjustment for both long-run and short-run relationships between oil prices, FDI, and economic growth in Pakistan. They concluded that economic growth in the country increased environmental degradation.

Bekhet and Matar (2013) examined the co-integration and causality among Jordan's stock markets using yearly stock price indices from 1978 to 2010. They employed autoregressive distributed lags (ARDL) to conclude that –44% short-run disequilibrium in the previous year could return to the long-run equilibrium in the current year. This finding may be criticised because the authors did not account for the effect of structural breaks in their study.

Mathuva (2014) investigated the speed of adjustment toward the cash conversion cycle (CCC) of listed firms in Kenya to explain how the firms manage deviation from the targeted CCC for the period ranging from 1993 to 2008. The author concluded that the short-run deviation adjusting to the long-run targeted CCC is slower at a rate of –43.8%.

Su (2011) quantifies the speed of adjustment between real estate and the stock market in Western European countries using the Threshold Error Correction Model (TECM) for monthly indices prices ranging from January 2000 to December 2008 and reveals that the speed of adjustment toward positive deviations is more rapid than towards negative deviations. Their study confirms the presence of rockets and feathers in pricing; generally, both speeds of adjustment are relatively low; –43.8% towards the negative speed of adjustment and –1.93% towards the positive speed of adjustment.

Yusof et al. (2016) examined the rental rate as alternative pricing for Islamic home financing in the UK markets over the period ranging from 2005Q1 to 2014Q2. They concluded that the speed of adjustment is low for the three models examined; the base model with –19.043% speed of adjustment, the mortgage model with –17.047% speed of adjustment, and the LIBOR model with –16.997% speed of adjustment.

This finding contributes to the literature on the speed of adjustment regarding Islamic banking financing. The finding of this study provides empirical evidence that the speed of adjustment differs across the sectors and reveals three different speeds of adjustment. First, slow speed of adjustment for mining and quarrying, financial and insurance, information and communication sectors. Second, the speed of adjustment for non-performing financing in the construction, manufacturing, transportation, and storage sectors needs to adjust. Third, despite the speed of adjustment showing no adjustment for some sectors, the speed for non-performing financing of agricultural and fishing, real estate, household financing, and wholesale and retail trade needs to be improved to re-establish an equilibrium relationship with economically contributing financing.

3.2   Non-performing financing

Several studies attributed poor performance or inefficiency of Islamic banks to the negative effect of non-performing financing. The study conducted by Abel (2018) studied cost efficiency and non-performing loans in the Zimbabwean banking sector between 2009–2014 and traced the root of non-performing financing (NPF) to low-level or inefficient credit management. Wiratno et al. (2018) used monthly data from January 2003 to June 2015 to conclude that NPF exerts a negative but significant impact on the profitability of Indonesia's Islamic bank industry. This study is supported by Ashraf and Butt (2019), who used panel data, and the results showed that NPF and banks' profitability are negatively related.

Similarly, Suhel et al. (2018) revealed that non-performing financing is an indicator for measuring the financial performance of *Shariah* banking. They urged Islamic banking to prevent an increase in non-performing financing. Suhel et al. (2018) further reported that non-performing financing tends to reduce the amount of *Shariah* financing granted to small and medium enterprises (SMEs). Rosly (2005) and Saiti and Abdullah (2016) revealed that the major source of revenue for Islamic banks is a return that is based on profit-loss sharing (PLS) financing activities. However, Alandejani et al. (2017) argued that Islamic banks prefer a more secure source of revenue than the revenue offered by PLS. Therefore, debt financing has been the dominant investment instrument of Islamic banks, while PLS instruments have received fewer financing attractions (Abu Hussain and Al-Ajmi, 2012). Furthermore, Mahdzan et al. (2017) revealed that debt financing (*Murabahah*) is the least understandable concept among Islamic financial products. However, the existence of credit risk that results from non-performing financing in Islamic banks is a critical issue.

Similarly, Jolevska and Andovski (2015) found a negative impact of the global crisis and non-performing financing on economic development and economic growth after examining the banking systems of Serbia, Croatia, and Macedonia. The authors further emphasised that corporate non-performing loans constitute the largest part of non-performing financing. The authors found that NPF severely affected the profitability of the Croatian conventional banking industry.

Kjosevski et al. (2019) used ARDL to examine the effect of non-performing financing in the context of enterprises and households for the period ranging from 2003Q4 to 2014Q4. They concluded that enterprise financing constitutes a larger part of non-performing financing in Macedonian banks. Barenberg (2004) and Nasution and Wiliasih (2007) revealed that Islamic banking NPF directly impacts the returns of financial institutions, particularly the profit and loss sharing business model.

Unlike the conventional banking industry, the Islamic banking industry is a financing-oriented financial industry that has to move ahead of a required robust allowance for financing losses. According to Nugraha and Setiawan (2018), invocation of necessary measures in the provision of financial services as an effective repayment policy would eliminate or reduce the volume of non-performing financing is highly essential, most especially in Islamic banks that are based on profit and loss sharing. Nonetheless, rejuvenation and reinvigoration of the economic system rest on the government's current and future fiscal and monetary policies to stimulate the economy, which is an exogenous variable, i.e., beyond the bank's control.

Despite the abundance of previous literature on non-performing financing, most studies examined non-performing financing from an industry perspective rather than a sectorial perspective. The findings of this study concluded that examining non-performing financing from a sectorial perspective would eliminate biases in generalising the findings. As a result, Islamic banks would be able to know how to strategise their financing policies across the sectors. In particular, Bahrain *Shariah*-compliant banks' non-performing financing from a sectorial perspective attracts less attention from researchers.

3.3 *Non-performing financing and justification for the analysis approach*

Despite related studies on non-performing financing in Islamic banks have gained increasing attention due to the risk associated with the increase of financing. As an indicator for measuring the healthiness of the banking system (Kjosevski et al., 2019), there is still a universally acceptance-modelling approach for conducting non-performing financing studies. Among the recent studies on non-performing financing are Ashraf and Butt (2019) used panel data conducted, pooled ordinary least squares, random effect estimators, and fixed effect estimators to test Pakistani banks. Kjosevski et al. (2019) used ARDL, while Wiratno et al. (2018) employed Two-stage least squares (TSLS). Abel (2018) applied the Granger causality test to the Zimbabwean banking sector. Atiku and Fields (2017) studied bank policy, bank efficiency, and job security in Nigeria using descriptive statistics and a graphical representation, while Jolevska and Andovski (2015) employed Excel graphs. These imply that the study's objectives govern the analysis approach to non-performing financing. Since the objective of this study is to investigate the financing efficiency of Islamic banking through the speed of adjustment of non-performing *Shariah*-compliance financing, it is essential to quantify the speed of short-run deviation towards long-run equilibrium. The analysis approach fulfils the condition

for linear long-run cointegration; the order of integration of all variables examined is $I\sim(1)$, and 1 cointegration relationship among the study variables is established.

4   Data and methodology

The quarterly data for the period ranging from 2014Q1 to 2019Q2 was obtained from the IFSB database and was assimilated into daily frequency data to increase the number of observations. The above data range was chosen for two main reasons. First, the data range is the only available data provided in the IFSB database, and the data source is more reliable because the data provided was obtained from the central banks of the countries under study. Second, the data range represents the post-2008 global financial crisis and is regarded as a relatively stable economic condition for most countries. The data range is considered good and serves as a basis to predict the worst-case scenario of non-performing financing if the economy is in crisis.

Therefore, the linkage between economically contributing *Shariah*-compliance financing (ECSCF) and non-performing *Shariah*-compliance financing (NPSCF) across several sectors was examined using Johansen cointegration, ANOVA, and VECM. The Johansen cointegration provides statistical evidence of whether the study's variables have a long-term relationship. Johansen cointegration uses two statistics: trace and max statistics, to predict the existence of a long-run relationship between the variables (Srinivasan and Ibrahim, 2012; Guidi and Ugur, 2014). This study adopts and adapts the VECM equation specification as in the study by (Srinivasan and Ibrahim, 2012).

$$\Delta X_t = \sum_{i=1}^{p-1} \Gamma \Delta X_{t-i} + \Pi X_{t-1} + \varepsilon_t; \varepsilon_t \mid \Omega_{t-1} \sim distribution\,(0, H_t) \tag{1}$$

where X_t represents 2×1 vector of (ECSCF$_t$, (NPSCF$_t$) respectively and Δ represents the first difference of (ECSCF$_t$) and (NPSCF$_t$), ε_t represents 2×1 vector of residual (ε_{ECSCF}, (ε_{NPSCF}) which follows time-varying matrix. H_t, of unspecified conditional distribution with mean zero. The estimated parameter for the long-run information is represented by Γ_i while short-run information is represented by Π. The existence of cointegration is predicted by the λ_{trace} test and the λ_{max} test as specified below.

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \lambda_i^-) \tag{2}$$

$$\lambda_{maz}(r, r+1) = -T \ln(1 - \lambda_{r+1}^-) \tag{3}$$

where λ_i^- represents the eigenvalues obtained from the estimate of the Π matrix, and T is the number of usable observations (Srinivasan and Ibrahim, 2012).

The statistically significant mean difference in (ECSCF$_t$) and (NPSCF$_t$) is quantified by ANOVA. At the same time, the speed of adjustment due to short-run shock is examined using ECT_{t-1} of VECM and finally, the impulse response function is presented. Examining the speed of adjustment to the shock in financing is essential because it allows quantifying the efficiency of financing provided and suggests if redistribution of such financing across non-oil sectors in Islamic banks in Bahrain is required. VECM provides information about long- and short-term adjustments (Srinivasan and Ibrahim, 2012). A more specific model for the current study is presented in equations (5) and (6) below:

$$\Delta\text{ECSCF}t = \sum_{i=1}^{p-1} a_{\text{ECSCF},i} \ \Delta\text{ECSCF}_{t-i} + \sum_{i=1}^{p-1} b_{\text{ECSCF},i} \ \Delta_{NPSCFt,i}$$
$$+ \ a_{\text{ECSCF}zt} - 1 + \varepsilon_{\text{ECSCF},t} \tag{5}$$

$\varepsilon_{i,t}|\Omega_{t-1} \sim distribution(0, H_t)$

$$\Delta\text{NPSCF}t = \sum_{i=1}^{p-1} a_{\text{NPSCF},i} \ \Delta_{\text{ECSCF}t-i} + \sum_{i=1}^{p-1} b_{\text{NPSCF},i} \ \Delta_{NPSCFt,i}$$
$$+ \ a_{\text{NPSCF}zt-1} + \varepsilon_{\text{NPSCF},t} \tag{6}$$

where $a_{\text{ECSCF},i}$, $b_{\text{ECSCF},i}$, $a_{\text{NPSCF},i}$, $b_{\text{NPSCF},i}$ represent the coefficients for the short-run, $z_{t-1} = \beta'X_{t-1}$ represents error correction term of the dependent deviation towards long-run equilibrium from equation (1), and $\varepsilon_{\text{ECSCF},t}$ and $\varepsilon_{\text{NPSCF},t}$ are residuals.

4.1   Simulation method

Data obtained from IFSB ranged from 2014Q1 to 2019Q2. We employed a dynamic Monte Carlo Simulation capable of running parametric and non-parametric simulations of 45 probability distributions with many simulation features (Mun, 2014). Monte Carlo simulation is "*a random number generator useful for forecasting, estimation and risk analysis.*" (Mun, 2014). Ahmed et al. (2019) admitted that researchers find the simulation technique useful.

The Monte Carlo simulation allows incorporating the data distribution and generating enough observations with a minimum of two observations for uniform distribution and three for triangular distribution. Quarterly data fulfilled the minimum requirement for the simulation, and the financing provided could be more parametric. Therefore, a non-parametric distribution was used. We simulated data yearly to prevent estimation errors. We calculated correlation for every four quarters and incorporated the coefficient of correlation into the data to be simulated. In addition, the dynamic simulation option was allowed to prevent interference with simulated data without restricting the process.

A Monte Carlo simulation allows simulation to be repeated for a specified number of trials and produces a reliable result that reflects a real economic system (Samitas and Polyzos, 2015). We set several trials for each simulation to 252, representing the number of trading days per year after excluding non-trading days and public holidays each year. The longer the number of simulation trials, the better the predictions (Masiane et al., 2020). In the end, yearly simulated data was extracted, and the total extraction from 2014Q1 to 2019Q2 was used for the main analysis. Once the simulation process is completed, the software allows the stimulation to be extracted for further analysis (Samitas and Polyzos, 2015).

5   Empirical results

Table 3 presents statistical summaries of Bahraini non-oil sectors economically contributing to *Shariah*-compliance financing (ECSCF$_t$) and non-performing *Shariah*-compliance financing (NPSCF$_t$). First, a graphical presentation of non-performing *Shariah*-compliant financing across ten sectors in Bahrain is presented in Figure 2.

Table 3   Descriptive statistics of log value of ECSCF$_t$ and NPSCF$_t$ by sectors in Bahrain

Sectors	Variables	Mean	Mini	Max	Std.	Skewness	Kurtosis	ANOVA F-Test
Agriculture & Fishing	ECSCF$_t$	2.4316	–0.3669	3.2335	0.4549	–0.5960	5.6196	1399.81**
	NPSCF$_t$	1.0104	–1.6939	1.9744	0.4776	–0.4183	4.8534	
Mining & quarrying	ECSCF$_t$	4.6667	4.1157	5.0421	0.1855	–0.4972	2.9588	482.58**
	NPSCF$_t$	3.4290	3.3175	3.5210	0.0577	–0.2983	1.5633	
Construction	ECSCF$_t$	6.5321	6.2639	6.9013	0.1609	0.1942	1.9075	1023.36**
	NPSCF$_t$	5.3169	4.4077	5.9230	0.3274	–0.1258	1.9957	
Real Estate	ECSCF$_t$	7.9897	7.6688	8.3001	0.1944	–0.0259	1.6175	3492.17**
	NPSCF$_t$	5.7449	5.3433	6.0395	0.1740	–0.3858	1.9064	
Financial & Insurance	ECSCF$_t$	7.6657	7.2214	8.0443	0.0987	0.0987	1.1569	5384.50**
	NPSCF$_t$	4.8782	4.2052	5.3062	–0.6996	–0.6996	2.2232	
Information & Communication	ECSCF$_t$	4.3524	3.5754	4.9132	0.2402	–0.2350	3.0127	2150.93**
	NPSCF$_t$	2.5907	–0.1059	3.4357	0.3787	–1.8844	10.3930	
Manufacturing	ECSCF$_t$	6.2580	5.6516	6.9892	0.3689	0.2958	2.3095	1518.94**
	NPSCF$_t$	4.7775	2.9676	5.5931	0.7337	–0.8030	2.0853	
Transportation & Storage	ECSCF$_t$	4.8201	4.2229	5.1579	0.1939	–0.4325	2.3239	4856.73**
	NPSCF$_t$	2.1728	0.9665	3.2088	0.6034	0.0351	1.6771	
Wholesale & retail trade	ECSCF$_t$	7.1901	6.9745	7.7780	0.1653	1.0048	3.3753	2045.30**
	NPSCF$_t$	5.4722	5.1112	5.9619	0.2082	1.0341	3.4240	
Household financing	ECSCF$_t$	7.7396	7.2157	8.0752	0.2525	–0.6420	1.9112	4930.88**
	NPSCF$_t$	5.0722	4.3099	5.5007	0.1743	0.5939	4.5798	

J-B statistics are not reported in Table 2 because it is statistically significant at 1% for all sectors. The observations for all sectors, excluding Mining and quarrying, are 1386, while the number of observations for mining and quarrying is 630 observations due to a lack of NPSCF$_t$ data from 2014Q1 until 2016Q4.

There was a steady increase in non-performing *Shariah*-compliant real estate financing from 2015Q2 (US$207.7M) to 2016Q3 (US$445.5M) and later reduced. Non-performing *Shariah-compliant* wholesale and retail financing sharply increased from 2015Q1 (US$234.4M) to 2015Q2 (US$403.3) and later fell.

   Figure 2 further indicates that non-performing *Shariah*-compliant financing for some sectors, such as mining & quarrying, information & communication, and transportation & storage, is the smallest across the study period. The construction sector had the highest non-performing *Shariah*-compliant financing (USD $378.0M) in 2018Q2 and will continue to decline. The least non-performing *Shariah*-compliant financing for the

manufacturing sector was documented in 2015Q2 ($15.6M) and later increased. In general, a huge amount is consistently wasted as non-performing *Shariah*-compliant financing, which requires urgent action.

The statistical summary of *Shariah*-compliant financing sectors in Bahrain in Table 3 reveals that financing for agriculture and fishing activities has the lowest mean score (Mean $ECSCF_t = 2.4316$; Mean $NPSCF_t = 1.0104$) while financing for real estate activities has the highest mean score (Mean $ECSCF_t = 7.9897$; Mean $NPSCF_t = 5.7449$). This finding is consistent with the finding that agricultural sectors are the least financed sectors, even in Nigeria, where their early development originated from the agricultural sector (Atiku and Fields, 2017). However, real estate financing in the GCC is unique since developers and investors abide by Islamic principles (Ibrahim et al., 2012). This implies that the Kingdom of Bahrain focuses more on financing real estate activities than agriculture and fishing activities. This revealed that the level of development in the Kingdom of Bahrain is expected to be high relative to the level of development in real estate and in commensuration with Vision 2030. The mean score for household financing (Mean $ECSCF_t = 7.7396$; Mean $NPSCF_t = 5.0722$) is the next highest after real estate, followed by financing and insurance. The mean score for the wholesale and retail trade sector is also high (Mean $ECSCF_t = 7.1901$; Mean $NPSCF_t = 5.4722$). This pattern shows that shelter and livelihood attract *Shariah*-compliance financing in Bahrain.

Figure 2 Quarterly non-performing financing provided for non-oil sectors in Bahrain (see online version for colours)
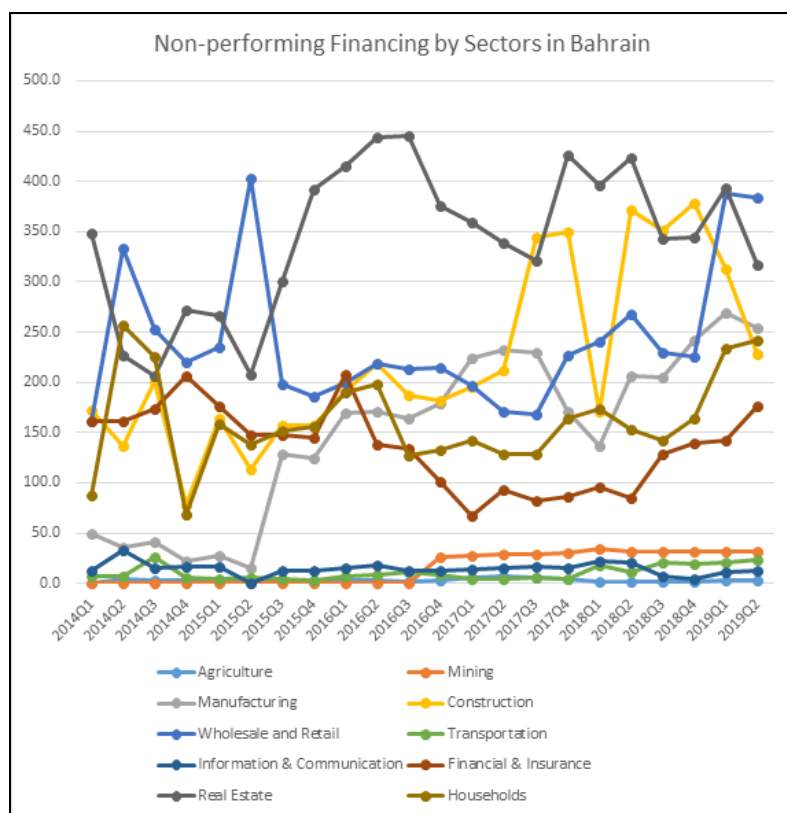
Although the statistical value of the standard deviation for all sectors is below 1, for most sectors, the standard deviation of NPSCFt is greater than ECSCFt. This implies that, in relative terms, financing NPSCFt is riskier than financing ECSCFt. Most sectors are negatively skewed, while only a few shows a high level of kurtosis ($k > 3$), and more picked distribution tends toward NPSCFt. This also indicates that NPSCFt is prone to a series of catastrophes. The report of skewness and kurtosis indicates that the series is not normally distributed. Lastly, the findings of the ANOVA test were also conducted for the equality of mean and variance. The result of ANOVA F-statistics is presented in the last column of Table 3. The result indicated a significant difference in the economically contributing and non-performing *Shariah*-compliant financing for all sectors. Similarly, the statistical significance of variance differences was confirmed by F-test, Bartlet, Levene, and Brown-Forsythe tests.

As reported in Table 4, the stationarity result for the data series conducted using ADF and KPSS unit root tests is reported. The stationary result indicates that ECSCFt and NPSCFt are not stationary in the level form but become stationary at the first difference for all sectors. This implies that the series will return to the stationary level in the event of a shock. This implies that ECSCFt and NPSCFt series fulfilled the necessary condition for using Johansen and VEC modelling techniques. The null hypothesis of the stationary test is rejected when the stationary of the series is attained at the first difference (Bekhet and Matar, 2013).

Table 4   Unit root test results of ECSCF$_t$ and NPSCF$_t$ by sectors in Bahrain

Sectors	Endogenous Variables	ADF		KPSS		Decision
		Level	1st. Diff,	Level	1st. Diff,	
Agriculture & Fishing	ECSCF$_t$	−1.9303	−16.2885***	0.5603***	0.0211	I(1)
	NPSCF$_t$	−3.0364	−17.5394***	0.4197***	0.0665	I(1)
Mining & quarrying	ECSCF$_t$	−3.1350	−17.0975***	0.3162***	0.1210	I(1)
	NPSCF$_t$	−2.1044	−16.8318***	0.4630***	0.0853	I(1)
Construction	ECSCF$_t$	−1.9341	−10.8152***	0.6283***	0.0285	I(1)
	NPSCF$_t$	−1.3672	−17.1632***	4.2571***	0.1282	I(1)
Real Estate activities	ECSCF$_t$	−1.0355	−29.7082***	4.2001***	0.0304	I(1)
	NPSCF$_t$	−1.8190	−17.2665***	4.0669***	0.0771	I(1)
Financial & Insurance	ECSCF$_t$	−1.2378	−29.2830***	3.6646***	0.0466	I(1)
	NPSCF$_t$	−2.0166	−24.0777***	2.0384***	0.1474	I(1)
Information & Communication	ECSCF$_t$	−1.3632	−11.0539***	3.3275***	0.0322	I(1)
	NPSCF$_t$	−3.1298	−16.4220***	0.3288***	0.1511	I(1)
Manufacturing	ECSCF$_t$	−1.9702	−29.6582***	0.4709***	0.0729	I(1)
	NPSCF$_t$	−2.6539	−23.8646***	0.8884***	0.1332	I(1)

Table 4 Unit root test results of $ECSCF_t$ and $NPSCF_t$ by sectors in Bahrain (continued)

Sectors	Endogenous Variables	ADF		KPSS		Decision
		Level	1st. Diff,	Level	1st. Diff,	
Transportation & Storage	$ECSCF_t$	−1.9305	−10.4332***	0.6610***	0.0250	I(1)
	$NPSCF_t$	−2.2528	−15.4699***	0.6217***	0.0539	I(1)
Wholesale & retail trade	$ECSCF_t$	−2.9289	−16.3167***	0.4103***	0.0202	I(1)
	$NPSCF_t$	−1.0213	−16.7325***	0.9237***	0.3385	I(1)
Household financing	$ECSCF_t$	−1.8706	−26.7135***	3..3935***	0.0557	I(1)
	$NPSCF_t$	−2.5383	−22.4788***	1.2227***	0.4195	I(1)

Note that *** indicates a 1% significance level.

Table 5 presents the long-run relationship between economically contributing *Shariah*-compliance financing and non-performing *Shariah*-compliance financing across ten sectors in Bahrain. Many pairs of financial time series share common features, and short-run deviation adjusts toward long-run overtime (Bhootra and Hur, 2012). The finding implies that both ECSCF*t* and NPSCF*t* have a long-run relationship. This implies that the short-run deviation, possibly due to shock, is only meant for a temporary period. The long-run relationship indicates that the sector's financing may be effective, and new market information is reflected in the financing approach. This finding supports the weak-form efficiency market hypothesis since cointegration was established by considering two variables across several sectors. The findings of this study establish a long-run equilibrium relationship between economically contributing financing and non-performing financing in the financing of some non-oil sectors in Bahrain. The speed of adjustment at which each sector responds to the temporary shock is presented in Table 6.

Table 5 Johansen maximum likelihood cointegration tests by sectors in Bahrain

Sectors	Variables	VAR Lags	Normality J-B joint test	Serial correlation LM test	H_0	λ_{Trace}	λ_{Max}	Coint. vectors
Agriculture & Fishing	$ECSCF_t$	6	0.0000	0.8411	$r = 0$	0.1021**	0.1021**	1
	$NPSCF_t$				$r \leq 1$	0.0073	0.0073	
Mining and quarrying	$ECSCF_t$	4	0.0000	0.0882	$r = 0$	0.0847**	0.0847**	1
	$NPSCF_t$				$r \leq 1$	0.0053	0.0053	
Construction	$ECSCF_t$	9	0.0000	0.8737	$r = 0$	0.0193**	0.0193**	1
	$NPSCF_t$				$r \leq 1$	0.0085	0.0085	
Real Estate	$ECSCF_t$	3	0.0000	0.3004	$r = 0$	0.0332**	0.0332**	1
	$NPSCF_t$				$r \leq 1$	0.0005	0.0005	

Table 5   Johansen maximum likelihood cointegration tests by sectors in Bahrain (continued)

Sectors	Variables	VAR Lags	Normality J-B joint test	Serial correlation LM test	H_0	λ_{Trace}	λ_{Max}	Coint. vectors
Financial & Insurance	$ECSCF_t$	7	0.0000	0.4797	$r = 0$	0.0117**	0.0117**	1
	$NPSCF_t$				$r \leq 1$	0.0011	0.0011	
Information & Communication	$ECSCF_t$	3	0.0000	0.1095	$r = 0$	0.0151**	0.0151**	1
	$NPSCF_t$				$r \leq 1$	0.0082	0.0082	
Manufacturing	$ECSCF_t$	7	0.0000	0.1755	$r = 0$	0.0181**	0.0181**	1
	$NPSCF_t$				$r \leq 1$	0.0023	0.0023	
Transportation & Storage	$ECSCF_t$	6	0.0000	0.1137	$r = 0$	0.0204**	0.0204**	1
	$NPSCF_t$				$r \leq 1$	0.0056	0.0056	
Wholesale & retail trade	$ECSCF_t$	3	0.0000	0.1372	$r = 0$	0.0249**	0.0249**	1
	$NPSCF_t$				$r \leq 1$	0.0067	0.0067	
Household financing	$ESSCF_t$	2	0.0000	0.3177	$r = 0$	0.0323***	0.0323***	1
	$NPSCF_t$				$r \leq 1$	0.0054	0.0054	

Note that ***, **, and * indicate 1%, 5% and 10% significance level respectively.

Table 6   Speed of adjustment of $ECSCF_t$ and $NPSCF_t$ by sectors in Bahrain

Sectors	Variables	Speed of adjustment		Diagnostic Test	
		Coefficient	t-statistics (ρ-value)	R^2 Adj.	F-stat.
Agriculture & Fishing	$ECSCF_t$	–0.2960	–6.3677***	0.4402	82.5518
	$NPSCF_t$	0.2136	4.8515***		
Mining & quarrying	$ECSCF_t$	–0.5919	–7.3532***	0.4621	60.5739
	$NPSCF_t$	–0.0224	–2.1470**		
Construction	$ECSCF_t$	–0.0696	–2.0088**	0.4364	57.0317
	$NPSCF_t$	0.0681	1.0317		
Real Estate	$ECSCF_t$	0.0157	2. 5404**	0.3048	87.4976
	$NPSCF_t$	0.1757	8.7728***		
Financial & Insurance	$ECSCF_t$	–0.0100	–2.0353**	0.3440	49.1380
	$NPSCF_t$	–0.0178	–5.5357**		
Information & Communication	$ECSCF_t$	–0.0064	–2.1002**	0.3866	125.3280
	$NPSCF_t$	–0.0599	–8.2922***		

Table 6 Speed of adjustment of $ECSCF_t$ and $NPSCF_t$ by sectors in Bahrain (continued)

Sectors	Variables	Speed of adjustment		Diagnostic Test	
		Coefficient	t-statistics (ρ-value)	R^2 Adj.	F-stat.
Manufacturing	$ECSCF_t$	–0.0121	–2.1730**	0.2032	24.4137
	$NPSCF_t$	0.0144	0.7649		
Transportation & Storage	$ECSCF_t$	–0.0355	–26153**	0.4146	76.0596
	$NPSCF_t$	–0.0207	–0.6560		
Wholesale & retail trade	$ECSCF_t$	–0.1191	–4.9861***	0.4032	134.3073
	$NPSCF_t$	0.1047	3.7556***		
Household financing	$ECSCF_t$	–0.0027	–2.0964**	0.3054	122.5531
	$NPSCF_t$	0.0229	9.1856***		

Note that ***, **, and * indicate 1%, 5% and 10% significance level respectively.

Table 6 presents the speed of adjustment toward the long run due to short-run shock across several sectors. A significant negative sign of the error correction term (ECT_{t-1}) indicates the shock-induced deviation is adjusting towards the long run, whereas the coefficient of ECT_{t-1} indicates the magnitude at which the adjustment is accomplished (Bekhet and Matar, 2013; Pesaran and Pesaran, 2009). Interestingly, the signs of the coefficient of $NPSCF_t$ for all sectors are mixed, causing the findings to be classified into three categories such as negative and significant, positive and significant, and not significant. This implies that those coefficients of NPSCF that are negative and significant are adjusting to establish a long-run relationship with ECSCF at the speed of their coefficients. While those sectors with positive and significant coefficients of NPSCF make greater efforts to re-establish the equilibrium with ECSCF due to short-run deviation shocks, among those are agriculture and fishing, wholesale and retail trade, and household financing. However, the NPSCF of construction, manufacturing, and transportation & storage sectors is statistically insignificant. This implies that the NPSCF of those sectors may finally end up as unrecoverable debt. At the same time, the $ECSCF_t$ responses are better to the newly available information due to the negative and statistically significant coefficient of ECT. Second, the coefficient of both $ECSCF_t$ and $NPSCF_t$ are negative and statistically significant at different magnitudes for sectors such as mining and quarrying, financial and insurance, information and communication. The speed of adjustment of $ECSCF_t$ for mining and quarrying is greater than that of all $NPSCF_t$. Even if the coefficient of $NPSCF_t$ is not statistically significant for construction, transportation and storage, and manufacturing, this result also suggests that $NPSCF_t$ responds to the shock at a very slow speed and makes greater efforts to re-establish long-run equilibrium. Third, the coefficient of real estate for both $ECSCF_t$ and $NPSCF_t$ is statistically significant but positive. This implies $ECSCF_t$ and $NPSCF_t$ are making greater efforts to re-establish equilibrium if a shock occurs.

In general, the majority of the findings indicate that adjustment towards the long run in the case of a short-run shock is slower, except for the $ECSCF_t$ of mining and quarrying, where the speed of adjustment is about 59.19%, agriculture and fishing at an

adjustment rate of 29.60%, and wholesale and retail trade activities with an adjustable rate of 11.91%. Other sectors' financing is adjusting to the shock at a very slow speed. The speed of adjustment of NPSCFt to the shock is not impressive. This finding empirically shows a need for a policy that will further reduce the possibility of NPSCFt to enhance the efficiency of Islamic banking institutions. This finding argues that the possibility that Bahrain Islamic banks are abiding by the PLS paradigm is narrow but rather supports that the interests of investment depositors and shareholders are not adequately protected. This finding supports the argument by Chong and Liu (2009) that Islamic banks' practices deviate substantially from the PLS paradigm.

## 5.1   *Impulse response function (IRF)*

In the final stage of the analysis, general impulse response functions are derived from the VAR model for the response of economically contributing *Shariah*-compliance financing and non-performing *Shariah*-compliance financing. Kim et al. (2010) defined IRF as a linear process as the "difference between realisation without shock and realisation with shock". Therefore, we quantified IRF with ±1% and ±2% shock ECSCF$_t$ and NPSCF$_t$ to compare the impact of small and large shocks across the period of the study, as presented in Figure 3. The dynamic response path of a variable due to a one-period standard deviation shock to another variable is mapped out by IRF (Masih et al., 2011; Grossmann et al., 2014). In addition, the optimal lag length for the VAR was determined by the Schwarz information criterion (SC), and the stability of the VAR was also examined. Similarly, Nazlioglu et al. (2013) used SC to determine the optimal lag length.

The IRF shows mixed results of significant and insignificant impacts from shocks. As graphically presented in Figure 3, the shocks from ECSCFt to NPSCFt are not statistically significant for some sectors such as construction financing, real estate financing, financial and insurance financing, and manufacturing. This implies that the short-run shock in ECSCFt for those sectors is not transmitted to the NPSCFt of the same sectors. However, the short-run shock from ECSCFt to NPSCFt for sectors like agriculture and fishing, mining and quarrying, information and communication, wholesale and retail trade, and household financing is statistically significant, which implies the short-run shock from ECSCFt will be transmitted to NPSCFt.

Contrary to that, short-run shocks in NPSCFt are statistically significant for all sectors except in financial and insurance financing, and to some extent, in-household financing. This implies that short-run shocks in NPSCFt are transmitted to ECSCFt. This is another indication of the vulnerability of NPSCFt to ECSCFt. Short-run financial and insurance financing shocks have no statistical significance for ECSCFt or NPSCFt. Since IRF quantifies the persistence of the shock of one variable over another variable (Hodgson et al., 2006), clearer shock behaviour would not have been captured if IRF had not been presented in this study.

In general, this study reveals sharp falls and a slight rise in the behaviour of NPSCF$_t$ through the speed of adjustment to short-run shock and graphical representation of the persistence of the shock across the period of study. However, ECSCF$_t$ behaves steadily stable after period 6, especially for the sectors in which it is statistically significant.

Figure 3 Impulse response function of both economically contributing Shariah-compliance financing and non-performing financing by sectors to the short-run shocks (see online version for colours)
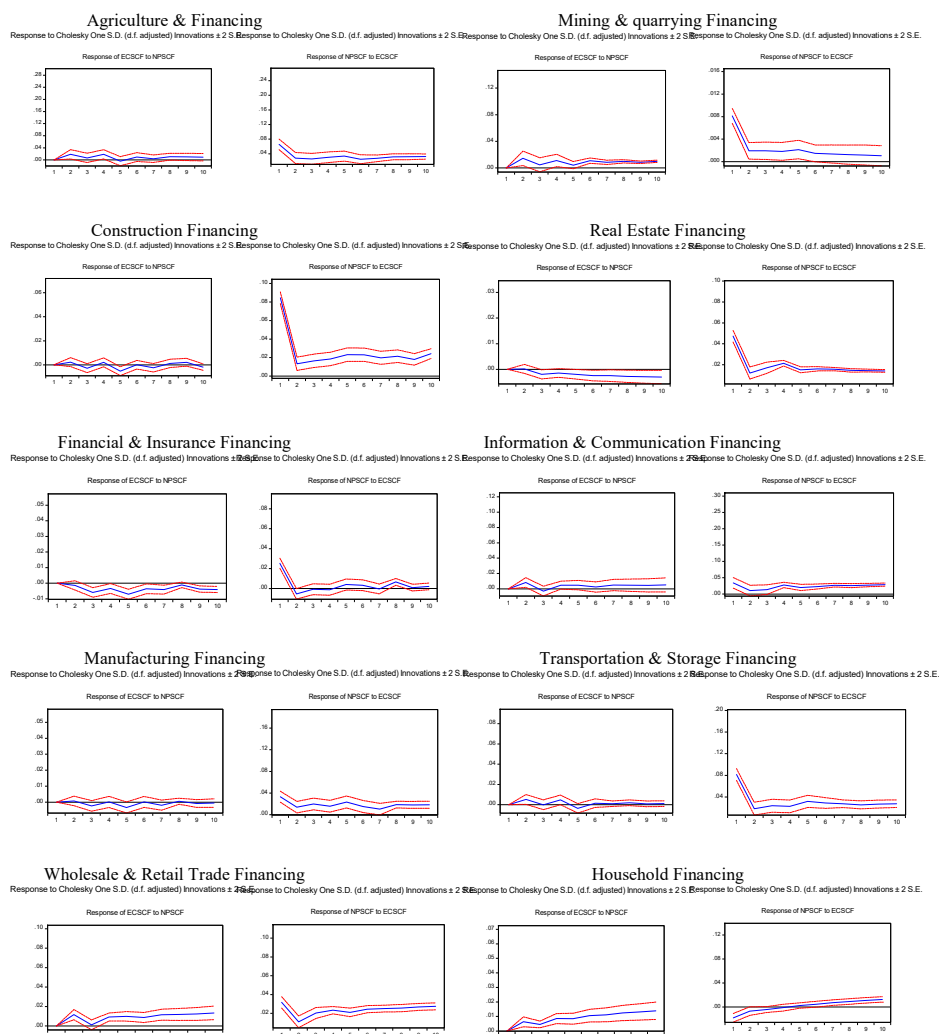
5.2 *Implications of the findings*

Our findings have several implications for Islamic banks, policymakers, and investors. From the Islamic banking perspective, these findings provide empirical evidence that the industry needs to be more strategised in financing non-oil sectors because of the risk associated with non-performing financing. Islamic banks, as financial intermediaries that link funds suppliers with funds demanders, should exercise all necessary due diligence to mitigate non-performing financing. As a result, more attention is required in financing many investor funds to sectors that may not use the financial fund to contribute to the economy's development significantly. Agénor and Zilberman (2015) advised banks to use both provision experience and economic conditions to provide financing to reduce the

negative implication of non-performing financing. The risk management of Islamic banks should pay special attention to the growth in the value of non-performing financing and make professional suggestions to the Islamic banks. This finding is consistent with the suggestion made by Chong and Liu (2009) that since Islamic banks have more to lose than conventional banks, they need to distinguish good customers from bad customers.

Even though Islamic banking is governed by *Shariah* and proving non-performing financing is due to negligence may be difficult, policymakers should pay more attention to Islamic banks' non-performing financing. This could be done by enforcing the right policy to prevent Islamic banking from providing financing that may later become non-performing. Leaving Islamic banks unmonitored on non-performing financing may not allow them to do things differently from conventional banks, which may put investors in the Islamic banking industry at greater risk. This is because the PLS paradigm requires Islamic banks to pay more attention to the kind of investment they finance as well as the credit history of the borrowers (Chong and Liu, 2009).

Both depositors and shareholders of Islamic banking are regarded as suppliers of funds, and their motives are not only to make ethical investments but also to increase the wealth of their investments (Lusyana and Sherif, 2017). Therefore, they should be conversant with the financing policy and progress report of Islamic banking to make strategic decisions that may curb Islamic banks if their financing policy is favourable. Depositors and shareholders should exercise greater caution when selecting Islamic banks and ensure their money is invested wisely (Chong and Liu, 2009).

In a nutshell, Islamic banks expect to outperform conventional banks and serve as a safe haven for investors; otherwise, the expectation of doing things differently from Islamic banks' operations may need to be revised.

6   Conclusion

In the context of the current study, non-performing financing is related to the efficiency of the redistribution of wealth, which may negatively affect several sectors and impose challenges on economic growth and development in the country. Therefore, there is a need for proactive *Shariah* compliance financing actions. In light of this, we examine the long-run relationship between economically contributing *Shariah*-compliance financing and non-performing *Shariah* compliance financing to quantify the speed of adjustment to the temporary shock to Islamic banking institutions in Bahrain. We first used Johansen cointegration to examine the long-run relationship between *Shariah*-compliance economically contributing financing and non-performing financing variables. Then, we used the error correction term (ECT) to quantify the speed of adjustment to temporary shocks throughout this study.

We discover evidence that non-performing *Shariah*-compliant financing adjusted very slowly, necessitating greater adjustment efforts in some cases. Contrary to that, we found the improved speed of adjustment of economically contributing *Shariah*-compliance financing across different sectors. These findings contribute to Bahrain's Islamic banking and finance industry and Bahrain's Vision 2030, especially on non-performing financing.

Therefore, these results suggest that Bahrain's Islamic finance industry should reduce financing for any project with a high potential of turning financing into non-performing. That might allow financing institutions to increase their financing for some sectors that

adjust better to short-run shocks to reduce the riskiness of using PLS to provide financing.

In addition, the findings of this study have important implications for Bahrain's Vision 2030. This is because efficient use of financing may result in efficient wealth redistribution by creating more jobs and reducing reliance on a few sectors. At the same time, this may enhance Bahrain's Vision 2030 to be accomplished within the proposed time frame. Diversification into other investments may enable Bahrain's Vision 2030 to be realised through 'cutting-edge infrastructure,' 'world-class infrastructure,' and "an increasing level of sophistication and innovation," as well as improve the quality of public services through cost-cutting. However, inefficient use of economically contributing financing may distort economic development and keep the projected vision from being realised within the projected time frame. As a result, an appropriate policy on the financing provided by Islamic banks is required.

Since the data relating to non-performing financing of non-oil sectors in Bahrain during the COVID-19 pandemic was not available to the public at the time of conducting this study, a future study may focus on the speed of adjustment of non-performing *Shariah*-compliance financing during and after the COVID-19 pandemic. This may enhance the current study's findings and assist Bahrain Islamic banks in making comprehensive decisions on non-performing *Shariah*-compliance financing.

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