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Article

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The nexus between Islamic banking and industrial production

Empirical evidence from Malaysia

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Abstract

Purpose – The purpose of this paper is to investigate the relationship between Islamic banking and industrial production by decomposing Islamic financing (IF) into profit and loss sharing (PLS) and non-profit and loss sharing (non-PLS) modes of financing.

Design/methodology/approach – This paper applies the autoregressive distributed lag (ARDL) approach and Toda and Yamamoto causality test on the monthly data set for Malaysia from 2010M1 to 2018M6.

Findings – The results reveal that IF plays an important role in boosting industrial production in the short run, as well as in the long run. Moreover, this positive effect mainly comes from non-PLS financing. In contrast, no significant relationship was found between PLS financing and industrial development neither in the short run nor in the long run.

Practical implications – The results have several policy implications. The existence of a time lag between the pooling of funds through PLS contracts and their channeling to industrial activities imply that Malaysian Islamic banks should maintain a long-term relationship with investment account holders. In addition, Islamic banks are called to increase the portion of PLS financing. The positive relationship between the industrial production index and IF (through non-PLS techniques) in the short and the long runs implies that policymakers in Malaysia should multiply their efforts to further expand the Islamic banking industry.

Originality/value – The originality of this study lies in decomposing Islamic banks' financing into PLS financing (*muḍārabah* and *mushārahah*) and non-PLS financing to assess the contribution of each mode of financing in industrial development.

Keywords Islamic banking, ARDL, Industrial production, PLS financing, Toda and Yamamoto causality test

Paper type Research paper

Introduction

The Islamic finance industry continues its impressive expansion with a total worth of US\$2.19tn in 2018 (IFSB, 2019). Malaysia is one of the countries that has experienced an increasing presence of Islamic banks in its banking system. Indeed, the market share of Islamic banking assets has increased to 26.5 per cent in 2018 (IFSB, 2019). In addition, the growth rate of the aggregate assets of Islamic banks and windows has increased by 9.3 per cent between 2Q2016 and 2Q2017, contributing to a 1.1 per cent increase in their domestic market share (IFSB, 2018). The first



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Islamic bank in Malaysia, Bank Islam Malaysia Berhad, was established in 1983 at a time when the government encouraged local banks to enter the Islamic finance market. In 1999, Bank Muamalat Malaysia Berhad started its operations as the second Islamic bank. After a while, the Malaysian Government also allowed foreign Islamic banks to operate. In 2004, three licenses were issued to foreign Islamic banks. At the end of 2018, there were 11 local and five foreign Islamic banks operating in Malaysia. This increasing market share of Islamic banks in Malaysia begs the question of their role in economic growth. Previous studies on this topic (Hachicha and Amar, 2015; Kassim, 2016) have focused on the role of the global Islamic banks' financing instead of identifying the contribution of each mode of financing. Thus, this study seeks to fill this gap in the literature by decomposing Islamic banks' financing into profit and loss sharing (PLS) financing (*muḍārabah* [profit-sharing contract] and *mushārahah* [PLS contract]) and non-profit and loss sharing (non-PLS) financing (the rest of Islamic banks' financings such as *murābahah*, *ijārah* and *istiṣnā'*) and investigate the relationship between Islamic banking and industrial production.

This paper provides evidence that there is a positive relationship between industrial production and non-PLS financing in the short and long run, while PLS financing appears to have no significant effect on industrial production. The contribution of this study to the existing literature is twofold. First, to the best of the authors' knowledge, it is the first attempt to decompose the global effect of Islamic banks' financing on industrial development. Second, unlike previous studies that used quarterly data to highlight the Islamic finance-growth nexus (Yazdan and Sadr, 2012; Yazdan and Dastan, 2013; Kassim, 2016), this study uses monthly data, which allows better capture of the interactions between financing and economic development through industrial production.

The remainder of the paper is organized as follows. The second section presents an overview of previous empirical studies on the relationship between Islamic banks' financing and industrial production. The third section presents the methodology used in this study. The findings are reported in the fourth section, while the fifth section summarizes the results and concludes the discussion.

Literature review

Studies on the nexus between Islamic banking and economic growth are abundant. They attempt to assess the role of Islamic banks' financing in fostering economic growth in the short run and long run. Yazdan and Sadr (2012) examine the relationship between Islamic banks' financing and economic growth in the cases of Iran and Indonesia using quarterly data (2000:1-2010:4). Their study uses the autoregressive distributed lag (ARDL) models. The results indicate that Islamic banks' financing is significantly associated with economic growth in short-run and long-run periods. The relationship appears to be bi-directional. In the same way, Abduh and Omar (2012) examine the relationships between Islamic banking development and economic growth in the case of Indonesia. The results show that Islamic financial development is significantly related to economic growth in both short-run and long-run periods. The relationship appears to be again bi-directional.

Using quarterly data (2000:1-2010:4), Yazdan and Dastan (2013) apply the panel co-integration approach models framework to examine the role of Islamic banks' financing on economic performance of nine countries in the Asian and Arab regions (Malaysia, Indonesia, Bahrain, the UAE, Saudi Arabia, Egypt, Kuwait, Qatar and Yemen). The results reveal a positive and statistically significant relationship between economic growth and Islamic banks' financing in the short run and long run. It is also found that the long-run relationship is stronger than the short-run relationship. Yusof and Bahlous (2013) examine the nexus between Islamic finance and economic growth using a panel data set from Gulf Cooperation Council countries, Indonesia and

Malaysia for the period 2000-2009. Their findings emphasize the contribution of Islamic banking to economic growth in the short run and long run. [Yusof and Bahlous \(2013\)](#) explain that a positive effect is because of the role of Islamic banking principles in increasing managers' entrepreneurial skills and in reducing agency costs.

[Hachicha and Amar \(2015\)](#) estimate the economic growth elasticity with respect to different Islamic bank financing indicators in Malaysia over the period 2000Q1-2011Q4. Their findings reveal that the effect of Islamic bank financing on economic growth is more important in the short run than their effect in the long run. They argue that the plausible explanation of this result is the fact that Islamic banks in Malaysia marginalize PLS activities.

[Caporale and Helmi \(2018\)](#) assess the effect of Islamic banking on the causal linkages between credit and gross domestic product (GDP) in countries with dual banking systems and countries without Islamic banks. They find that the long-run causality running from credit to GDP is present only in countries with Islamic banks. [Abd. Majid and Kassim \(2015\)](#) investigate the effects of Islamic banking and financial institutions on economic growth in Malaysia. They use three econometric tests, namely, ARDL-bounds testing approach, vector error correction model (VECM) and variance decompositions (VDCs) over the period 1997Q3-2009Q2. Empirical results provide a long-run equilibrium relationship between Islamic banking and financial institutions and economic growth. The study also shows a significant unidirectional causality from Islamic banking and financial institutions' development to economic growth.

The relationship between financial development and economic growth has been studied broadly in the literature. However, studies, which consider the relationship between financial development and industrialization have been overlooked in the literature ([Chen and Guariglia, 2013](#)). [Chen and Guariglia \(2013\)](#) use a panel of Chinese manufacturing firms over the period 2001-2007. They found that Chinese firms' productivity is positively and significantly affected by the availability of internal finance. [Neusser and Kugler \(1998\)](#) investigate the relationship between manufacturing growth and financial development for 13 countries from the Organization for Economic Co-operation and Development. The results show that the null hypothesis of no co-integration between manufacturing and the financial sector could not be rejected for half of the countries. They also investigate the causal relationship between these two variables, the null hypothesis of no Granger causality from financial sector activities to manufacturing is rejected only for the USA, Japan and Germany.

[Kassim \(2016\)](#) assesses the contribution of Islamic finance in boosting economic growth in Malaysia by applying the ARDL approach on a quarterly data set over the period 1998Q1-2013Q4. This study uses the industrial production index (IPI) as a proxy of the real sector of the economy. Her findings reveal that Islamic deposits turn out to have a significantly positive effect on economic growth only in the long run. [Kassim \(2016\)](#) points out also that Islamic banks' financings contribute significantly to economic growth both in the short and long runs. [Yüksel and Canöz \(2017\)](#) investigate the effects of Islamic banking on economic growth and industrial development in Turkey. They use quarterly data for the period 2005-2016. The results reveal that Islamic banks' loans do not have a significant effect on the improvement of the economy and industry in Turkey. The main reason for this result is that Islamic banking has a very low percentage in the Turkish banking sector.

[Mesagan et al. \(2018\)](#) study the relationship between financial sector development and manufacturing sector performance in Nigeria over the period 1981-2015. Unlike all previous studies, they conclude that there is no significant relationship between financial development and manufacturing sector performance in Nigeria. According to the authors, this result is explained by the low industrial production in Nigeria, which is a mono-product economy that depends on crude oil export to generate its foreign exchange earnings.

Muhammad *et al.* (2019) examine the impact of financial development on industrial production using the co-integration test and the VECM over the period 1972-2014 in the case of Pakistan. The results show a positive impact on financial development and savings on industrial growth in the long run and short run. The VECM Granger causality confirms the bidirectional causality between financial development and industrial production in the long run. The VDC approach shows that financial development has a major contribution in explaining industrial production. Setyowati (2019) finds that Islamic bank deposits and financing contribute significantly to boost industrial production in Indonesia.

The aforementioned literature review reveals that, to our knowledge, there is no empirical study on the relationship between Islamic banking and industrial production that decomposes Islamic financing (IF) into PLS and non-PLS to assess the role of each financing technique. Thus, this study seeks to fill this gap in Islamic banking literature.

Methodology

Data and variables

This study uses monthly time series data from Malaysia over the period 2010M1 and 2018M6. The choice of this period is because of the availability of data on IF decomposed into each mode of financing. The data are collected from the monthly statistical bulletin of Bank Negara Malaysia (Central Bank of Malaysia).

The main purpose of the paper is to investigate the relationship between Islamic banks' financing and industrial production. Thus, the IPI is used as a proxy for industrial development. This measure is also used by some previous studies (Kassim, 2016). The industrial production representing the dependent variable in this study is assumed to be explained by Islamic banks' financing and macroeconomic variables. The sum of *musharakah* and *muḍārabah* is used as an indicator of the ability of Islamic banks in mobilizing funds through PLS-based instruments while the rest of Islamic banks' financing is used as non-PLS contracts (including *murābaḥah*, *ijārah*, *istiṣnā'* and others).

The consumer price index (CPI) is included as a measure of inflation. Inflation may affect industrial production through the elasticity of demand. According to the hypothesis of the price elasticity of demand, the quantity demanded negatively responds to the increase of the consumer price. Kassim (2016) finds that inflation has a negative effect on industrial output. Similarly, Baharumshah *et al.* (2016) find a negative coefficient for inflation. Thus, it is expected that inflation may affect industrial production in a negative way.

The value of exports (EXP) is used as an indicator of the external sector. Easier access to foreign markets encourages firms to increase production capacity to meet higher customer demand. Mamun and Nath (2005) and Mohsen *et al.* (2015) find that exports have a positive effect on industrial production in Bangladesh and Syria, respectively. Thus, it is expected that exports may affect industrial production in a positive way.

Autoregressive distributed lag co-integration approach

This paper studies the relationship between industrial development and the components of Islamic banking financing. Following Kassim (2016), this study applies the ARDL-bounds proposed by Pesaran *et al.* (2001).

In the ARDL model, the relation between the variables is tested regardless of whether the variables are integrated of order zero or one, i.e. I(0), I(1) or a combination of both. In addition, the ARDL approach provides better results for small sample sizes in time series data than other co-integration techniques (Pesaran *et al.*, 2001; Tang, 2001). The method allows the introduction of optimal lags of both the dependent and independent variables. In addition, the ARDL model

involves the formatting of the unrestricted error correction model (ECM). The empirical formulation of ARDL models for this study is specified as follows:

$$\begin{aligned} \Delta \ln(IPI)_t = & \alpha_0 + \lambda_1 \ln(X)_{t-1} + \lambda_2 \ln(CPI)_{t-1} + \lambda_3 \ln(EXP)_{t-1} + \lambda_4 \ln(IPI)_{t-1} \\ & + \sum_{i=1}^p \beta_1 \Delta \ln(IPI)_{t-i} + \sum_{i=0}^{p_1} \beta_2 \Delta \ln(X)_{t-i} + \sum_{i=0}^{p_2} \beta_3 \Delta \ln(CPI)_{t-i} \\ & + \sum_{i=0}^{p_3} \beta_4 \Delta \ln(EXP)_{t-i} + \mu_t \end{aligned} \quad (1)$$

Where \ln denotes the natural logarithm function, IPI is the industrial production index, X represents, respectively, the aggregate Islamic banks' financing (Model I), PLS financing (Model II) and non-PLS financing (Model III). PLS represents the PLS instruments (i.e. *mushārahah* and *muḍārahah*), non-PLS represents the rest of Islamic banks' financings (*murābahah*, *ijārah*, *istiṣnā'* and others), CPI is the consumer price index, EXP is the total value of exports and μ_t is the error term.

The null hypothesis of no co-integration in the long-run relationship is defined as $H_0: \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = 0$, against the alternative hypothesis $H_1: \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq 0$. Two sets of critical value bounds for the F -statistic are generated by Pesaran *et al.* (2001). The decision to reject or accept H_0 is based on the following conditions: if F -value > upper bound $I(1)$, then reject H_0 and the variables are co-integrated; if F -value < lower bound $I(0)$, then accept H_0 and the variables are not co-integrated; but if $I(0) \leq F$ -value $\leq I(1)$, then the evidence is inconclusive.

Once co-integration is established, the conditional ARDL long-run model can be estimated as:

$$\begin{aligned} \ln(IPI)_t = & \beta_0 + \sum_{i=1}^p \beta_1 \ln(IPI)_{t-i} + \sum_{i=0}^{p_1} \beta_2 \ln(X)_{t-i} + \sum_{i=0}^{p_2} \beta_3 \ln(CPI)_{t-i} \\ & + \sum_{i=0}^{p_3} \beta_4 \ln(EXP)_{t-i} + v_t \end{aligned} \quad (2)$$

The ECM for the estimation of the short-run relationship is specified as follows:

$$\begin{aligned} \ln(IPI)_t = & \beta_0 + \sum_{i=1}^p \beta_1 \Delta \ln(IPI)_{t-i} + \sum_{i=0}^{p_1} \beta_2 \Delta \ln(X)_{t-i} + \sum_{i=0}^{p_2} \beta_3 \Delta \ln(CPI)_{t-i} \\ & + \sum_{i=0}^{p_3} \beta_4 \Delta \ln(EXP)_{t-i} + \phi ECT_{t-1} + \eta_t \end{aligned} \quad (3)$$

where ECT is the error correction term. A negative and significant ECT_{t-1} coefficient ϕ implies that any short-term disequilibrium between the dependent and explanatory variables will converge to the long-run equilibrium relationship.

The ARDL method estimates the number of regressions to obtain the optimal lag length for each variable. The terms (p , p_1 , p_2 and p_3) represent the number of lags for each variable included in the models. The Schwarz Bayesian criterion (SBC) criterion is used in this study to select the optimal lag length.

Toda and Yamamoto causality analysis

Using VAR models, the causality direction between variables can be detected. This study adopts the modified version of the Granger causality proposed by Toda and Yamamoto (1995) to

investigate the causal relationship between industrial production and the components of Islamic banks' financing. This approach is chosen because it can be performed regardless of the order of integration of the variables. [Toda and Yamamoto \(1995\)](#) proposed an approach based on the estimation of an augmented VAR ($k + d_{max}$) model, where k is the optimal lag length in the original VAR system and d_{max} is the maximum order of integration of the system's variables.

The Toda and Yamamoto causality test is conducted by estimating the following VAR ($k + d_{max}$) models:

$$\begin{aligned} \ln(IPI)_t = & \alpha + \sum_{i=1}^k \beta_i \ln(IPI)_{t-i} + \sum_{j=k+1}^{k+d_{max}} \beta'_j \ln(IPI)_{t-j} + \sum_{i=1}^k \varphi_i \ln(X)_{t-i} \\ & + \sum_{j=k+1}^{k+d_{max}} \varphi'_j \ln(X)_{t-j} + \delta_1 \ln(CPI)_t + \delta_2 \ln(EXP)_t + v_t \end{aligned} \quad (4)$$

$$\begin{aligned} \ln(X)_t = & \gamma + \sum_{i=1}^k \varphi_i \ln(IPI)_{t-i} + \sum_{j=k+1}^{k+d_{max}} \varphi'_j \ln(IPI)_{t-j} + \sum_{i=1}^k \omega_i \ln(X)_{t-i} \\ & + \sum_{j=k+1}^{k+d_{max}} \omega'_j \ln(X)_{t-j} + \theta_1 \ln(CPI)_t + \theta_2 \ln(EXP)_t + \eta_t \end{aligned} \quad (5)$$

Results

Descriptive statistics

The descriptive statistics of all the variables used in this study are reported in [Table I](#). The means of the IPI and CPI, respectively, equal to 114.8738 and 109.5039, indicating that industrial production and inflation have increased on average by 14.8738 and 9.5039 per cent, respectively, over the sample period. [Table I](#) also shows that PLS represents, on average, only 6.89 per cent of total financing. This evidence is consistent with findings in [Chong and Liu \(2009\)](#), [Hachicha and Amar \(2015\)](#) and [Abid and Mufti \(2017\)](#).

Unit root tests

The ARDL approach does not require that the variables must be integrated of the same order, i.e. the variables could be integrated of order zero or one, i.e. I(0), I(1) or a combination of both. However, the ARDL approach may be inappropriate if one of the variables is integrated of order two, i.e. I(2). Thus, a two-unit root test is performed to verify that all variables are either I(0) or I(1). The first one is the Augmented Dickey–Fuller (ADF) test, which adjusts for autocorrelation, and the second one is the Phillips–Perron (PP), which adjusts for both autocorrelation and heteroscedasticity.

The results of the unit root tests reported in [Table II](#) indicate that the logs of total IF, non-PLS, CPI and total EXP are stationary at level, i.e. integrated of order zero, I(0). In contrast, the logs of IPI and PLS have unit roots at their levels but they become stationary after first difference, and therefore, integrated of order one, I(1). This combination between I(0) and I(1) variables requires the use of the ARDL approach to investigate the co-integration.

Results of the co-integration test

The first stage in studying the long-run relationship between variables is to test the co-integration by computing the F -statistics. [Pesaran et al. \(2001\)](#) provide two critical bounds:

- (1) the first one for the ARDL model when all the regressors are I(0); and

(2) the second one for the ARDL model when all variables are I(1).

If the computed *F*-statistic is higher than the upper critical value, this implies that the null hypothesis of the absence of co-integration long-run relationship can be rejected. The results of the bounds tests reported in Table III reveal that, for the three models, the null hypothesis can be rejected at the 1 per cent level of significance. This result suggests that there is a long-run relationship between the variables used in this study.

Estimates of the long-run relationship

We began by estimating the long-run relationship between total IF and industrial production; then we decomposed this financing into PLS and non-PLS modes. The results of the estimates of the three models are displayed in Table IV. The total IF turns out to have a significant positive coefficient suggesting that a 1 per cent change in IF leads, *ceteris paribus*, to 0.254 per cent increase in industrial production. This important contribution of IF in industrial development in Malaysia may be explained by the fact that the financial contracts of Islamic banks must be linked directly to the real economy (Gulzar and Masih, 2015; Kammer *et al.*, 2015). This result is consistent with earlier findings in Chen and Guariglia (2013) for China, Kassim (2016) for Malaysia, Mesagan *et al.* (2018) for Nigeria and Muhammad *et al.* (2019) for Pakistan.

Decomposing total IF into PLS financing (comprising *muḍārabah* and *mushārahah*) and non-PLS financing, we point out that there is no evidence on the long-run relationship between PLS financing and industrial development. In contrast, we provide evidence on the strong linkage between non-PLS and industrial production. The plausible explanation of this result is that only a negligible portion of Islamic

Statistics	Variables					
	IPI	IF	PLS	Non-PLS	CPI	EXP
Mean	114.8738	296,697.2	20,456.33	276,240.9	109.5039	62,796.08
Median	114.4069	291,410.9	17,758.56	273,652.3	109.9000	61,585.00
Maximum	133.8746	452,046.3	44,194.42	407,851.9	119.7000	82,624.81
Minimum	91.26477	135,309.2	2,412.511	132,896.6	99.40000	46,641.03
SD	11.29766	103,997.6	13,789.74	90,435.73	6.170818	7,438.919
Observations	102	102	102	102	102	102

Notes: Where: IPI = Islamic production index; IF = Total Islamic financing; PLS = Profit and loss sharing contracts; CPI = Consumer price index; EXP = Total value of exports

Table I.
Descriptive statistics

Variables	ADF test		PP test		Stationarity status
	Level	First difference	Level	First difference	
ln(IPI)	-1.183	-7.715***	-2.053	-39.794***	I(1)
ln(IF)	-2.941***	-6.088***	-2.875**	-9.152***	I(0)
ln(PLS)	-4.506***	-5.160***	-3.463**	-8.669***	I(0)
ln(nonPLS)	-2.994***	-9.056***	-2.931**	-9.120***	I(0)
ln(CPI)	-0.311	-8.422***	-0.329	-8.352***	I(1)
ln(EXP)	-0.953	-11.043***	-3.566***	-16.168***	I(0)

Note: ** and *** represent significance levels at 5 and 1%, respectively

Table II.
Unit root test

banks' financing in Malaysia (Table I) is compliant with PLS principles (Chong and Liu, 2009; Hachicha and Amar, 2015).

The CPI used as a measure of inflation shows a negative impact on industrial production in the three models. This result corroborates that of Kassim (2016) in Malaysia, and Baharumshah *et al.* (2016) in a panel of 94 emerging and developing countries. However, the effect of inflation is statistically significant only in Model II.

The variable EXP enters with a positive sign and is highly significant in the three models. This result is expected, as the easier access to foreign markets encourages firms to increase production capacity to meet higher customer demand.

The results of the diagnostic tests are presented in the second part of Table IV. They indicate that, for the three models, there is no serial correlation among residuals at a 5 per cent level of significance. Moreover, the residuals appear to be normally distributed and homoscedastic.

Estimates of short-run relationship and the error correction model

The results of the short-run relationship between Islamic banking and industrial production are reported in Table V. They reveal that IF has a positive impact on industrial production in the short run. The coefficient of IF is 0.1830 and statistically significant at the 1 per cent level, implying that a 1 per cent change in IF leads, *ceteris paribus*, to a 0.183 per cent increase in industrial production. This result is consistent with that of Kassim (2016) in Malaysia. We also notice that the short-run

Table III.
Results of bounds
test

Computed <i>F</i> -statistic	Model I <i>F</i> = 11.546	Model II <i>F</i> = 10.216	Model III <i>F</i> = 10.514
	Critical bounds (<i>k</i> = 3)		
Levels of significance (%)	I (0)		I (1)
1	4.29		5.61
5	3.23		4.35
10	2.72		3.77

Note: The critical values are based on Pesaran *et al.* (2001)

Table IV.
ARDL estimates of
long-run relationship

Regressors	Model I (with IF)		Model II (with PLS)		Model III (with non-PLS)	
	Coefficients	<i>t</i> -statistics	Coefficients	<i>t</i> -statistics	Coefficients	<i>t</i> -statistics
ln(IF)	0.254***	33.219				
ln(PLS)	–	–	0.013	0.495	–	–
ln(non-PLS)	–	–	–	–	0.267***	3.571
ln(CPI)	–0.608	–1.010	–1.275***	–0.802	–0.548	–0.976
ln(EXP)	0.311***	2.987	0.209**	2.115	0.295***	2.958
Intercept	1.217	0.868	–2.978**	–2.015	0.916	0.719
Observations	102		102		102	
Diagnostic test statistics						
Serial correlation	1.153 [0.271]		1.571 [0.147]		1.128 [0.311]	
Normality	1.201 [0.577]		0.917 [0.625]		1.007 [0.602]	
Heteroscedasticity	1.878 [0.111]		1.915 [0.111]		1.811 [0.115]	

Note: ** and *** represent significance levels at 5% and 1%, respectively

relationship is smaller than the long-run relationship. This result corroborates that of [Yazdan and Dastan \(2013\)](#) in nine countries in the Asian and Arab regions. The error correction terms take negative and significant signs in the three models, suggesting the existence of an adjustment process toward equilibrium. On the other hand, we point out that PLS financing does not have any effect on industrial production in the short run. In contrast, non-PLS financing turns out to have a significant positive effect on industrial development in the short run.

Finally, all the plots of the cumulative sum of recursive residuals (CUSUM) are within the critical bounds of the 5 per cent significance level ([Figures 1, 2 and 3](#)); hence, the null hypothesis of the stability of all the coefficients in the regressions can be accepted.

Toda and Yamamoto causality test results

In this paper, the Toda and Yamamoto causality approach is used to detect the direction of causality between industrial production and the components of Islamic banks' financing. To

Regressors	Model with IF		Model with PLS		Model with non-PLS	
	Coefficients	t-statistics	Coefficients	t-statistics	Coefficients	t-statistics
$\Delta (\ln IF)$	0.183***	3.581	–	–	–	–
$\Delta (\ln PLS)$	–	–	0.013	0.512	–	–
$\Delta (\ln non-PLS)$	–	–	–	–	0.185***	3.498
$\Delta (\ln CPI)$	–0.453	–1.108	–0.421	–0.637	–0.367	–0.983
$\Delta (\ln CPI[-1])$	–	–	–2.823**	–2.004	–	–
$\Delta (\ln CPI[-2])$	–	–	4.151***	3.084	–	–
$\Delta (\ln CPI[-3])$	–	–	–3.318***	–3.956	–	–
$\Delta (\ln EX)$	0.423***	8.615	0.4118***	8.247	0.425***	8.515
ECM(–1)	–0.683***	–6.347	–0.583***	–5.692	–0.663***	–6.113
Observations	101		98		101	

Table V.
ARDL estimate of short-run relationship

Notes: ARDL (1, 0, 0, 1) is selected for IF and non-PLS while ARDL (1, 0, 4, 1) is selected for PLS based on Schwarz criterion. ** and *** represent significance levels at 10 and 1%, respectively

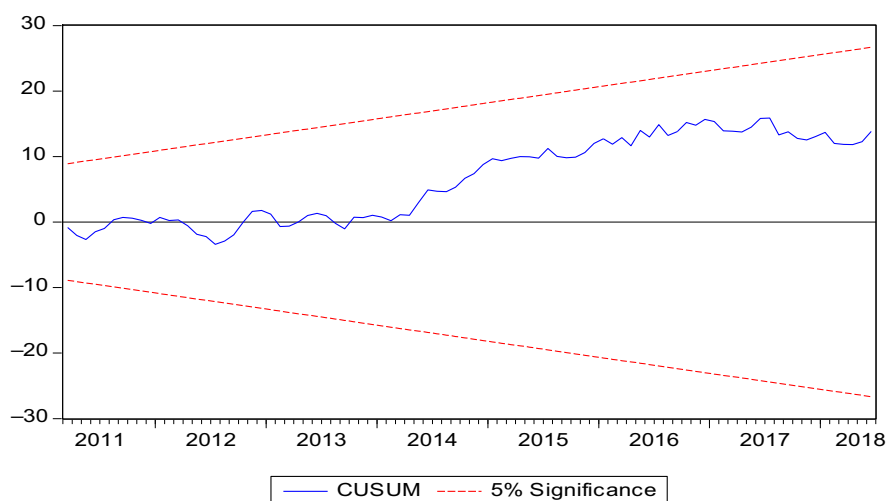


Figure 1.
Plot of the CUSUM for IF

Figure 2.
Plot of the CUSUM
for PLS

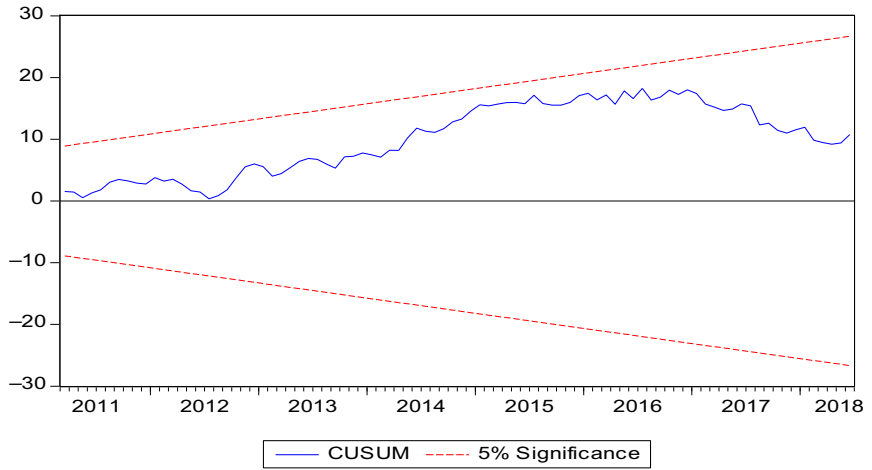


Figure 3.
Plot of the CUSUM
for non-PLS

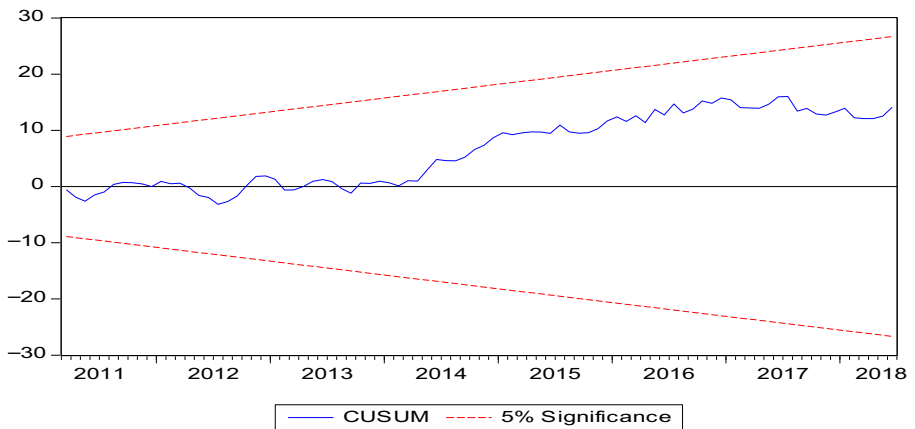


Table VI.
Causality test results

Null hypothesis	df	χ^2	Prob	Direction of causality
IF does not granger cause IPI	4	12.993	0.0106	Bidirectional causality
IPI does not granger cause IF	4	12.8142	0.0123	Bidirectional causality
PLS does not granger cause IPI	4	4.856	0.3549	No causality
IPI does not granger cause PLS	4	1.082	0.9049	No causality
Non-PLS does not granger cause IPI	4	12.894	0.0118	Bidirectional causality
IPI does not granger cause non-PLS	4	12.619	0.01306	Bidirectional causality

estimate the optimal lag length k , Akaike information criterion and SBC are used. The empirical results of the causality test reported in [Table VI](#) reveal the existence of a bidirectional relationship between industrial production and Islamic banking as measured either in aggregate terms or in terms of non-PLS only. In contrast, there is no causality relationship between PLS and industrial development.

Conclusion

The development of the Islamic finance industry and the increasing market share of Islamic banking in Malaysia make it necessary to assess the contribution of Islamic banks' financing to industrial production. Thus, the main goal of this study was to investigate empirically the contribution of each mode of Islamic banks' financing to industrial development. Using the ARDL and bounds testing approaches, this study provides evidence that Islamic banks' financing plays an important role in enhancing industrial development and that this positive effect in the short and the long run comes mainly from non-PLS financing. In contrast, the absence of any significant effect of PLS financing on industrial production may be attributed to the fact that *muḍārabah* and *mushārahah*, considered as long-term financing contracts, need long periods to give their effect. Thus, future research on this topic should use longer periods of study. The Toda and Yamamoto causality test show a bidirectional relationship between industrial development and IF, as well as non-PLS. In contrast, no causality relationship is found between PLS and industrial development.

These findings have several policy implications. The existence of a time lag between the pooling of funds through PLS contracts and their channeling to productive investment activities imply that Malaysian Islamic banks should maintain a long-term relationship with investment account holders. In addition, Islamic banks are called to increase the portion of PLS financing. The positive relationship between the IPI and non-PLS in the short and the long run implies that policymakers in Malaysia should multiply their efforts to further expand the Islamic banking industry.

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