Competition between conventional and Islamic banks in Malaysia revisited
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Abstract

Purpose – This paper aims to assess the nature of competition between conventional and Islamic banks operating in Malaysia. It is an effort to enrich the existing literature by offering an empirical compromise on the differences in the results of studies related to competition between the two types of banks.

Design/methodology/approach – Secondary data on all banks operating in Malaysia’s diversified banking sector is collected from the FitchConnect database for the period 2011-2017. A non-structural measure of competition (H-statistic) as informed by Panzar–Rosse is used to measure the competition between conventional and Islamic banks. Panel data analysis techniques are used to estimate H-statistic. Wald test for the market structure of perfect competition/monopoly is used to affirm the validity and consistency of the results.

Findings – The findings of this study signify that the Malaysian banking sector operated under monopolistic competition during the period of study. The long-run equilibrium condition holds for the Malaysian banking sector. Competition among conventional banks is more intense than that among Islamic banks. Financial reform endeavours of Bank Negara Malaysia (BNM) along with the liberalisation wave of the financial system were successful in promoting competition, rendering the financial system contestable, resilient and dynamic.

Practical implications – Regulators and policymakers may find the results beneficial in terms of rethinking the number of banks operating in the Islamic sector. The number of banks, however, is not the only determinant of competition in the banking sector. Implications of competition change for stability and risk-taking behaviour of banks should be considered.

Originality/value – Within the context of Malaysia’s diversified banking system, given the contradictory results reported in studies on competition, this study is an effort to provide a plausible middle ground. It suggests a possible answer as to why competition nature has not changed since the policy change initiatives of BNM, namely, banks merger, expansion of Islamic banking operation scope and liberalisation process.

Keywords Competition, Panzar–Rosse, Islamic banks, Conventional banks, Diversified banking system

Paper type Research paper

1. Introduction

Structural change takes place when firms change their business operations because of changing economic conditions. The implications of the structural changes for bank operations depend on the degree of competition within the banking market. Malaysia’s banking system is a diversified banking system that has undergone several transformations. Structurally, the Malaysian banking market has experienced four major structural-change processes, namely, the application of the Islamic banking system (Husain, 2019).
These processes exposed Malaysian banks to greater competition from foreign and non-bank financial intermediaries. The changes in market competition are a result of many structural changes, which led to a transformation in the number and type of financial institutions and their range of operations/activities. The market structure has changed significantly as a result of liberalisation that facilitated the entry of foreign banks into the Malaysian banking sector, which in turn, intensified competition among banks at the local and global levels. The implementation of advanced technology, in turn, paved the way for banks to extend their range of operations in the market, especially in terms of services. Banks that adopt advanced technology have a greater capacity to compete, retain or increase their market share.

Accordingly, the present study assesses the competition in Malaysia’s diverse banking sector within and between conventional and Islamic banks. The study sheds light on whether competition among Islamic banks has improved compared to competition among conventional banks. This study enriches the studies that focused on the conventional sector (Casu and Girardone, 2006; Abdul Majid and Sufian, 2007; Sharma and Bal, 2010). Nonetheless, two very recent studies on the diversified banking system of Malaysia reported contradicting results despite the fact that the sample and period of study are the same. Ibrahim et al. (2019) and Mohammed et al. (2018) examined competition between conventional and Islamic commercial banks over the same period, namely, 1997-2016 and 1997-2015, respectively. However, they reported contradicting results. Ibrahim et al. (2019) provided evidence that conventional commercial banks, to a certain extent, are more competitive than Islamic banks. By contrast, Mohammed et al. (2018) maintained that competition among Islamic commercial banks is more intense than that among conventional banks. Unlike these two studies, this study considers all banks operating in the Malaysian banking industry, regardless of their type. This is an effort to meet these researchers halfway in terms of their empirical results. In addition, the study investigates the most elastic input prices (sensitive to outputs) that contribute to competition for both Islamic and conventional banks. It contributes to the literature by assessing competition within and between the two types of banks by extending the sample considering all banks operating in Malaysia.

The remainder of the paper is arranged as follows. Section 2 presents the changes that have transpired in the Malaysian Islamic banking sector. Section 3 reviews the literature relevant to competition in the banking sector and its measures. Section 4 details the data collection methods and analytical tools. Section 5 provides a comprehensive discussion of competition estimates as well as empirical comparison of competition condition between and within Islamic and conventional banking sectors. Section 6 concludes the study and includes policy implications.

2. Literature review
Fundamentally, this study focuses on competition within a diversified banking system. The literature is limited to the context of Malaysia’s banking system. It sheds light on the structural changes the banking system has undergone and presents the approach widely used to measure competition.

2.1 Structural changes in the Malaysian banking sector
The banking industry in Malaysia has undergone accelerated liberalisation resulting in a rapid expansion in business reflected in the immense increase in the portfolio of loans and operations. Given the robust principles and local demand within Malaysia’s banking sector, Malaysian banks have expanded their operations to foreign markets despite the negative indirect effects of the US subprime crisis (Saiti et al., 2016).
A promising initiative to motivate mergers of small-sized local banks, a two-tier banking system was introduced by Bank Negara Malaysia (BNM) in the 1990s. This marked the onset of the consolidation process in the Malaysian banking sector (Bank Negara Malaysia, 1999). Nevertheless, this initiative was unsuccessful as very few mergers were carried out to capitalise on the advantages of the tier-one banking group status (Suansen, 2007). Only three banking mergers were awarded the tier-1 status. Suansen (2007) stated that the smaller banks with the tier-2 status had increased their capital to qualify for tier-1 status. Further, to guarantee sufficient return on capital, banks with considerable tier-2 have been lending unwisely and, as a result, endured significant losses during the Asian financial crisis (Suansen, 2007). In the aftermath of the 1997 Asian financial crisis, and to scale down the likely effects of systemic banks upon the banking sector, tight measures were adopted to compel incorporated local banks to merge (Bank Negara Malaysia, 1999). Consequently, a further merger plan was introduced, where local banking institutions were required to merge and appoint a leader (Bank Negara Malaysia, 1999). In response to this plan, ten domestic banking groups were merged. Despite this, BNM stated that it would still take part directly to single out partners if banks do not manage to accomplish the mergers. Ten anchor banks were chosen, and each bank possessed a minimum shareholders’ fund of RM 2bn and an asset base of at least RM 25bn (Bank Negara Malaysia, 1999). The number of local banks declined considerably as a result of the formation of these 10 banking groups to only 29 banking institutions. The result was ten finance companies, ten commercial banks and nine merchant banks.

Malaysia’s banking sector witnessed considerable changes in market structure in the aftermath of the consolidation process. In this regard, the consolidation process was marked as a structural amendment of the local banking sector. The number of banks dropped after the consolidation process, and the market became more concentrated. Horizontal mergers among banks characterised the Malaysian banking sector’s consolidation, which caused overlapped market partition, leading to the creation of many chief banks and/or financial holding companies, and hence a broad distribution of bank size.

The financial landscape in Malaysia has witnessed dramatic changes. Malaysia has successfully implemented a diversified banking system. Malaysia’s Islamic banking is unique because of it being horizontally and vertically institutionalised into social, economic and political institutions. The width and depth of integration are parallel to that of conventional banking. Islamic banking has gained its importance and has been on an advanced upward trend. As of 2000, the Islamic banking industry has experienced annual growth at an average rate of 19% in terms of assets (Abdul Majid and Suansen, 2007). Based on Table 1, the number of institutions in the Malaysian banking system landscape has changed. The commercial banks decreased from 27 to 22 in 2006, then it remained constant until the year 2010 where it increased to 23 participants, 25 in the year 2011, and from 2012 to 2017 the number was stable at 27 commercial banks. For investment banks, they witnessed the entry of five participants, after that they decreased to ten participants. Islamic banks increased from 6 participants in the year 2005 to 17 by the year 2017. This increase in the number of Islamic banks was because of the introduction of Islamic banking subsidiaries as well as allowing foreign banks to participate in the Malaysian banking system. This signifies that the market share of Islamic banks in the Malaysian banking system has increased, which has implications for competition and concentration.

2.2 Panzar–Rosse approach: theory and evidence

The Panzar–Rosse (P-R) approach is used in this study to measure competition. The P-R technique depends on the presumption that banks will use distinguished pricing strategies in response to changes in input prices (e.g. cost of funds [PF], cost of labour [PL] and cost of...
capital (PK)) according to the market structure in which they operate. Hence, whether a bank operates in a competitive environment or practices monopoly power can be deducted from the analysis of that bank’s total revenue as it reacts to changes in input prices. The test is extracted from an inclusive banking market model. It specifies equilibrium output and the equilibrium number of banks by maximising profits at both industry and bank levels. Two crucial suggestions are identified for this equilibrium model. Firstly, at the bank level, profit is maximised where marginal revenue is equal to marginal cost:

\[ R^i_y (y_i, k, v_i) - C^i_y (y_i, f_i, q_i) = 0 \]

\( R^i_y \) is the marginal revenue function; \( C^i_y \) is the marginal cost function; \( y_i \) is the output of bank \( i \); \( k \) is the number of banks; \( v_i \) and \( q_i \), composed of exogenous variables that shift the bank’s revenue and cost functions, respectively; and \( f_i \) is a vector of bank \( i \)'s factor input prices. The second suggestion is that the zero-profit constraint holds at the industry level:

\[ R^y (y^*, k^*, v_j) - C^y (y^*, f, q) = 0 \]

According to several studies (Claessens and Laeven, 2004; Yildirim and Philippatos, 2007; Agoraki et al., 2011; Schaeck and Cihak, 2012; Hamza and Kachtouli, 2014), the proxy most commonly used to evaluate the banking sector competing at the bank level is the P-R model, which uses the H-statistic index. It was constructed by Rosse and Panzar (1977) and Panzar and Rosse (1987). H-statistic is the addition of the input price elasticities of the reduced-form revenue equation, which discloses the market contestability circumstances of the banking sector. The input price elasticities represent the linkage between the returns and the input prices. Therefore, it is possible to use these elasticities to examine how alterations in returns appear when input prices change, and the estimation of the sum of these elasticities is representative of the contestable behaviour within the banking sector. Casu and Girardone (2006) stated that the test should be termed H-statistic given that it is calculated from a reduced-form revenue equation and measures the total elasticity of revenue of the firm regarding the firm’s factor prices that can be formulated as follows:

\[ \sum_{k=1}^{m} \frac{\partial R^i_y}{\partial w_{hi}} \times \frac{w_{hi}}{R^i_y} \]

where \( R^i \) is the returns of the bank (income) \( i \), \( w_{hi} \) is the input price for bank \( i \) and \( \partial R^i_y \) and \( \partial w_{hi} \) are the changes in revenue and input prices, respectively. The variables marked with a

<table>
<thead>
<tr>
<th>Year</th>
<th>Islamic banks</th>
<th>Commercial banks</th>
<th>Merchant/investment banks</th>
<th>Total number of institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005-2006</td>
<td>6-10</td>
<td>27-22</td>
<td>10</td>
<td>43-42</td>
</tr>
<tr>
<td>2007-2008</td>
<td>11-17</td>
<td>22</td>
<td>14-15</td>
<td>47-54</td>
</tr>
<tr>
<td>2009-2010</td>
<td>17</td>
<td>22-23</td>
<td>15</td>
<td>54-55</td>
</tr>
<tr>
<td>2011-2012</td>
<td>16</td>
<td>25-27</td>
<td>15-13</td>
<td>56</td>
</tr>
<tr>
<td>2013-2014</td>
<td>16</td>
<td>27</td>
<td>12-11</td>
<td>55-54</td>
</tr>
<tr>
<td>2015-2016</td>
<td>16</td>
<td>27</td>
<td>11</td>
<td>54</td>
</tr>
<tr>
<td>2017</td>
<td>17</td>
<td>27</td>
<td>10</td>
<td>54</td>
</tr>
</tbody>
</table>

Source: Bank Negara Malaysia (2016)
star are the equilibrium values for these variables (Panzar and Rosse, 1987; Shaffer and DiSalvo, 1994; Vesala, 1995; Bikker and Haaf, 2002).

As shown in Table 2, the size of the H-statistic provides information on the contestable behaviour of the market in question (Panzar and Rosse, 1987). When \( H \leq 0 \), it indicates that the market is in a monopoly condition or a short-run conjectural variation oligopoly because an increase in input prices increases the marginal costs of the bank. This, in turn, reduces the equilibrium output level and overall revenue (Panzar and Rosse, 1987; Vesala, 1995; Shaffer, 1983). If the H-statistic value ranges between zero and one, i.e. \( 0 < H < 1 \), then the market is running under monopolistic contestability conditions. Under these conditions, the income experiences less increase proportionally to factor prices alterations as the demand is not elastic (Panzar and Rosse, 1987). Eventually, for perfect contestability, the H-statistic is equivalent to one, i.e. \( H = 1 \). Under this circumstance, an increase in input prices brings about the exit of some banks from the market. This phenomenon takes place when an increase in the average and marginal costs experienced by banks will not bring forth alterations in the optimum output levels of individual banks as the demand is perfectly elastic. The reduction in the number of banks in the industry results in a rise in demand and output prices, and hence revenue and costs increase evenly, while the sector remains in a long-run equilibrium (Panzar and Rosse, 1987).

Applying the P-R method necessitates that observations should be in long-run equilibrium. Investigating the long-run equilibrium is based on the estimation of H-statistic in a reduced form equation where revenues (dependent variable) are substituted with return on assets (ROA) or return on equity (ROE). The generated H-statistics is anticipated to equal zero in the long-run equilibrium, and negative otherwise. This supposition has been vindicated in practice, that is, when risk-adjusted return rates are uncorrelated with input prices in equilibrium. Nonetheless, the entry and exit of firms could be critical for equilibrium validation. Therefore, equilibrium within this method is considered a serious issue (Gutiérrez de Rozas, 2007). On the other hand, the long-run competitive assessment necessitates increasing the marginal cost. This is a technical constraint on the presence of long-run competitive equilibrium, rather than a shortcoming of the P-R method (Bikker et al., 2012). Generally, this method is considered a useful approach when assessing conditions in the markets as revenues are more likely to be observed compared to prices of output. In addition, given that, presently, data availability is no longer a serious concern, all necessary information used in the P-R model is obtainable from financial statements and various databases, thereby rendering the approach more successful on the ground (Gutiérrez de Rozas, 2007).

<table>
<thead>
<tr>
<th>Parameter zone</th>
<th>Contestable environment test</th>
</tr>
</thead>
<tbody>
<tr>
<td>( H \leq 0 )</td>
<td>Market structure in this range is featured with either monopoly or perfectly colluding oligopoly, as under these two situations the input prices (PL, PF and PK) increase lead to increase in marginal costs, lessen equilibrium output and thereby scale down total firm revenue</td>
</tr>
<tr>
<td>( 0 &lt; H &lt; 1 )</td>
<td>Monopolistic competition</td>
</tr>
<tr>
<td>( H = 1 )</td>
<td>Contestability at its perfect stage, any rise in input prices give rise to both marginal and average costs without changing the optimal output of any individual firm. It also means natural monopoly in a perfectly competitive market or sales maximizing firm subject to a breakeven barrier</td>
</tr>
<tr>
<td>( H = 0 )</td>
<td>Equilibrium</td>
</tr>
<tr>
<td>( H &lt; 0 )</td>
<td>Disequilibrium</td>
</tr>
</tbody>
</table>

Table 2. Interpreting the H-statistics of P-R
Even though the number of empirical studies on competition in the banking sector has seen an increasing trend, it is still relatively scarce, particularly in countries that adopt a diversified banking system. To this end, this study investigates competition in Malaysia’s diversified banking system to provide evidence on two banking systems coexisting in the same environment. Especially after the Islamic banking sector has seen considerable growth and development in Malaysia, where it has been gaining more market power in the face of the fierce competitive conventional sector. This approach differs between the studies (Abdul Majid and Sufian, 2007; Fah and Ariff, 2017; Ibrahim et al., 2019) that investigated competition, either at the banking sector level, focusing on commercial banks only, or by using the ten largest banks in the banking sector. In addition, studies have focused on one sector only, i.e. Islamic sector (Abdul Majid and Sufian, 2007; Mohammed et al., 2015) or conventional sector (Gajurel and Pradhan, 2012; Sharma and Bal, 2010). Although, Hakim and Chkir (2014) used concentration measures to measure competition, and Uddin and Suzuki (2014) examined both banking systems, the study of both banking streams is still limited, particularly for an emerging economy like Malaysia. Mohammed et al. (2018) sampled all banks operating in the Malaysian banking system over the period from 1997 to 2013. Similarly, our study considers all Islamic and conventional banks operating in the Malaysian banking sector for a comprehensive comparative analysis of both sectors over the period from 2011 to 2017.

Four recent studies have addressed the topic of competition in the Malaysian banking sector as a comprehensive comparative study between Islamic and conventional sectors. The first study by Ibrahim et al. (2019) used 21 conventional and 16 Islamic commercial banks for the period from 1997 to 2015. The Lerner index was used to measure competition. Essentially, the Lerner index reflects the ability of banks to set their prices above the marginal cost. In other words, it is the difference between output prices and marginal costs. It is also used to detect technical changes in the cost function. They concluded that the consolidation wave has not curbed the competitiveness capacity of banks. The competition-stability view holds, especially for commercial banks. In other words, competition is a strengthening mechanism for the stability of the banking sector. The Lerner index of the Islamic banking sector was below that of its conventional counterpart, that is, Islamic commercial banks are less contestable than their conventional counterparts. It is worth mentioning that conventional banks reflect the competitiveness of the entire banking sector because of their dominance over the sector in both size and number. Finally, both Islamic and conventional banks experienced monopolistic competition during the study period.

The second study by Mohammed et al. (2018) is similar to Ibrahim et al. (2019) where the period 1997-2016 was investigated. Both studies sampled commercial banks. However, Mohammed et al. (2018) used the P-R method as a non-structural test. The dependent variables used in estimating the P-R model are total revenues and income generated out of interest or financing activities. The second dependent variable was used to check for robustness. The study assessed the degree of competition in the Malaysian banking industry. It investigated Islamic banks’ capability to cope with the fierce competition from their well-established conventional counterparts. It was concluded that, in general, Islamic and conventional banking sectors experienced monopolistic competition. Competition in the Islamic banking sector was slightly higher than that in the conventional sector as compared to Ibrahim et al. (2019) where the opposite was found. Throughout the study period, competition ranged between $-0.253$ and $0.931$ for Islamic banks and between $-0.153$ and $0.871$ for conventional banks. Regardless of using different measuring techniques in assessing completion and given that the sample and the study period are the same for both studies, it is surprising that the results are contradictory in terms of competition level within the Islamic and conventional banking sectors. The results
are contradicting, yet still lend support to the monopolistic competition feature characterising the Islamic and conventional sectors.

The third study by Fah and Ariff (2017) is unlike the aforementioned two studies in sample and period; only the largest 11 banks in the Malaysian banking industry were used in the study covering the period 2006-2014. However, it used both techniques in assessing competition, namely, the P-R model non-structural test and Lerner Index. They argue that, as these 11 banks make up 87% of the industry, investigating them is equivalent to investigating the entire sector. Discordantly, the study concluded that neither perfect nor monopolistic competition was prevailing during the study period. Competition appeared to be like a cartel with low H-statistic. The Lerner index, which is a measure over time, indicates slowly increasing competition perhaps owing to the learning effect from adjusting to post-consolidation realities. The study argued that consolidation might lead to shape a cartel-like structure which is not favourable because of misuse of market power in the name of stability.

The fourth study by Wahid (2017) used a sample of 37 banks, comprising 17 Islamic and 21 conventional banks. The P-R method was used to estimate competition. For the entire period, both types of banks experienced monopolistic competition. Islamic banks were operating in a more competitive environment compared to their conventional partners. When considering the 2008 financial crisis, Islamic banks were operating in a monopoly environment during the pre-crisis period; however, their conventional counterparts were operating under monopolistic competition. Therefore, conventional banks were experiencing a more competitive environment compared to Islamic banks. On the other hand, during the crisis period, Islamic banks approached perfect competition, whereas conventional banks continued to earn profit under monopolistic competition. This indicates the superior competitiveness of the Islamic sector. During the post-crisis period (2010-2013), conventional banks appeared to be operating in a more competitive environment compared to Islamic banks.

3. Data and methodology

Annual bank-level data on all Malaysian banks covering the period from 2011 to 2017 is collected from the FitchConnect database. The overall number of banks operating in the Malaysian banking sector during the study period is 54, comprising 17 Islamic and 37 conventional banks. This gives a total of 362 yearly observations. Three banks are excluded from the sample because of data unavailability.

The P-R model is applied to estimate contestability in the banking sector at three levels, namely, industry, Islamic and conventional sectors. Unlike Bikker and Haaf (2002), Claessens and Laeven (2004) and Shaffer (1982), who used the P-R model revenue test, we use total income in estimating contestability. We do so because Islamic banks do not generate profit from interest-based activities. The method is to gauge the impact of factor prices on the observed equilibrium values of total income (TINC). TINC is the operating and non-operating income and input prices are PF, PL and PK. Total loans to total assets (TA), non-performing loans to TA, equity to TA and TA are used as bank-specific factors. Following Sarkar and Sensarma (2016) and Maji and Hazarika (2018), we estimate equation (1) to obtain the P-R H-statistic:

\[
\ln(TINC_{it}) = \alpha + \beta_1 \ln(w_{1,it}) + \beta_2 \ln(w_{2,it}) + \beta_3 \ln(w_{3,it}) + \gamma_1 \ln(Y_{1,it}) + \gamma_2 \ln(Y_{2,it}) + \gamma_3 \ln(Y_{3,it}) + \gamma_4 \ln(Y_{4,it}) + \varepsilon_{it}.
\]

Where:
\(TINC\) = total income (operating + non-operating income);
\(WI\) = PL (personal expenses/TA);
\[ W2 = PK \text{ (other operating expenditure/total asset);} \]
\[ W3 = PF \text{ (interest expenses/total deposit);} \]
\[ Y1 = \text{degree of intermediation (total loans/TA);} \]
\[ Y2 = \text{bank-specific risk (non-performing loans/TA);} \]
\[ Y3 = \text{capital structure (equity/TA);} \]
\[ Y4 = \text{size/economies of scale (TA).} \]

To conclude, the above analysis related to H-statistics based on both ordinary least squares (OLS) and generalized least squares (GLS) is valid; equilibrium condition should be observed in the long run. The logic behind this is that, in equilibrium, the dependent variable should be uncorrelated with the input prices.

\[
\ln(\text{ROA}_{it}) = \alpha + \beta_1 \ln(w_{1,it}) + \beta_2 \ln(w_{2,it}) + \beta_3 \ln(w_{3,it}) + \gamma_1 \ln(Y_{1,it}) + \gamma_2 \ln(Y_{2,it}) + \gamma_3 \ln(Y_{3,it}) + \gamma_4 \ln(Y_{4,it}) + \varepsilon_{it}. \tag{2}
\]

Equilibrium condition in the banking sector is evaluated through the estimation of equation (2) where ROA is used as the dependent variable. As ROA can take negative values, we calculate the dependent variable as \( \text{ROA} = \ln(\text{ROA} + 1) \). Equilibrium E-statistics equals to \( E = \beta_1 + \beta_2 + \beta_3 \). It should be tested if \( E = 0 \) based on F-test. If the test rejects the null, the market deviates from equilibrium. The notion underlying this test is that in the equilibrium position, risk-adjusted rates of return should be equal across banks, and values of ROA should be uncorrelated with the input prices.

4. Findings, analysis and discussion

4.1 H-statistics estimation results

Table 3 reports the descriptive statistics for all variables used in estimating H-statistics for the three categories. At the sector level, the dependent variable, total income, shows a mean of 1,469.80 and a standard deviation of 3,113.04 for all banks, which is considered very high; this implies the disparity of the generated income across banks.

With regard to independent variables, it is apparent from the table that the high level of disparity between banks as the standard deviation exceeds the mean. On the other hand, the dependent variable shows a mean and standard deviation of 1,858.666 and 3,670.643, and 623.8638 and 674.3962 for conventional and Islamic banks, respectively. The disparity of income for Islamic banks is lower than the conventional banks. This is attributed to the fact that the number of conventional banks in the sample is considerably greater than the Islamic banks, or because of the fact that conventional banks generate more income compared to Islamic banks owing to their size and differences in the nature of business activities. In addition, the high level of disparity between conventional banks in comparison with Islamic banks is apparent from the table. Again, this is because of size, the number of banks in each sector and nature of business.

Table 4 reports the estimated H-statistics for Islamic and conventional banks[2]. H-statistics ranging between 0 and 1 implies a monopolistic competition. For the industry, Islamic and conventional banks’ H-statistics values are found to be 0.66, 0.23 and 0.71, respectively, in the OLS model. This denotes that for three categories, competition is monopolistic. Islamic banks have a lower market power than conventional. The same result is detected in the fixed effect model with H-statistics of 0.473, 0.5902 and 0.5798 for the Islamic and conventional banks, respectively. Our findings are supported by previous studies (Claessens and Laeven, 2004; Perera et al., 2006; Mensi, 2010; Sufian and Shah Habibullah, 2013). The lower competition among Islamic banks is attributed to the different
religious and economic incentives. Islamic banks ought to consider and maintain Islamic norms of behaviour such as the obligation to charge fair prices. Being conscientious and submissive to Islamic principles, they are not restricted to charge burdensome prices. Moreover, Islamic banks have incentives to deal with loans based on certain Shariah principles compared to conventional banks and, hence face higher exposure to Shariah-compliant and the moral hazard of borrowers. For multicollinearity and correlation matrix of variables used in the P-R model, refer to Tables A1 and A3.

Total income is used as the dependent variable in the estimation[3]. The three independent variables used in our study are input prices, namely, PL, PK and PF, which
show a positive sign except for PF at the Islamic level. This implies that the increased costs are associated with increased total income (output).

At all levels, all factor costs are statistically significant with two exceptions. Firstly, at the conventional level where PK is not significant; and secondly, PF at the Islamic level is the second main contributor to Islamic H-statistics with a negative impact of \(-0.31\). The major contributor to H-statistics for all banks comes from all input prices with slight differences. For Islamic banks, the major contribution (of a high elasticity) comes from PK with a coefficient of 0.45. In contrast, at the conventional level, the major contributor to H-statistics stems from PL with a coefficient of 0.60. For Islamic banks, this is because Islamic banks’ total income is very responsive to change in PK (capital for Islamic banks is embodied in equity). For conventional banks, this is because of the fact that total income is very sensitive to PL. It is likely owing to the reason that fee-based income demands a higher level of talented labour. The same result was reported by 

Fah and Ariff (2017).

The impact of equity/TA on total income is positive but non-significant in the OLS model at the three levels. However, at the banking sector level, in the fixed effect model (Table 5), it indicates a significant positive sign at the 5% level. It is not only statistically significant but also economically significant as the value of 0.1856 is the second-highest value among the variables. This confirms theory prediction about well-capitalised banks having a lower cost of bankruptcy owing to their ability to generate more income. On the other hand, in both OLS and fixed-effect models, Islamic banks’ capitalisation is not significant. This is because Islamic banks are not well-capitalised. For conventional banks, it shows significance at 10% with a positive coefficient of 0.14. This confirms the superiority of conventional banks over Islamic banks in terms of capitalisation contribution to competition.

Our results concur with previous studies. For example, Fah and Ariff (2017), where only the 11 major banks are used in their study; Ibrahim et al. (2019), where only conventional and Islamic commercial banks were considered; and Kadir et al. (2014), where only commercial banks were used for the period from 1996 to 2009. These three studies reported a positive association between total income and input prices. This present study is distinguished from previous studies in a way that it considers all banks, and therefore provides a comprehensive picture of competition in Malaysia. In addition, it investigates how competition differs between Islamic and conventional banks regardless of the products not being homogeneous across banks.

### Table 4.
Results of panel data analysis for H-statistics (dependent variable: total income [OLS model])

<table>
<thead>
<tr>
<th>Variable</th>
<th>Whole sample</th>
<th>Islamic</th>
<th>Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnPL</td>
<td>0.2212***</td>
<td>0.0912***</td>
<td>0.5993***</td>
</tr>
<tr>
<td>lnPK</td>
<td>0.2734***</td>
<td>0.4504***</td>
<td>0.0313</td>
</tr>
<tr>
<td>lnPF</td>
<td>0.1611***</td>
<td>-0.3102***</td>
<td>0.0868**</td>
</tr>
<tr>
<td>lnEQ/TA</td>
<td>0.0713</td>
<td>0.0542</td>
<td>0.0526</td>
</tr>
<tr>
<td>lnNPL/TA</td>
<td>-0.0254***</td>
<td>-0.0249</td>
<td>-0.0419**</td>
</tr>
<tr>
<td>lnTL/TA</td>
<td>-0.0282**</td>
<td>0.0731</td>
<td>-0.0214**</td>
</tr>
<tr>
<td>lnTA</td>
<td>1.0567***</td>
<td>1.0171***</td>
<td>1.0459***</td>
</tr>
<tr>
<td>Constant</td>
<td>-1.0118***</td>
<td>-2.2966***</td>
<td>-0.5959***</td>
</tr>
<tr>
<td>R²</td>
<td>0.9711</td>
<td>0.9836</td>
<td>0.9834</td>
</tr>
<tr>
<td>F-statistic</td>
<td>2,533.95***</td>
<td>905.96***</td>
<td>2,028.95***</td>
</tr>
<tr>
<td>H-statistics</td>
<td>0.6557***</td>
<td>0.2315***</td>
<td>0.7173***</td>
</tr>
<tr>
<td>No. of obs</td>
<td>362</td>
<td>114</td>
<td>248</td>
</tr>
</tbody>
</table>

Notes: ***, ** and * indicate significance level at 1, 5 and 10%, respectively; all variables are subject to Ln = natural logarithm.
For non-performing loans that represent risk inclination, the coefficient signs for the three categories are negative and very small with the exception of being insignificant for Islamic banks. This suggests that the loan portfolio of banks is not risky. In addition, it suggests that conventional banks do not engage in risky provisions. For Islamic banks, it is very clear as it is prohibited to engage in extending loans on interest. For this reason, the coefficient is small and insignificant.

The coefficients for TA are positive and statistically significant. It shows a very high value for the three categories as TA are potentially the pillar of generating income. Furthermore, it suggests that the size of banks is critical in terms of income generation. Moreover, this implies that banks are efficient in using their assets to generate income. Lastly, this gives further insights that banks in Malaysia are experiencing economies of scale.

Finally, for the ratio of loans to TA, the coefficient shows a significant positive sign at all-bank levels and conventional level. In contrast, for Islamic banks, the coefficient shows a positive but insignificant sign. This implies that loans share in interest income to total revenues, especially for conventional banks.

To sum up, during the study period, the Islamic banking market and conventional market generated income under monopolistic competition. The estimated values of H-statistic for the three categories indicate that competition among conventional banks is higher compared to that among Islamic banks.

Based on Table 6 and Figure 1, the mean H-statistics value, which is an indicator of banks’ reaction to changes in input prices, showed an increase in the first year, from 2011 to 2012, for all banks and conventional banks. It then increased slightly and steadily for the remainder of the period. On the other hand, competition in the Islamic banking sector decreased sharply along the period of study. This could be attributed to the size of Islamic banks, the generated profit or external factors such as identical pricing strategies followed by banks or economic conditions. In addition, Meslier et al. (2017) stated that Islamic banks’ competition is encountered by conventional banks via setting higher deposit rates, especially when their market power is lower. They also adopt lower interest rates when their market power is strong. These could have been some of the critical reasons behind the decrease in Islamic banks’ competition.
Islamic and conventional banks in Malaysia were operating under monopolistic competition. It is noteworthy that the market power of conventional banks is far higher than that of Islamic banks. This result is supported by Ibrahim et al. (2019).

For the validation of our competition estimation, Kadir et al. (2014), using a sample of Islamic and conventional commercial banks, stated an H-statistic of 0.27 for a study period of 14 years (1997-2016). For Islamic banks, this result is a bit higher than our result (0.23) because of the sample period and sample composition as we consider all banks regardless of their core business. For conventional banks, H-statistics was reported to be 0.77 for the same period. This differs slightly from our result (0.72) and might be attributed to the sample period. However, both results do not differ much and still lend support to the condition of monopolistic competition within both sectors.

5. Equilibrium condition in the Malaysian banking sector

Table 7 reports the equilibrium condition in the banking sector. It is evaluated through the estimation of equation (2), where ROA is used as the dependent variable. As ROA can take negative values, we calculate the dependent variable as \( \text{ROA}' = \ln(\text{ROA} + 1) \). We set equilibrium E-statistics as being equal to \( \beta_1 + \beta_2 + \beta_3 \). We test if \( E = 0 \) based on F-test. If the test rejects the null, the market is supposed to deviate from equilibrium. The notion underlying this test is that, in the equilibrium position, risk-adjusted rates of return should be equal across banks, and values of ROA should be uncorrelated with the input prices.

This method for examining if the observations are in long-run equilibrium condition is already set in the literature (Shaffer, 1982; Molyneux et al., 1996; Claessens and Laeven, 2004; Schaeck et al., 2009). Table 7 presents the outcomes of regression and test. Based on the Wald \( \chi^2 \) test value, we fail to reject the null hypothesis that \( H = 0 \), as to whether the market is in equilibrium. Hence, as we fail to reject the null hypothesis, we conclude that the Malaysian banking sector is in equilibrium in the long run, thereby supporting the consistency and validity of our results. Further, the equilibrium condition holds when ROE is used instead of ROA (see results in Table A2).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Banking sector</td>
<td>0.4471</td>
<td>0.5953</td>
<td>0.6245</td>
<td>0.6313</td>
<td>0.6406</td>
<td>0.649</td>
<td>0.6557</td>
</tr>
<tr>
<td>Islamic</td>
<td>0.5191</td>
<td>0.5114</td>
<td>0.5086</td>
<td>0.4327</td>
<td>0.3137</td>
<td>0.2818</td>
<td>0.2315</td>
</tr>
<tr>
<td>Conventional</td>
<td>0.6090</td>
<td>0.705</td>
<td>0.7202</td>
<td>0.7281</td>
<td>0.7220</td>
<td>0.7181</td>
<td>0.7173</td>
</tr>
</tbody>
</table>

**Table 6.**

H-statistics (P-R model)

Figure 1.
Plots of H-statistic for banks in Malaysia by category
6. Conclusion

Given the considerable structural changes the Malaysian banking sector has undergone, the degree of competition at the industry, conventional and Islamic banking sector levels have changed. This study investigates and compares competition within and between Islamic and conventional banks over the period from 2011 to 2017. Equilibrium test is also conducted to validate the equilibrium condition in the long run during the study period, and therefore the consistency of the results. To this end, the P-R approach is applied using OLS and GLS techniques.

The findings of the study revealed that the PL is a major contributor to competition within the conventional sector, with a positive impact of $0.60$. In contrast, within the Islamic banking sector, PK and PF are found to be the main contributors to competition with $0.45$ and $0.31$ impact, respectively. In other words, these input prices signify higher elasticity to total income. The values of H-statistic provided evidence of monopolistic competition condition across the banking system. This is the case within both Islamic and conventional sectors. The degree of competition within the conventional banking sector is higher and therefore denoting a lower concentration within this sector.

These results concur with those of Weill (2011) who conducted a comparative study of market power of both banking systems in 17 countries where both operate in the same environment and found that conventional banks possess more market power than Islamic banks. On the other hand, competition in the Islamic banking sector is lower than that of the conventional, hence providing evidence that Islamic banking sector is still experiencing a higher degree of concentration. The results are also in line with those reported by Ibrahim et al. (2019). One possible explanation as to why monopolistic competition has remained is that, in the long-run, new banks are attracted into the industry as a result of fewer barriers to entry, in addition to good knowledge and an opportunity to differentiate. In addition, banks in Malaysia are the price makers instead of price takers. In other words, the price elasticity of demand is high. However, banks’ ability is ultimately offset as the demand for products is facing high price elasticity. This implies that to increase their prices, banks need to be efficiently able to distinguish their products from their rivals in terms of quality. Another possible explanation is that, to some degree, the financial sector rent for incubating Islamic banks in Malaysia might have been provided under a protective financial policy or customary practices in pricing.
The findings of this study concur with those of Basri (2020) where he investigated the impact of competition on concentration for Islamic banks in Malaysia. His study consisted of 16 Islamic banks covering the period between 2008 and 2015. Using P-R model, with total revenues as a dependent variable, his results revealed that Islamic banks operated under monopolistic competition conditions with a moderately concentrated market structure. It also showed that the introduction of foreign Islamic banks stimulated competition along with a decrease of concentration. Accordingly, financial reform endeavours of BNM along with the liberalisation wave of the financial system were successful in promoting competition, rendering the entire financial system contestable, resilient and dynamic.

The findings of this study have several important implications at the policy level. Firstly, competition in the Islamic market needs to be promoted further, thereby paving the way to a more competitive environment where banks will be more efficient and profitable in the face of their conventional counterparts (“competition is the gymnastics of banks” (Padoa-Schioppa, 2001)). Accordingly, regulators and authorities may find the results beneficial in terms of rethinking the number of banks operating in the Islamic sector. Secondly, the number of banks is not the only factor that determines competition in the banking sector. Entry and exit from the sector have been detected in the literature to be of considerable importance in determining the degree of competition. BNM should consider the implications of this change in competition which could have been brought about at the expense of other banking characteristics. This structural change is anticipated to have implications for the stability and risk-taking behaviour of banks. This puts forward, for future research, the need to investigate the impact of this structural change on the stability and risk-taking behaviour of conventional and Islamic banks.

Future research is encouraged to be undertaken on the entry restrictions and their impact on competition. In addition, constraints on activities that banks can embark on, in turn, play an important role in the decrease or increase of competition. Therefore, regulators and policymakers may consider several factors when aiming at encouraging or discouraging competition in the banking sector, as the case may be. Reasonable competition is beneficial for banks in terms of investment and performance. However, extreme competition may decrease generated profits, thereby leading to adverse consequences. Accordingly, competition can be improved through effective and prudent merger and acquisition strategies, improving operational cost efficiency, profit efficiency and diversification of assets and liabilities, in addition to alleviating non-interest revenue. Researchers are encouraged to investigate further the level of competition within and between Islamic and conventional banks in Malaysia based on financing and deposit products.

Notes
1. There were only three banking mergers given the tier-1 institutions status: DCB Bank with Kwong Yik Bank, DCB Finance with Kwong Yik Finance and United Overseas Bank with Chung Khiaw Bank, resulting in both DCB Bank and Kwong Yik Bank being granted the tier-1 institutions status. Rashid Hussain Bank resulted out of a merger that took place between DCB Bank and Kwong Yik Bank as the second largest bank, and later agreed to buy Sime Bank, which underwent huge losses during the second half of 1997. By the end of 1997, ten commercial banks were given the tier-1 status.

2. The model does not suffer from multicollinearity issue as variance inflation factor (VIF) values are less than 4 (Table A1).

3. Please see Table A3 for the correlation matrix.
References


Further reading


### Appendix

#### Table A1.
Multicollinearity test using VIF

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
<th>1/VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>PL</td>
<td>1.80</td>
<td>0.56</td>
</tr>
<tr>
<td>PK</td>
<td>1.49</td>
<td>0.67</td>
</tr>
<tr>
<td>PF</td>
<td>1.03</td>
<td>0.97</td>
</tr>
<tr>
<td>EQTA</td>
<td>3.41</td>
<td>0.29</td>
</tr>
<tr>
<td>TA</td>
<td>2.58</td>
<td>0.39</td>
</tr>
<tr>
<td>TLTA</td>
<td>1.21</td>
<td>0.83</td>
</tr>
<tr>
<td>NPLTA</td>
<td>1.19</td>
<td>0.84</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.82</td>
<td></td>
</tr>
</tbody>
</table>

#### Table A2.
Panel regression results for equilibrium condition for the Malaysian banking sector using ROE

<table>
<thead>
<tr>
<th>Variable</th>
<th>OLS</th>
<th>Fixed</th>
<th>Random</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnPL</td>
<td>0.002</td>
<td>-0.009</td>
<td>0.005</td>
</tr>
<tr>
<td>lnPK</td>
<td>0.00003</td>
<td>0.0002</td>
<td>-0.004</td>
</tr>
<tr>
<td>lnPF</td>
<td>-0.031</td>
<td>-0.05</td>
<td>-0.04</td>
</tr>
<tr>
<td>lnEQ/TA</td>
<td>-0.41***</td>
<td>-0.06</td>
<td>-0.11**</td>
</tr>
<tr>
<td>lnNPL/TA</td>
<td>-0.006**</td>
<td>-0.01</td>
<td>-0.008</td>
</tr>
<tr>
<td>lnTL/TA</td>
<td>-0.006***</td>
<td>-0.0008</td>
<td>-0.006</td>
</tr>
<tr>
<td>lnTA</td>
<td>0.014***</td>
<td>0.015</td>
<td>0.01**</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.27</td>
<td>-0.52</td>
<td>-0.35</td>
</tr>
<tr>
<td>R²</td>
<td>0.32</td>
<td>0.32</td>
<td>0.31</td>
</tr>
<tr>
<td>F-statistic/Wald test</td>
<td>29.78*** (0.000)</td>
<td>0.87 (0.54)</td>
<td>7.23 (0.41)</td>
</tr>
<tr>
<td>Hausman test</td>
<td>33.61</td>
<td>(p-value = 0.0000)</td>
<td></td>
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<tr>
<td>H-statistics</td>
<td>-0.02</td>
<td>-0.058</td>
<td>-0.038</td>
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<td>No. of obs</td>
<td>362</td>
<td>362</td>
<td>362</td>
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</tbody>
</table>

**Notes:** *** and ** indicate significance level at 1 and 5%, respectively; all variables are subject to Ln

#### Table A3.
Correlation matrix of the variables used in P-R model

<table>
<thead>
<tr>
<th></th>
<th>TI/TA</th>
<th>pl</th>
<th>pk</th>
<th>pf</th>
<th>eq/ta</th>
<th>npl/ta</th>
<th>tl/ta</th>
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</thead>
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<tr>
<td>TI/TA</td>
<td>1.0000</td>
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<tr>
<td>pl</td>
<td>-0.18***</td>
<td>1.0000</td>
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<tr>
<td>pk</td>
<td>-0.1508***</td>
<td>0.4696***</td>
<td>1.0000</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>pf</td>
<td>0.0368</td>
<td>0.1073***</td>
<td>0.0795</td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>eq/ta</td>
<td>-0.5621***</td>
<td>0.5925***</td>
<td>0.4149***</td>
<td>0.0404</td>
<td>1.0000</td>
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<tr>
<td>npl/ta</td>
<td>-0.2634***</td>
<td>-0.0669</td>
<td>-0.1917***</td>
<td>0.0046</td>
<td>0.2065***</td>
<td>1.0000</td>
<td></td>
</tr>
<tr>
<td>tl/ta</td>
<td>0.3338***</td>
<td>-0.1866***</td>
<td>-0.0142</td>
<td>0.1005*</td>
<td>-0.3326***</td>
<td>-0.0866</td>
<td>1.0000</td>
</tr>
<tr>
<td>ta</td>
<td>0.9503***</td>
<td>-0.3966***</td>
<td>-0.3606***</td>
<td>-0.0390</td>
<td>-0.7657***</td>
<td>-0.1810***</td>
<td>0.3564***</td>
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</table>

**Note:** *** and ** indicate significance level at 1, 5 10%, respectively; and all variables are in Ln
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