UNIVERSITI PUTRA MALAYSIA

MARKET STRUCTURE AND PERFORMANCE OF DUAL BANKING SYSTEM IN MALAYSIA

NAFISAH BINTI MOHAMMED

FEP 2018 24

MARKET STRUCTURE AND PERFORMANCE OF DUAL BANKING SYSTEM IN MALAYSIA

By

NAFISAH BINTI MOHAMMED

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Doctor of Philosophy

April 2018

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

MARKET STRUCTURE AND PERFORMANCE OF DUAL BANKING SYSTEM IN MALAYSIA

By

NAFISAH BINTI MOHAMMED

April 2018

Chairman : **Junaina Binti Muhammad, PhD**
Faculty : **Economics and Management**

Concentration, competition and efficiency are three elements that are often associated with the banking industry. Banking industry in most of the countries in the world had undergone tremendous changes due to several structural changes occurred in the industry. Malaysia has also not left behind in facing this wave of change. There are four main sources that contribute to the structural changes in the Malaysian banking industry namely, bank mergers, implementation and restructuring of Islamic banking industry, liberalization and advancement in information and communication technology (ICT). Besides, the 1997 East Asian Financial Crisis and restructuring of banking industry under the Financial Sector Master Plan also have contribute to the aggressive structural changes in the Malaysian banking industry. Thus, the main purpose of this study is to investigate the impact of structural changes on the degree of concentration, competition and performance of the Islamic banking system compared to conventional banking system in Malaysia.

This study used the data of both domestic and foreign banks which operated in dual banking industry in Malaysia, covered the period 1997-2016. The research method in this study has been developed properly to achieve the objectives of the study. First, this study utilizes structural approach to measure various types of market concentration indices, calculated on year-to-year basis in order to investigate the link between concentration and competition. All measures of concentration have been calculated using the formulas proposed in the industrial organizational theory. Second, this study developed the Panzar-Rosse (PR) model to calculate the H-statistics to determine the degree of competition in Islamic and conventional banking markets. Third, the data envelopment analysis (DEA) method is used to measure income and cost efficiency scores. Finally, the calculated measures of

concentration, competition and efficiency are included in a model in order to estimate the relationship between those variables. All the econometric models in this study are estimated using pooled cross-section (OLS) and panel estimation approach (fixed and random effects).

Findings of this study are as follows. First, analysis on market concentration provides evidence on the decreasing trend in the level of concentration of Islamic banking market. In contrast, level of concentration is increasing in the conventional banking market. Second, the H-statistics computed using the PR model shows both banking markets operated under the monopolistic competition structure. However, level of competition is more intensifying in the Islamic compared to conventional banking market. Third, results on efficiency scores show that Islamic banks are more cost efficient, but conventional banks are more efficient in generating income. Fourth, the results on the nexus between competition, concentration and efficiency show the existence of negative relationship between competition and concentration; and a positive relationship between efficiency and competition. Based on these findings, this study concludes that the existence of an ideal level of concentration and competition is important for banks to adjust their behaviour to suit market conditions and to operate efficiently. Besides, policy makers and regulators may use the knowledge on market structure and performance in this study to formulate policies and strategies that will optimize the number of banks that operated in the industry.

STRUKTUR PASARAN DAN PRESTASI PERBANKAN DWI SISTEM DI MALAYSIA

Oleh

NAFISAH BINTI MOHAMMED

April 2018

Pengerusi : **Junaina Binti Muhammad, PhD**
Fakulti : **Ekonomi dan Pengurusan**

Penumpuan, persaingan dan kecekapan adalah tiga elemen yang sering dikaitkan dengan industri perbankan. Industri perbankan di kebanyakan negara di dunia telah mengalami perubahan besar kesan daripada beberapa perubahan struktur yang berlaku dalam industri berkenaan. Malaysia juga tidak ketinggalan dalam menghadapi gelombang perubahan ini. Terdapat empat sumber utama yang menyumbang kepada perubahan struktur dalam industri perbankan di Malaysia iaitu penggabungan bank, pelaksanaan dan penstrukturan semula industri perbankan Islam, liberalisasi dan kemajuan dalam teknologi maklumat dan komunikasi (ICT). Selain itu, krisis kewangan Asia Timur 1997 dan penstrukturan semula industri perbankan di bawah Pelan Induk Sektor Kewangan juga telah menyumbang kepada perubahan struktur yang agresif dalam industri perbankan di Malaysia. Oleh itu, tujuan utama kajian ini adalah untuk mengkaji kesan perubahan struktur terhadap darjah penumpuan, persaingan dan prestasi dalam sistem perbankan Islam berbanding dengan sistem perbankan konvensional.

Kajian ini menggunakan data bank domestik dan asing yang beroperasi dalam industri perbankan dwi di Malaysia, yang meliputi tempoh 1997-2016. Kaedah penyelidikan dalam kajian ini telah dibangunkan dengan baik untuk mencapai objektif kajian. Pertama, kajian ini menggunakan pendekatan struktur untuk mengukur pelbagai indeks penumpuan pasaran yang dikira berdasarkan tahun ke tahun untuk menyelidik hubungan antara penumpuan dan persaingan. Kesemua ukuran penumpuan tersebut telah dihitung menggunakan formula yang diutarakan dalam teori organisasi industri. Kedua, kajian ini membangunkan model Panzar-Rosse (PR) untuk mengira statistik H untuk menentukan tahap persaingan dalam pasaran perbankan Islam dan konvensional. Ketiga, kaedah analisis pengumpulan data (DEA) digunakan untuk mengukur skor kecekapan pendapatan dan kos.

Akhirnya, ukuran-ukuran penumpuan, persaingan dan kecekapan yang telah dikira dimasukkan ke dalam satu model untuk menganggarkan hubungan antara pembolehubah-pembolehubah tersebut. Semua model ekonometrik dalam kajian ini dianggarkan menggunakan kaedah keratan rentas terkumpul (OLS) dan anggaran *panel* (kesan tetap dan rawak).

Penemuan kajian ini adalah seperti berikut. Pertama, ukuran penumpuan pasaran memberikan bukti mengenai trend menurun dalam tahap penumpuan pasaran bagi perbankan Islam. Sebaliknya, tahap penumpuan semakin meningkat dalam pasaran perbankan konvensional. Kedua, statistik H yang dikira menggunakan model PR *(Panzar-Rosse)* menunjukkan kedua-dua pasaran perbankan adalah beroperasi dalam struktur pasaran persaingan bermonopoli. Walau bagaimanapun, peningkatan tahap persaingan adalah lebih tinggi dalam pasaran perbankan Islam berbanding perbankan konvensional. Ketiga, skor kecekapan yang diperoleh menunjukkan bank Islam adalah lebih efisien dari segi kos, tetapi bank konvensional lebih efisien dalam menjana pendapatan. Keempat, keputusan hubungan antara persaingan, penumpuan dan kecekapan menunjukkan wujudnya hubungan negatif antara persaingan dan penumpuan dan hubungan positif antara kecekapan dan persaingan. Berdasarkan penemuan ini, kajian ini menyimpulkan bahawa kewujudan tahap penumpuan dan persaingan yang ideal adalah penting bagi bank untuk menyesuaikan gelagat mereka agar sesuai dengan keadaan pasaran dan beroperasi dengan cekap. Selain itu, pembuat dasar dan pengawal selia boleh menggunakan pengetahuan mengenai struktur pasaran dan prestasi dalam kajian ini untuk merumuskan dasar dan strategi yang dapat mengoptimumkan bilangan bank yang beroperasi dalam industri.

ACKNOWLEDGEMENTS

Alhamdulillah, praise to Allah s.w.t. With, the grace of Allah I am able to complete this thesis. I would like to express my deepest appreciation to Dr. Junaina Muhammad, Professor Abdul Ghafar Ismail and Dr Zaleha Mohd Noor for their invaluable guidance, suggestions and encouragement during the course of completing this research. I am especially indebted to Dr Junaina Muhammad for her indispensable role as the chairman of my thesis committee. My invaluable appreciation also deducted to Dr Suhaila Abdul Jalil, the former chairman of my thesis committee.

Many thanks to Universiti Kebangsaan Malaysia and Ministry of Higher Education for granting a scholarship as well as Universiti Putra Malaysia. I am also indebted to all my friends at Faculty of Economics and Management, UKM for providing assistance and moral support during the completion of this study.

My deepest appreciation to my dear husband, Abdul Malik B. Mustaffa who always give me a support and encouragement during completing this research. His patience over the years is greatly appreciated. Thank you very much for my children, Ummu Salmah Maisarah, Noor Adilah, Muhammad Syakir Faiz and Muhammad Anas for their understanding and supports. I hope their sacrifice in getting my attention has been worthwhile.

I am forever grateful to my father, Haji Mohammed, my beloved mother, Hajjah Khatijah and my siblings. My deepest appreciation also to my in-law family members particularly my father and mother in law, Haji Hamzah and Hajjah Aminah.

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Junaina binti Muhammad, PhD
Senior Lecturer
Faculty of Economics and Management
Universiti Putra Malaysia
(Chairman)

Zaleha binti Mohd Noor, PhD
Associate Professor
Faculty of Economics and Management
Universiti Putra Malaysia
(Member)

Abdul Ghafar bin Ismail, PhD
Professor
Faculty of Islamic Economics and Finance
Universiti Islam Sultan Sharif Ali
(Member)

ROBIAH BINTI YUNUS, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date:

Declaration by graduate student

I hereby confirm that:
- this thesis is my original work;
- quotations, illustrations and citations have been duly referenced;
- this thesis has not been submitted previously or concurrently for any other degree at any other institutions;
- intellectual property from the thesis and copyright of thesis are fully-owned by Universiti Putra Malaysia, as according to the Universiti Putra Malaysia (Research) Rules 2012;
- written permission must be obtained from supervisor and the officeof Deputy Vice-Chancellor (Research and Innovation) before thesis is published (in theform of written, printed or in electronic form) including books, journals, modules, proceedings, popular writings, seminar papers, manuscripts, posters, reports, lecture notes, learning modules or any other materials as stated in the Universiti Putra Malaysia (Research) Rules 2012;
- there is no plagiarism or data falsification/fabrication in the thesis, and scholarly integrity is upheld as according to the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) and the Universiti Putra Malaysia (Research) Rules 2012. The thesis has undergone plagiarism detection software.

Signature: _____   Date: _____

Name and Matric No.: Nafisah Binti Mohammed, GS24870

Declaration by Members of Supervisory Committee

This is to confirm that:
- the research conducted and the writing of this thesis was under our supervision;
- supervision responsibilities as stated in the Universiti Putra Malaysia (Graduate Studies) Rules 2003 (Revision 2012-2013) are adhered to.

Signature:
Name of
Chairman of
Supervisory
Committee: Dr. Junaina binti Muhammad

Signature:
Name of
Member of
Supervisory
Committee: Associate Professor Dr. Zaleha binti Mohd Noor

Signature:
Name of
Member of
Supervisory
Committee: Professor Dr. Abdul Ghafar bin Ismail

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

xvi

LIST OF APPENDICES

LIST OF ABBREVIATIONS

AME	Arab Middle Eastern
ATM	Automated Teller Machine
BNM	Bank Negara Malaysia
BIMB	Bank Islam Malaysia Berhad
BMMB	Bank Muammalat Malaysia Berhad
CIMB	Commerce International Malaysian Bankers
CR_3	Concentration ratio of three largest banks
DEA	Data Envelopment Analysis
DFI	Development Financial Institution
ENT	Entropy Index
EAEC	East Asian Financial Crisis
EMU	European Monetary Union
ES	Efficient Structure
EU	European Union
FSMP	Financial Sector Master Plan
FYROM	Former Yugoslav Republic of Macedonia
GATT	General Agreement on Tariffs and Trade
GCC	Gulf Cooperation Council
GDP	Gross Domestic Product
HHI	Herfindahl-Hirshman Index
IBS	Islamic Banking Scheme
IBD	Islamic Banking Division
ICT	Information and Communication Technology
IT	Information Technology
MYR	Malaysian Ringgit
MENA	Middle East and North Africa
NBFIs	Non-bank Financial Intermediaries
NEIO	New Empirical Industrial Organization
NIM	Net Interest Margin
LOFSA	Labuan Offshore Financial Services Authority
PR	Panzar-Rosse
RHB	Rashid Hussein Bank
SCP	Structure-Conduct-Performance
SFA	Stochastic Frontier Analysis
SPTF	Skim Perbankan Tanpa Faedah
SPI	Skim Perbankan Islam
RMP	Relative Market Power
ROA	Return on Assets
ROE	Return on Equity

CHAPTER 1

INTRODUCTION

This chapter will explain the background as well as the issues that motivate this study. Furthermore, this chapter also describes some important aspects of the study, namely the objectives of the study and the research framework. This chapter concludes with the study's organization which explains in general the essence of each chapter.

1.1   Background of the Study

The study on market structure particularly on the levels of concentration and competition had been given a special attention by researchers because both may reflect the activities of economic agents. Concentration refers to the market power held by the firms in the market. Meanwhile, competition refers to rivalry behaviour between firms in the market. Hence, information on market structure is important to firms in making their corporate or business decisions. Firms may use the knowledge on concentration and competition to control and watch their behaviors to suit market condition. Meanwhile, government may use information on market structure to formulate economic policy. For instance, government uses the information on concentration to make decisions on bank's merger program in many countries. In addition, the information on market structure is also important to the banking system because the levels of concentration and competition may affect the soundness and stability of the banking system.

There is a contradictory argument proposed by the proponents and the opponents of banking concentration. The proponents of banking concentration propose that a banking system with high degree of concentration is important. This is because a banking system with few large banks is less fragile, easier to monitor and highly efficient. On the other hand, the oppositions of concentration state that competitive banking system is important to enhance social economic welfare, and is more stable and easier to monitor. Therefore, the study on both issues is important and interesting to be refined especially in the case of Malaysia which implements dual banking system.

Many studies have been done to investigate the changes in the market structure of the banking industry. This is due to the structural changes that had taken place in this industry of various countries. The examples of such studies are Repon and Islam (2016) for Bangladesh banking industry, Abdul Kadir et al. (2014) for Malaysian banking industry and Gajurel and Pradhan (2012) for Nepal banking industry. Although many recent studies have been done for developing countries, they are still lacking and need further exploration particularly for banking system which implements dual banking system as covered in this study.

1

Apart from the market structure, bank performance is also an important element that is often a concern for researchers to study. The relationship between market structure and performance is based on a traditional hypothesis, namely structure-conduct-performance (SCP) paradigm. According to this paradigm, the relationship between concentration and competition is negative; and concentration will positively affect performance. Therefore, competition, concentration and performance are three aspects that are often associated with the banking industry. This is in line with the opinion of Beck et al. (2011) who saw competition as the most important driver for financial innovation. In fact, competition in the banking industry is said to be good and beneficial because it helps to accelerate economic growth, improve efficiency of the banking industry itself as well as enhance consumer's welfare. It is also believed that uncompetitive banking markets will cause firms to provide inadequate banking services, use non-optimal allocation of resources and operate in less efficient manner. Hence, a certain level of competition is needed in the banking industry so that the positive impact of competition can be reaped.

In many countries, matters regarding market structure and performance in the financial system can be major economic and policy issues. As in other countries, Malaysian financial sector particularly banking industry is also experiencing a rapid transformation as a consequence of several measures adopted by the government; such as deregulation, liberalization, merger and rationalization process. In addition, in Malaysia, the implementation of dual banking system has also contributed to the structural changes in the Malaysian financial system particularly, the banking industry. The development of information and communication technologies (ICT) has also accelerated the transformation that occurred in the Malaysian banking system. These transformations positively impacted the development of Malaysian banking industry, especially in terms of the scope of banking operations, the number of institutions, number of branches, bank's ownership and the use of technology. This development causes changes in the market structure; particularly to the levels of concentration and competition. This in turn, will affect the performance of those institutions and the banking industry as a whole.

Also, it is important to know the ability of the banks operating in a market which experiences growing competition. Therefore, studies on firms' behavior are very important for examining the ability of the banks in facing competition in the market. For instance, liberalization of the financial sector as well as mergers between domestic banks should be able to improve the performance of the banking industry in Malaysia. The question is, whether changes in market structure and performance will help banks to operate in a highly competitive market. Therefore, this study is conducted to analyze how the behavior of firms in the market can influence the level of competition in the market. To achieve that goal, an analysis of market structure is very important. Market structure analysis in this study focuses on two aspects, namely the degrees of concentration and competition. Subsequently, the performance of banks will be assessed to identify the level of

efficiency of banks operating in the banking system. Furthermore, it is hoped that this study will provide information to policy makers and bank managers in shaping the banks' conducts in order to ensure their survival in the increasingly competitive market.

1.1.1 Market Structure

To understand the structure of the banking industry, the knowledge of the basic structure of the banking system is very important. Therefore, a close look at the structure of Malaysian banking system is essential in order to understand the structural changes that had taken place in the Malaysian banking market; in which altered market concentration, level of competition and bank performance. Banking system is the largest component of the Malaysian financial system. It plays an important role in stimulating the growth of financial sector, stabilizing the economy, as well as in the formulation and implementation of monetary and credit policies in order to achieve financial and economic objectives.

Prior to 1997 East Asian Financial Crisis (EAFC), the Malaysian banking system was consisted of commercial banks, Islamic banks, finance companies and merchant banks. As shown in Table 1.1, the types of banking institutions in the banking system have reduced; whereby presently, there are only three types of banking institutions in Malaysia, namely commercial banks, Islamic banks and Investment banks. Finance companies which have decreasing shares in the banking system over time started to merge with commercial banks in January 1998 and the exercise was completed in 2006. Further, in 2006, Malaysian banking system underwent a modernization period. It changed the banking landscape through the integration of discount houses, merchant banks and stock-broking companies under one roof known as Investment banks.

Table 1.1 : Financial intermediaries in Malaysian banking industry

Before Restructuring	After Restructuring
Conventional commercial banks	Conventional commercial banks
Islamic banks/ conventional banks with IBSa	Islamic banks/ conventional banks with IBSa/Islamic bank subsidiariesd
Finance companiesb	Investment banks
Merchant banks	

Note: [a] IBS, Islamic Banking Scheme

[b] Finance companies started to merge with commercial banks in 2003 and completed in 2006.

[c] Merchant banks upgraded to investment banks through merger and rationalization process in 2006.

[d] Islamic bank subsidiaries emerged in 2002 when BNM issued licenses to local and foreign banks.

(Source: Author's compilation)

3

Consolidation and rationalization process among financial institutions had changed the financial landscape particularly the structure of the banking system. The banking industry becomes less fragmented with reduction in the type and number of financial institutions as shown in Figure 1.1. For instance, in 2016, there were only 54 banking institutions in the Malaysian banking sector compared to 88 institutions in 1997 (for detailed on the number of banking institutions see Appendix A1). Basically, merger and rationalization process is seen as one of the external sources which leads to increased firm concentration in the market. Therefore, evaluation of the market structure particularly in terms of concentration is important in order to examine the impact of changes in market concentration; i.e. whether it impedes or heightened the level of competition among the firms in the market.
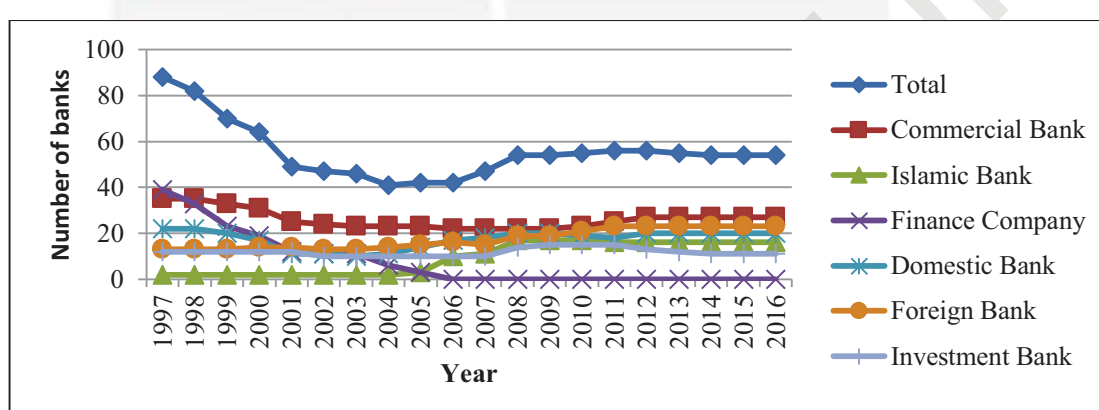
Note: Number of domestic and foreign banks includes banks with Islamic banking operation.

Figure 1.1 : Number of Financial Institution in Malaysian Banking System 1996-2016
(Source: Author's compilation from BNM's Monthly Statistical Bulletin (various issue) and Financial Stability and Payment System Reports (various issue))

The study of market structure for Malaysia is more attractive because Malaysia is the first country that implements dual banking system in which its Islamic banking system operates side by side with the conventional banking system. Therefore, the implementation of dual banking system has also contributed to the change in market structure of the Malaysian banking industry. Further, the changes in regulation regarding the type and scope of operation of Islamic banks particularly after Financial Sector Master Plan (FSMP, 2001) have also changed the landscape of Malaysian banking system.

The development of the Islamic banking in Malaysia is not achieved within a day, but has taken decades to be developed. The history of the Islamic banking in Malaysia originated with the establishment of Tabung Haji (the Pilgrims Management and Fund Board) in 1963 by the government. Apart from this, they were also inclined to introduce a well-coordinated and systematic Islamic financial system. The development Islamic of banking system in Malaysia can be divided

4

into three phases (Ahmad Mokhtar et al., 2008). The first phase began in July 1983 with the establishment of Bank Islam Malaysia Berhad (BIMB) as the first Islamic bank. Hence, BIMB monopolized the Islamic banking operation in Malaysia. The first phase (1983-1992) is known as the familiarization period.

One of the aims of the second phase (1993-2003) is to increase the number of players in the Islamic banking industry and to promote Islamic banking services to the public. Therefore, government had introduced interest free banking *(Scheme Perbankan Tanpa Faedah)* in March 1993. However, in December 1998, interest free banking was revisited and replaced with Islamic Banking Scheme (IBS). Under this scheme, the existing conventional banking institutions were permitted to offer Islamic banking products and services using their existing infrastructure, including staff and branches. Hence, the number of participating banking institutions had increased significantly, from three banks in March 1993 to fifty-four as at end-June 1999 (Bank Negara Malaysia, 1999). Further, in October 1999 Bank Muammalat Malaysia Berhad (BMMB) was established as a second Islamic bank. Hence, BIMB lost its monopoly status due to the increase in the number of players in the Islamic banking industry.

The focus of the third phase (2004 onwards) is to improve the operation of existing Islamic banks' subsidiary and further liberalized the Islamic banking market. Hence, under the FSMP (2001), the existing domestic and foreign banks obtained licenses to operate full-fledged Islamic banks. Meanwhile, the liberalization process has encouraged the entry of new foreign banks into the Islamic banking market. Hence, changes in the scope or type of operation and the entry of new foreign banks had intensified level of competition in the Islamic banking market. This development in third phase has also altered the level of concentration in the banking market.

In conclusion, bank mergers, introduction of the Islamic banking system and upgrading of the Islamic banks operation to full-fledge Islamic banks and liberalization process have changed the market structure of Malaysian dual banking industry. Additionally, the use of technological advances in the industry has also contributed to the change in the market structure (Ahamed, 2012). Present study is interesting and expects to provide new evidence on the actual levels of competition and concentration in the banking industry, particularly in the case of dual banking system, which is still limited. Therefore, analysis on market structure in terms of degrees of concentration and competition should be conducted as to understand the impact of structural changes on banking market structure. The knowledge regarding the current market structure is important to the banks in both banking streams so that banks may adjust their behaviors to suit the real market conditions.

1.1.2 Bank Performance

Many recent studies on SCP paradigm emphasized that there is a need to examine the structure-performance relationship in financial service industries, particularly in banking industry. Several structural changes that occur in the banking industry have changed the market structure, level of competition and bank performance in the industry (Uddin and Suzuki, 2014; Ahamed, 2012; Mensi et al., 2011; Gajurel, 2010; Seelanatha, 2010). Most of the previous research focused on the issue of how market structure affects bank performance. The SCP hypothesis states that changes in the market structure or concentration of the banking firms may affect the way banks behaved and performed (Fu and Heffernan, 2009).

The studies of bank performance can be classified into two groups. The first group includes the studies that assess bank performance using traditional financial ratios such as return on assets, return on equity and net interest margin. In contrast, the second group of studies focuses on bank efficiency and utilized frontier analyses' approaches rather than traditional financial ratios. Besides, studies in this group can be divided into two. First, studies that evaluate efficiency of Islamic bank or conventional banks only; and second, studies that compare the efficiency of Islamic and conventional banks (Hassan et al., 2009).

Many studies on performance focus on the issue of how market structure affects bank performance as done by Samad (2008), Seelanatha (2010), Lin and Zhengchao (2012) and Mensi et al. (2011). According to SCP paradigm, market structure will affect performance. Many studies used return on assets (ROA) and return on equity (ROE) as a proxy for performance (Samad, 2008; Bhatti & Hussain, 2010 and Gajurel, 2010); only limited study used efficiency score as a measure of performance as done by Uddin and Suzuki (2011 & 2014). Besides, many studies on performance focused on the profitability issue of the banks. Those studies investigated how market structure and firm behavior, in terms of efficiency, may affect profitability (performance) of banks. For instance, Samad (2008) found that enhancement in the efficiency level may increase the performance of banks in Bangladesh banking industry. In addition, study by Ahamed (2012) also confirmed the existence of positive link between concentration ratio and return on assets for the banks in Bangladesh banking industry. However, the study that links efficiency and competition is still limited.

There are some indicators that can be used to investigate the link between market structure and bank performance. According to Bikker (2004), net interest margin (NIM) may reflect the competitive condition or efficiency of the banking market whereby lower interest margin indicates more competitive banking market. Figure 1.2 shows that the net interest margin in Malaysian banking industry can be considered as low. During the 18 year-period (1997-2015), only once did the net interest margin reached a high value, i.e. its highest was 4.94% in 2011. The low value of NIM shows that the levels of competition and efficiency in the Malaysian

banking industry have intensified over time. Further, the low value of NIM shows that the income generated from the loan activity is decreasing; hence banks need other sources of income such as fee-based income.
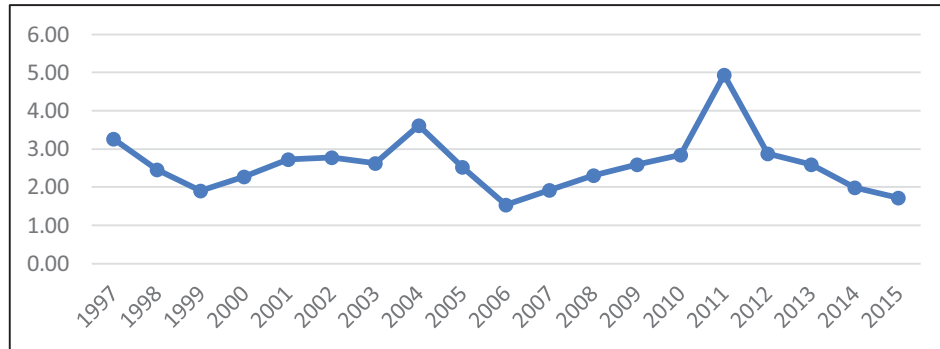
Figure 1.2 : Net Interest Margin in Malaysian Commercial Banking System
(Source: Author's compilation based on the data retrieved from Beck and Mohseni-Cheraghlou, 2017)

Figure 1.3 portrays the trend of several indicators of Malaysian commercial banking system. The return on assets (ROA) of the sector is lower compared to return on equity (ROE), but both are stable in nature. The ROA and ROE had reduced drastically during the 1997 EAFC and showed an improvement during the post crisis period (1999-2005). Both ROA and ROE reached their highest rates of 2.9% and 29%, respectively in 2011. However, both showed a declining trend after 2011. Further, decreasing trend of the cost-income ratio (CIR) indicates lower costs compared to income, and vice versa. Lower CIR reflects that competitive condition has intensified over the period together with the enhancement in the level of efficiency of commercial banks.
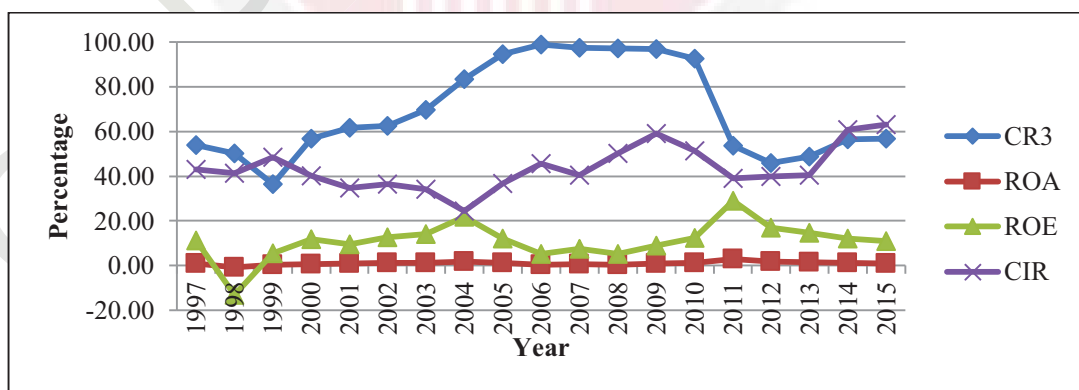
Figure 1.3 : Key Indicators for Malaysian Commercial Banking System
(Source: Author's compilation based on the data retrieved from Beck and Mohseni-Cheraghlou, 2017)

In addition, changes in CR$_3$ have proven that there has been a change in the structure of the banking market. The increase in market concentration demonstrates the existence of collusive behavior among leading banks, which in turn reduces the degree of competition and bank efficiency (Ahamed, 2012). However, after 2010 concentration ratio was decreasing; which indicates growing competition and efficiency among banks in the industry. However, after 2010, the level of concentration showed a decline, does this mean that market competition and the efficiency of banks in Malaysia have also increased? Further investigation on this issue is needed as this study intends to examine current market structure of the banking sector which had undergone tremendous changes due to several structural changes. Those changes have given a significant implication to market structure which altered the levels of concentration and competition as well as the behavior of the banks in the industry.

1.1.3 Structural Changes in the Banking Industry

Structural change refers to the economic situation that will alter the conduct of the banks in the industry suitable with the changes in the market structure. Hence, structural change may alter the market structure of an industry. From the industrial organizational perspective, changes in the market structure can be examined based on the levels of concentration and competition in the industry. The industry's structure is considered stable, but it can be transformed by changes in economic policy, regulation, technology and buyer's needs. These transformations are known as structural changes. They alter the conventional elements of market structure, such as firm's size distribution, numbers of firms and firm's ownership structure. The sources of structural change and the impact on Malaysian banking market as shown in Figure 1.4.
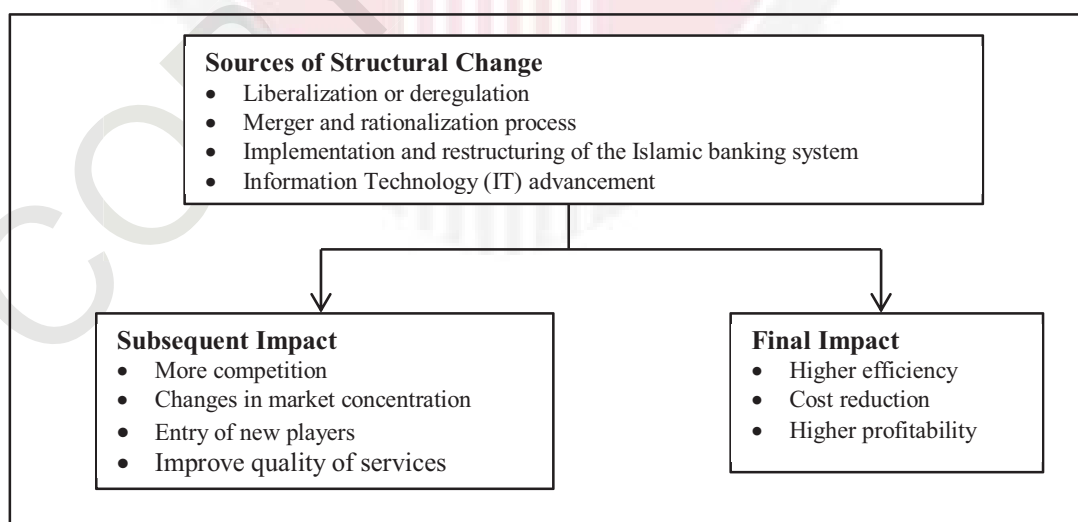
Figure 1.4 : Sources and Impact of Structural Change in Malaysian Banking Market
(Source: Author's compilation from Bikker and Bos , 2005)

There are four sources that contribute to the structural changes in the Malaysian banking industry. Abdul Majid and Sufian (2007b) provided evidence that merger among banks had decreased the level of concentration in Malaysian conventional banking market. Further, liberalization and globalization had increased the level of competition in the Islamic banking market (Abdul Majid and Sufian, 2007a). Meanwhile, according to Hussain (2002) the implementation of dual banking system had also altered the market structure of Malaysian banking industry. Finally, the use of technological advancement in the banking services had also altered the market structure of Malaysian banking industry. According to Hawkins and Mihaljek (2004), the use of new technology affects the structure and performance of the banking industry in emerging markets particularly through its impact on the costs and the determination of optimal scale.

The banking industry in most developing economies has been experiencing fundamental changes in its market structure since the 1997 EAFC. Merger process among the Malaysian banking institutions were done through two phases (Abdul Majid et al., 2007b). Merger process was adopted in order to strengthen the banking sector which was halted during the crisis. The focus of merger process is to merge the small financial institutions with the bigger ones which are known as 'anchor' banks (for detailed see summary of merger in Appendix A2). Meanwhile, banks and their finance company subsidiaries had been instructed to merge in the second phase of merger. Hence, merger process had reduced the number of financial institutions operating in the industry 88 institutions in 1997 to only 54 institutions in 2016 (for detailed see Appendix A1)

Liberalization and deregulation process also contributed to the changes in the market structure and performance of the nation's banking system as well as in the Malaysian banking market structure (Sharma & Bal, 2010; Ahmad Mokhtar et al., 2008, Murjan & Ruza, 2002; Duncan & Langrin, 2004; and Abdul Majid & Sufian, 2007a). Malaysia has adopted the gradualist and progressive approach to liberalize her financial market. Under the gradualist approach, the liberalization process of the financial system was done in phases, in-tandem with the capability and ability of the institutions in the system to absorb the changes without affecting the financial stability. This was then followed by the gradual opening of the financial system (Njie, 2006). The main objective for liberalizing the financial system is to attract foreign participation into Malaysian financial sector. Malaysia believed that the opening up the domestic financial system to foreign competition would create a more efficient, competitive and market-driven financial sector (BNM, 1999). The wave of liberalization in both conventional and Islamic banking markets had increased the number of foreign players in the Malaysian banking system from 13 in 1995 to 24 in 2016 (see Appendix A3).

Malaysia had implemented Islamic banking system since 1983 but its implementation becomes more pronounced after 1993 when conventional banks were permitted to offer Islamic windows under interest free banking scheme.

Hussain (2002) mentioned that one of the important reasons for Malaysia adopting dual banking system is to increase the number of players instantly. This is to increase competitive edge among the banks in the market. As the end of 2016, there were 16 Islamic banks in the Malaysian banking industry, compared to only two banks from 1993 until 2004 (see Appendix A1).

Advancement in technology is a means to enjoy economies of scale in production, development of new product and services, creation of knowledge, as well as to instil product quality and services efficiency (Selamat et al., 2009). As in other sectors, the banking sector also benefited from rapid technological advancement. Hawkins and Mihaljek (2004) mentioned that the use of new technology affects the structure and performance of the banking industry in emerging markets particularly through its impact on the costs and the determination of optimal scale. Therefore, financial institutions especially banking institutions began to invest heavily in technology to enhance customer services in order to remain competitive in the market (Sharma and Bal, 2010; Wong et al., 2006 and Gajurel, 2010). The use of technology in delivering banking services has increased the number of bankable customers. For instance, the number of subscribers of internet banking had increased by 66.5 percent between 2012 (13,678) and 2016 (22,774) (BNM, 2016).

1.2   Problem Statement

Analysis of market condition in the banking industry, particularly in terms of market structure and performance deserves particular attention because it may have powerful effects on social welfare and overall performance of the industry. In many countries, as well as in Malaysia, banking institutions particularly commercial banks, become the largest mobilizers of deposits which provide financing to enterprises and businesses. It is, therefore, necessary for banking institutions to operate efficiently within the existing market structure to guarantee the performance of the banking industry as a whole. Commercial banks are the largest components of the Malaysia financial system which account about 50% to 70% of the total banking assets. As at the end of January 2016, the total assets by the whole banking institutions stood at MYR2,444 billion and the shares of total assets concentrated in both conventional and Islamic commercial banks were about 76% (MYR1,859.5 billion) and 24% (MYR584.5 billion), respectively.

Most countries in the world, regardless of developed, developing or least developed countries, had experienced a rapid transformation in their financial sectors contributed by the structural changes. Malaysia has also not been left behind in facing this wave of change such as implementation of merger, liberalization process and the increasing use of technology in delivering banking services. However, Malaysia is unique and interesting to study because implementation and restructuring of the Islamic banking system also has contribute to the structural changes in the industry.

Deregulation and financial liberalization in Malaysia had begun in October 1978 where interest rate was deregulated to promote more liberal and competitive financial system. Moreover, measures undertaken by Malaysian government under General Agreement on Tariffs and Trade (GATT) obligations had encouraged the entry of foreign banks. This consequently altered the market structure of the banking industry due to increased number of banks, change in banking operation and change in bank's ownership. However, the 1997 crisis had exposed the structural weakness of Malaysian financial sector, particularly the banking industry. Before the crisis, Malaysian banking sector is highly fragmented with huge number of institutions. The number of banking institutions during the crisis was about 88 and had declined drastically to 70 institutions in 1999 and only 54 in 2016. Hence, the 1997 crisis has given the opportunity to identify problems in the structure of the financial system that has been used over the years. In addition, liberalization and deregulation process together with the merger and rationalization process prior to the crisis and restructuring program under FSMP (2001) had reshaped the Malaysian financial landscape particularly the banking sector. Furthermore, the emergence of Islamic banking system has also brought changes to the structure of the Malaysian banking industry.

The structure of the financial sector, especially the banking sector, was seen as highly fragmented with huge number of institutions, which have resulted from deregulation and financial liberalization undertaken since 1978. Thus, the 1997 crisis has exposed the structural weakness of Malaysian banking system. Therefore, the government had encouraged mergers between domestic banks to strengthen their positions during the Asian financial crisis. The measures taken by the government have reshaped the Malaysian financial landscape particularly the banking industry. Besides, the implementation of dual banking system also has resulted in an increase in the number of banking institutions and bank branches, which are domestic and foreign owned, offering Islamic banking products and services. The impacts of consequent changes are observable from the type of institutions, ownership structure and the number of institutions in the Malaysian banking industry.

Structural changes have altered the level of concentration and competition in Malaysian dual banking industry. Past experience has taught that BNM has to plan and strategize to improve the level of concentration and competition to stabilize the banking industry. According to Classens and Laeven (2004) certain level of competition is very important to the banking institutions to achieve efficiency in the production of financial services, served quality financial products and enhanced innovation activity in the financial sector. Besides, although many countries implement dual banking system, the studies on the issues of concentration and competition on dual banking are still limited and need further exploration. Throughout my investigation, there were five studies that have been done on the issue of competition in the banking industry in Malaysia. Three of these studies examine competition in conventional banking systems while the rest, each one in the Islamic banking system and dual banking system. While research on the issue

of market concentration in the dual banking system in Malaysia has not yet been done. Therefore, this study can provide significant results on the relationship between concentration and competition because it uses long period of data which covers 20 years (1997-2016) and further makes this study differs from previous studies especially for Malaysia.

Moreover, by knowing the nature of competition and concentration in the dual banking market, policy makers and bank managers may obtain information regarding the ability of Islamic banks to face competition in a banking market dominated by conventional banks which have long history of operations. Hence, policy makers can formulate policy that increases the competitive ability of the Islamic banks. Meanwhile, bank managers may alter their conducts to be competitive.

Besides enhancing competition in the banking sectors, those changes also encouraged banks to operate efficiently (Bikker, 2004; Okehalam, 2001 and Seelanatha, 2010). An influx of new foreign banks has encouraged domestic banks in both Islamic and conventional systems to operate efficiently in order to remain in the market. According to theory, less competitive market may weaken the incentives for banks to improve their efficiency. In contrast, banking specificities' hypothesis suggests that greater competition will reduce cost efficiency of banks through increased monitoring costs.

This study used bank efficiency as a proxy to investigate the performance of banks in both Islamic and conventional banking markets. Bank performance in this study is based on bank efficiency in generating income and cost savings. Most research focused on the issues of how market structure and firm behavior affect the performance of the bank. For example, a study by Samad (2005) examined the impact of market structure and bank efficiency on bank performance (profit). Most studies on bank efficiency reported that the levels of efficiency of banks are increasing over time (Ahmad Mokhtar et al., 2008; Sufian et al., 2007; Dwivedi and Charyulu, 2011 and Hassan et al., 2009). However, the question is, does the increase in efficiency help the firm to survive in a highly competitive market? Contrary to previous studies, this study intends to analyze how bank performance, measured in terms of efficiency, may affect the degree of competition in the market. In addition, many studies have calculated the efficiency score for the banking industry and further examine the relationship between efficiency and competition without providing empirical evidence particularly for Malaysia. Therefore, this study combines all the incomplete in past studies on market structure and performance in the banking industry which covers 20 years as compared to previous studies especially for Malaysia.

1.3   Research Questions

Given the above issue, this study attempts to investigate how changes in market concentration and bank performance will affect the level of competition among banks in the Malaysian banking industry, particularly in Islamic compared to conventional banking market. Thus, the research question in this study can be classified into three:

(i)   what is the actual level (nature) of concentration in Islamic relative to conventional banking system;
(ii)   what is the competitive condition in Islamic compared to conventional banking system;
(iii) what is the impact of concentration and bank performance on the level of competition in Islamic compared to conventional banking system?

1.4   Objective of the Study

Based on the research question and above problem statement, the main purpose of this thesis is to investigate the changes in the level of concentration, competition and efficiency of Islamic relative to conventional banking system. In addition, it also intends to further investigate the relationships between market concentration, competition and bank performance. In particular, the objectives of this study are:

(i)   to analyze the trade-off between competition and concentration of Islamic banking relative to conventional banking.
(ii)   to measure the degree of competition in Islamic banking relative to conventional banking.
(iii) to compare the income and cost efficiency scores of Islamic banks relative to conventional banks and further investigate the relationships between concentration, competition and bank efficiency.

1.5   Significance and Contribution of the Study

As discussed earlier, this study attempts to investigate market structure of the Malaysian banking industry based on the level of concentration and degree of competition in the market. Further, this study attempts to investigate how the levels of concentration and bank performance influence the degree of competition in both banking streams. First, this study may provide interesting and useful insights on market structure and performance issues in dual banking market. Contrary to previous research, present study investigates the level of concentration in both banking markets, namely Islamic and conventional banking markets. The study on market structure on dual banking market is still limited as done by Muhamad

(2017) and Turk Ariss (2009). Many studies on this issue concentrate on single banking market, i.e. Islamic or conventional only.

Second, many studies on market structure focus only on two traditional measures of concentration, namely concentration ratio (CR) and Herfindahl-Hirshman index (HHI) to investigate the nature of competition and concentration. During my investigation, it was found that only a handful of studies had used various measures of concentration in the analysis of market structure as done by Uddin and Suzuki (2014) and Sharma and Bal (2010). Hence, this study will utilize various measures of concentration to best represent the issues of concentration and competition in the Malaysian banking market. The use of several measures is important because different measure provides different insights (Sharma & Bal, 2010); and no single measure can capture everything that happened in the market (KwokaJr, 1985). Hence, the use of various measures is important in investigating the market structure of Malaysian dual banking industry as done by this study.

Third, besides measuring the degree of competition using the Panzar-Rosse (PR) method, this study also attempts to calculate the yearly H-statistics to investigate the evolution in the degree of competition in Islamic compared to conventional banking industry. Only limited studies had calculated the yearly H-statistics as done by Kuzucu (2015), Aktan and Masood (2010), Claessens and Laeven (2004) and Bikker and Haaf (2002a). All those studies were done for conventional market. Only two studies examined both conventional and Islamic banking industries as done by Cupian (2017) and Weill (2011). Hence, this study contributes to the existing literature by providing the direct measure of market competitiveness for both banking systems particularly for emerging economies like Malaysia. By calculating the yearly measure of competitiveness, this study is able to investigate the link between concentration and competition accurately; and hence provides new evidence to support the SCP paradigm hypothesis.

Fourth, instead of measuring the income and cost efficiency of the banking firms in conventional and Islamic banking systems, this study also investigates the relationships between competition, concentration and both types of efficiency. The study on this issue is important as it investigates how market condition and bank's conduct will intensify or dampen the level of competition in Islamic compared to conventional banking industry. It is hoped that this study will be useful not only for the policy makers but also for the existing players, the potential entrants and for other stakeholders of the banking industry. For instance, the study's findings may help bank managers in choosing their operational objective that suits government policies. Meanwhile, policy makers may provide regulation that may alter market condition and bank's behavior to intensify the level of competition in banking industry.

Finally, this study intends to investigate the market structure and performance of Islamic compared to conventional banking system with a relatively large number of years (1997-2016). Therefore, the analysis on concentration and competition in this study may provide accurate findings on this issue for Malaysian banking industry. Furthermore, this study also provides information on how firms should conduct in the changing market conditions to remain in the industry.

1.6   Scope of Study

This study intends to analyze the market structure and performance of Malaysian dual banking industry for relatively large number of years (1997-2016). Therefore, the findings on this issue are more accurate and may give clearer picture regarding the evolution of concentration and competition in the Malaysian dual banking market; which had experienced several structural changes during the period. Further, by comparing the market structure in both banking streams, present study is able to investigate the ability of the embryonic Islamic banks in facing competition in the market dominated by conventional banks. Besides, the use of various measures over the long period of study result in the analysis on market structure and performance in this study to be more accurate and thereby help the bank to adjust their conducts or behavior that will make them competitive in the increasingly competitive banking market. Moreover, the calculation of yearly H-statistics provides measures of the degree of competition in the Malaysian banking market. Meanwhile, performance of banks in this study is calculated using efficiency scores. Hence, this study is able to provide empirical evidence on the links between competition, concentration and performance by using direct measures of those variables.

1.7   Conceptual Framework

Figure 1.5 shows the study framework which has been formed from previous literature analysis. The study framework is based on a well-known approach in the industrial organization study, that is SCP paradigm. It was developed by Professors Mason and Bain in the 1940s and 1960s. Traditionally, this paradigm explained a direct relationship between market structure, market conduct and market performance. Attempt of this study is to analyze how the structural changes in Malaysian dual banking system affect the market structure of the banking industry in terms of concentration and competition. Further, this study also attempts to provide empirical evidence on the links between competition, concentration and bank performance.
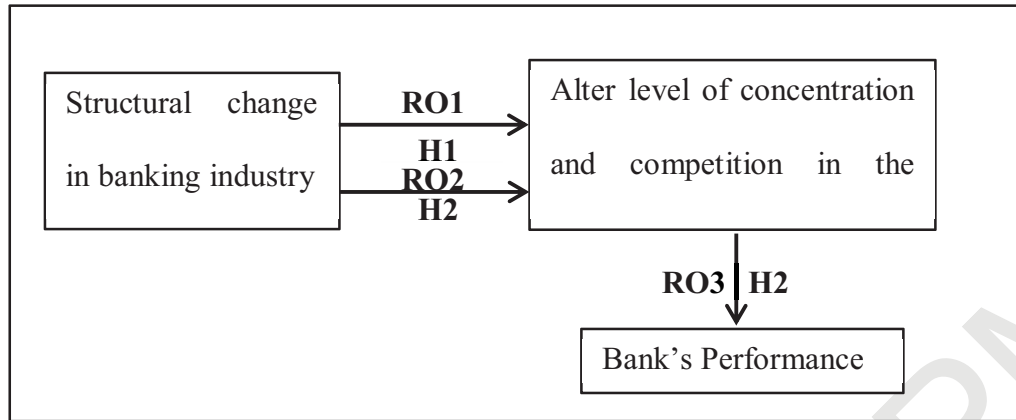
Note: RO is research objective; H is hypothesis

Figure 1.5 : Study Framework
(Source: Author's compilation)

As mentioned previously, liberalization, merger process, implementation of Islamic banking system and the use of technology in providing banking services contributed to the structural changes in the Malaysian dual banking market. As shown in Figure 1.5, structural changes in the banking market will change the market structure of the banking industry by altering the levels of concentration and competition in the market. Then, these changes in the level of concentration will lead to the change in the degree of competition of the market, i.e. whether it will intense or impede the level of competition in the banking industry. Further, changes in the degree of concentration and competition will influence the efficiency of the banking firms. Finally, this study attempts to investigate the links between competition, concentration and performance. That is, how the degree of concentration and bank behavior, in terms of efficiency, can affect the degree of competition in the market.

According to the objectives; first, this study attempts to investigate the link between market concentration and competition that has changed due to the structural changes occurred in the Malaysian banking industry. Hence, the first hypothesis is to test whether less concentration will lead to enhanced competition in both banking markets. The second objective is to measure the degree of competition in Islamic compared to conventional banking market. Henceforth, the second hypothesis is developed to test whether structural changes have increased the level of competition in both banking markets. The third objective is to compare the income and cost efficiency in both banking markets and further investigate the links between competition, concentration and performance. The main hypothesis for the third objective is whether type of efficiency (income or cost efficiency) matters in determining the relationship between competition and efficiency.

16

1.8   Chapter Summary

In short, this chapter explains the impact of structural changes that are taking place in the Malaysian dual banking system. Factors contributing to structural changes are bank mergers, liberalization and the use of technology in the banking services. Studies on the Malaysian banking system are quite unique and interesting. This is because the implementation of the Islamic banking system and restructuring of the Islamic banking operation changed the market structure of Malaysian banking industry. The structural change has altered the market structure of the banking industry in terms of concentration and competition. Subsequently, the changes in market structure will affect the performance of banks. The question is, whether changes in the degree of concentration and bank performance will have a positive impact on the degree of competition in the banking market. In addition, this study has also identified the capability of Islamic banks in facing the competition from the long established conventional banks.

Based on this issue, this study attempts to investigate the impact of structural changes on market concentration. The changes in the market concentration in this study will be analyzed using the traditional measures of concentration as proposed in the structural approach to measure competition. The SCP paradigm hypothesis is used to test the link between concentration and competition, which is expected to be negative. Second, market conduct of the banking firms will be evaluated by examining the degree of competition in both Islamic and conventional banking systems. The non-structural approach will be adopted to calculate the degree of competition measures which is known as H-statistics. Third, efficiency of the banking firms will be evaluated by measuring the cost and income efficiency's scores for both Islamic and conventional banking streams. According to theory, intense competition in the market will force firms to operate efficiently. Therefore, this study attempts to validate the relationship between competition with both types of efficiency.

1.9   Organization of the Research

This study consists of five major chapters and is organized as follows. **Chapter One** looks at the general overview of the research, and justifies the topic of this study. Descriptions of market structure and bank performance in the earlier part of this chapter can illustrate the importance of this study. Furthermore, the explanation in this chapter continues with the statement of the problems, the objectives of the study, research question, significance and contribution of study, scope of the study, conceptual framework and chapter summary.

Chapter Two discusses previous literature that relates to the study. This chapter is divided into three sections. The first section describes the relationship between concentration and competition in the banking market through the investigation on the existing literature regarding this issue. The second section provides the

summary of previous literature that used non-structural approach to measure the degree of competition in banking industry. Besides, the third section focuses on the concept of efficiency and its relationship with competition. It also provides a summary of related previous studies.

Chapter Three describes the methodology, data and definition of the variables used in the study. It provides detailed explanation regarding the research methodology and the econometric estimation technique employed by this study. Furthermore, it also explains the model employed in estimating the relationship between concentration and efficiency with the level of competition in Malaysian banking industry.

Chapter Four presents the empirical results and consists three sections. The first reports the empirical results of the relationship between concentration and competition in both Islamic and conventional banking systems using structural approach. The second section reports the condition of competition in the Malaysian dual banking system using the non-structural approach. Meanwhile, the third section reports the efficiency scores in both banking streams and explains the relationships between competition, concentration and efficiency in the Malaysian dual banking system. **Chapter Five** is on the summary and conclusion. It summarizes the findings and conclusion of the study and provides several policy implications as a guideline for the policy makers and bank managers.

REFERENCES

Abbasoğlu, O.S., Aysan, A.F. and Guňes, A. (2007). *Concentration, Competition, Efficiency and Profitability of the Turkish Banking Sector in the Post-Crises Period.* Munich Personal RePEc Paper

Abdul Kadir, H, Habibullah, M. Z., Siong Hook, L and Mohamed, A. (2014). Market structure and bank competition conditions in Malaysia. *Journal of Technology Management and Business, 1*(2), 1-34.

Abdul Majid, M. Z. and Sufian, F. (2007a). *Market Structure and Competition in Emerging Market: Evidence from Malaysian Islamic Banking Industry*. Munich Personal RePEc Paper.

Abdul Majid, M. Z. and Sufian, F. (2007b). Consolidation and competition in emerging market: An empirical test for Malaysian banking industry. *Economic Change and Restructuring, 39*, 105-124.

Abuzayed, B. Al-Fayoumi, N. and Gharaibeh, H. (2012). Competition in MENA countries banking market. *International Journal of Financial Services Management, 5*(3), 272-301.

Acikalin, S. and Saking, L. (2015). Assessing competition with the Panzar-Rosse model in the Turkish banking sector. *Journal of Economics Bibliography*, *2*(1), 18-28.

Adelman, M. A. (1969). Comment on the "H" concentration measure as a number s equivalent period. *The Review of Economics and Statistics*, *51*(1), 99-101.

Ahamed, M. D. M. (2012). Market structure and performance of Bangladesh banking Industry: A panel data analysis. *Bangladesh Development Studies, XXXV*(3), 1-18.

Ahmad Mokhtar, H. S., Abdullah, N. and Alhabshi, S. M. (2008). Efficiency and competition of Islamic banking in Malaysia. *Humanomics 24*, 28-48.

Aktan, B and Masood, O. (2010). The state of competition of the Turkish banking industry: An application of the Panzar-Rosse model. *Journal of Business Economics and Management, 11*(1), 131-145.

Allen, F. and Gale, D. (2004). Financial intermediaries and markets. *Econometrica*, *72*(4), 1023-1061.

Al-Muharrami, S., Matthews, K. and Khabari, Y. (2006). Market structure and competitive conditions in the Arab GCC banking system. *Journal of Banking and Finance, 30*, 3487-3501.

Al-Muharrami, S. (2009). Analysis of competitiveness in Qatar banking industry. *International Journal of Business Innovation and Research*, *3*(2), 168-181.

148

Al-Obaidan, A. M. (2008). Market structure, concentration and performance in the commercial banking industry of emerging markets. *International Journal of Economics, Finance and Administrative Science, 12*, 104-115.

Anzoategui, D., Peria, M. S. M. and Melecky, M. (2012). Bank competition in Russia: An examination at different levels of aggregation. *Emerging Markets Review, 13*, 42-57.

Ariff, M. and Can, L. (2008). Cost and profit efficiency of Chinese banks: A non-parametric analysis. *China Economic Review, 19*, 260-273.

Bain, J. S. (1951). Relation of profit rate to industry concentration: American manufacturing, 1936-1940. *Quarterly Journal of Economics, 65*, 293-324.

Bank Negara Malaysia. (1979). *Money and Banking in Malaysia.* Kuala Lumpur: Bank Negara Malaysia. Retrieved from http:// www.bnm.gov.my.

Bank Negara Malaysia. (1999). *The Central Bank and the Financial System in Malaysia.* Kuala Lumpur: Bank Negara Malaysia. Retrieved from http:// www.bnm.gov.my.

Bank Negara Malaysia. *Monthly Statistical Bulletin.* Bank Negara Malaysia. Kuala Lumpur. Various issue. Retrieved from http:// www.bnm.gov.my

Bank Negara Malaysia. *Annual Report.* Bank Negara Malaysia. Kuala Lumpur.Various issue. Retrieved from http:// www.bnm.gov.my

Bank Negara Malaysia. *Financial Stability and Payment System Report.* Bank Negara Malaysia. Kuala Lumpur. Various Issue. Retrieved from http:// www.bnm.gov.my

Baumol, W. J. (1982). Contestable markets: An uprising in the theory of industry structure. *The American Economic Review, 72,* 1-15.

Beck, T., Demirguck-Kunt, A. and Levine, R. (2003). *Bank Concentration and Crises.* Policy Research Working Paper.

Beck, T., Maimbo, S. M., Faye, I. and Triki, T. (2011). *Financing Africa: Through the Crisis and Beyond.* Retrieved from http://blogs.worldbank.org/allaboutfinance/financing-africa-through-the-crisis-and-beyond

Beck, T., Demirguck-Kunt, A. and Merrouche, Q. (2013). Islamic vs. conventional banking: Business model, efficiency and stability. *Journal of Banking and Finance, 37,* 433-447.

Beck. T. and Mohseni-Cheraghlou. (2017). *Financial Structure Dataset.* The World Bank: Washington D.C.

149

Berger, A. N. and Hannan, T. (1993). *Using Efficiency Measures to Distinguish among Alternatives Explanations of the Structure Performance Relationships.* Working Paper Federal Reserve Board. Washington DC.

Berger, A. N. (1995). The profit structure relationship in banking: Tests of market power and efficient structure hypothesis. *Journal of Money, Credit and Banking, 27*, 403-431.

Berger, A. N. and Humphrey, D. B. (1997). Efficiency of financial institutions: International survey and directions for future research. *European Journal of Operational Research*, *98*, 175-212.

Berger, A. N. and Mester, L. J. (1997). Inside the black box: What explain differences in the efficiencies of financial institutions. *Journal of Banking and Finance*, *21*, 895-947.

Berger, A. N. and Hannan, T. (1998). The efficiency cost of market power in the banking industry: A test of the 'quiet life' and related hypothesis. *The Review of Economics and Statistics, 80*, 454-465.

Berger, A. N., Demirgüc-Kunt, A., Levine, R. and Haubrich, Joseph G. (2004). Bank concentration and competition: An evolution in the making. *Journal of Money, Credit and Banking, 36*, 433-451.

Bhattacarya, M. (2001). *Industrial Concentration and Competition in Malaysian Manufacturing.* Working paper of Monash University, Australia.

Bhatti, G. A. and Hussain, H. (2010). Evidence on structure conduct performance hypothesis in Pakistani commercial banks. *International Journal of Business and Management*, *5*, 174-197.

Biekpe, N. (2011). The competitiveness of commercial banks in Ghana. *African Development Review, 23*(1), 75-87.

Bikker, J. A. and Groeneveld, J. M. (1998). *Competition and Concentration in the EU Banking Industry.* Research Series Supervision No. 8. De Nederlandsche Bank.

Bikker, J. A. and Haaf, K. (2002a). Measures of competition and concentration in the banking industry: a review of the literature. *Economic and Financial Modelling, 9*, 53-98.

Bikker, J. A. and Haaf, K. (2002b). Competition, concentration and their relationship: An empirical analysis of the banking industry. *Journal of Banking and Finance, 26*: 2191-2214.

Bikker, J. A. (2004). *Competition and Efficiency in a Unified European Banking Market*. United Kingdom: Edward Elgar Publishing Limited.

Bikker, J.A. &Bos, J.W.B. (2005). *Trend in competition and profitability in the banking industry: A basic framework.* Chapters in SUERF Studies, 2. Retreived from: http://www.suerf.org/download/studies/study20052.pdf. Bikker

Bikker, J. A., Spierdijk, L., and Finnie, P. (2007). Misspecification of the Panzar-Rosse Model: Assessing competition in the banking industry. Retrieved from http://www.rug.nl/staff/l.spierdijk/panzar_rosse.pdf.

Bod'a, M. (2014). Concentration measurement issues and their application for the Slovak banking sector. *Procedia Economics and Finance*, *12*, 66-75.

Boyd, J. H. and Runkle, D. E. (1993). Size and performance of banking firms. *Journal of Monetary Economics, 31*, 47-67.

Buchs, T. and Mathisen,J. (2005). Competition and efficiency in banking: Behavioural evidence from Ghana. *International Monetary Fund Working Paper.*

Casu, B. and Giradone, C. (2006). Bank competition, concentration and efficiency in the single European market. *The Manchester School*, *74*(4), 441-468.

Casu, B. and Giradone, C. (2007). *Does Competition Lead to Efficiency? The Case of EU Commercial Banks.* Discussion Paper.

Casu, B. and Giradone, C. (2009). Testing the relationship between competition and efficiency in banking: A panel data analysis. *Economic Letters, 105*, 134-137.

Chan, D., Schumacher, C. and Tripe, D. (2007). Bank competition in New Zealand and Australia. Retrieved from: http://www.melbournecentre.com.au/FinsiaMCFS/2007/DonaldChan.pdf

Chirwa, E. W. T. (2001). Market structure, liberalization and performance in the Malaysian banking industry. *African Economic Research Consortium (AERC) Research Paper* 108.

Christopoulos, D. K., Lolos, S. G. G. and Tsionas, E. G. (2002). Efficiency of the Greek banking system in view of the EMU: A heteroscedastic stochastic frontier approach. *Journal of Policy Modelling*, *24*, 813-829.

Claessens, S. and Laeven, L. (2004). What drives bank competition? Some international evidence. *Journal of Money, Credit and Banking*, *36*, 563-583.

Coccorese, P. (2004). Banking competition and macroeconomics conditions: A disaggregate analysis. *Journal of International Financial Markets, Institutions and Money, 14*, 203-219.

Coelli, T. J., Prasada Rao, D.S., O'Donnell, C. J. and Battesse, G. E. (2005). An Introduction to Efficiency and Productivity Analysis. Retreived from http://www.springeronline.com.

Cupian, M.A. (2017). Competitive condition and market power of Islamic banks in Indonesia. *International Journal of Islamic and Middle Eastern Finance and Management*, *10*(1), 1-17.

Curry, B. and George, K.D. (1983). Industrial concentration: a survey. *Journal of Industrial Economics, 31*, 203-256.

Daley, J and Metthews, K. (2011). Competitive *Conditions in the Jamaican Banking Market 1998-2009.* Cardiff Economics Working Paper.

Davcev, L. and Hourvouliades, N. (2013). Banking concentration in FYROM: Evidence from a country in transition. *Procedia Economics and Finance, 5*, 222-230.

Davies, S. W. (1980). Measuring industrial concentration: An alternative approach. *Review of Economics and Statistics, 62*, 306-309.

De Bandt, O. and Davis, E. P. (2000). Competition, contestability and market structure in European banking sectors on the eve of EMU. *Journal of banking and Finance*, *24*, 1045-1066.

Detragiache, E. and Gupta, P. (2004). *Foreign banks in emerging market crises: Evidence from Malaysia*. IMF Working Paper.

Deltuvaite, V., Vaskelaitis, V. and Pranchkeviciute, A. (2007). The impact of concentration on competition and efficiency in the Lithuanian banking sector. *Engineering Economics*, *4*, 7-19.

Demirguck-Kunt, A and Levine, R. (2000). *Bank Concentration: Cross Country Evidence*. The World Bank.

Demsetz, H. (1973). Industry structure, market rivalry and public policy. *Journal of Law and Economic, 16*, 1-9.

Dickson, V. (1981). Conjectural variation elasticities and concentration. *Economics Letters, 7*, 281-285.

Duncan, D. and Langrin, B. (2004). Testing for competition in the Jamaican banking sector: Evidence from bank level data. *Southwestern Journal of Economics VI*(1).

Dwivedi, A. K. and Charyulu, D. K. (2011). Efficiency of Indian banking industry in the post-reform era. *Indian Institute Working Paper*.

Elmas, F. and Degirmen, S. (2009). Foreign direct investment and industrial concentration in the Turkish manufacturing System. *International Journal of Finance and Economics*, *23*, 246-252.

Farell, M. J. (1957). The measurement of productive efficiency. *Journal of Royal Statistical Society Association, 120*, 253-81.

Ferguson, P. R. and Ferguson, G. J. (1994). *Industrial Economics: Issues and Perspectives.* London: The McMillan Press Ltd.

Fischer, T. and Kamerschen, D. R. (2003). Measuring competition in the U.S airlines industry using the Rosse-Panzar test and cross-sectional regression analysis. *Journal of Applied Economics, 6*, 73-93.

Fu, X. and Heffernan, S. (2009). The effects of reform on China's bank structure and performance. *Journal of Banking and Finance, 33*, 39-52.

Gajurel, D. P. (2010). *Market Structure of Nepalese Banking Industry*. Retrieved from http://ssrn.com/abstract=1657903.

Gajurel, D. P. and Pradhan, R. S. (2012). Concentration and competition in Nepalese Banking Industry. *Journal of Economics, Business and Finance, 1*(1), 5-16.

Gasaymeh, A.S., Abdul Karim, Z., Abdul Majid, M. and Jusoh. (2014). Competition and market structure of banking sector: a penel study of Jordan and GCC countries. *Jurnal Ekonomi Malaysia, 48*(1), 23-34.

Gelos, R. G. and Jorgez Roldos. (2002). *Consolidation and Market Structure in Emerging Market Banking System*. International Monetary Fund Working Paper.

George, K. D., Joll, K. and Lynk, E. L. (1992). *Industrial Organisation: Competition, Growth and Structural Change.* Great Britain: St. Edmundsbury Press Ltd.

Gilbert, R. A. (1984). Bank market structure and competition: A survey. *Journal of Money, Credit and Banking*, *19*, 617-645.

Giustiniani, A. and Ross, L. (2008). Bank competition and efficiency in the FYR Macedonia. *South-Eastern Europe Journal of Economics, 2*, 145-167.

Gwin, C. R. (2001). A Guide for Industry Study and the Analysis of Firms and Competitive Strategy. Retrieved from http://faculty.babson.edu/gwin/indstudy/index.html.

Hakim, A. and Chkir, A. (2014). Market structure and concentration in Islamic and conventional banking. *International Journal of Financial Services Management*, *7*(3/4), 246-266.

Hamza, H. and Kachtouli, S. (2014). Competitive conditions and market power of Islamic and conventional commercial banks. *Journal of Accounting and Business Research*, *5*(1), 29-46.

Hamza, R. A. (2011). Validation Panzar-Rosse Model in determining the strutcural characteristics of Tunisian banking industry. *Journal of Economics and International Finance*, *3*(5), 259-268.

Harrison, D. and Rude, J. (2004). *Measuring Industry Concentration in Canada's Food Processing Sectors.* Agriculture and Rural Working Paper.

Hassan, T., Mohamad, S. and Bader, M. K. I. (2009). Efficiency of conventional versus Islamic banks: evidence from the Middle East. *International Journal of Islamic and Middle Eastern Finance and Management,* 2, 46-65.

Hauner, D. and Peiris, S.J. (2005). *Bank Efficiency and Competition in Low-Income Countries: The Case of Uganda.* IMF Working Paper

Hause, J .C. (1977). The measurement of concentrated industrial structure and the size distribution of firms. *Annals of Economics and Social Measurement, 6,* 73-107.

Hawkins, J. and Mihaljek, D. (2004). *The Banking Industry in the Emerging Market Economies: Competition, Consolidation and Systematic Stability: An Overview.* BIS Papers.

Horowitz, A. and Horowitz, I. (1968). Entropy, markov processes and competition in the brewing industry. *Journal of Industrial Economics, 16,* 196-211.

Hunter, W. C. and Timme, S. G. 1(986). Technical change, organizational form, and the structure of bank production. *Journal of Money, Credit and Banking*, *18*, 152-156.

Husain, A.S. (2002). Islamic banking and finance: an overview. Paper presented at *Seminar on Islamic Banking and Finance: Current Development and Latest Instruments in Islamic Banking Industry*, Kuala Lumpur.

Iqbal, M. and Molyneux, P. (2005). *Thirty Years of Islamic Banking: History, Performance and Prospects*. New York: Palgrave Macmillan.

Isik, I. and Hassan, M. K. (2002). Cost and profit efficiency of the Turkish banking industry: An empirical investigation. *The Financial Review, 37*, 257-280.

Iuga, I. (2013). Analysis on the banking system's concentration degree in EU countries. *Annales Universitatis Apulensis Series Oeconomica, 15(1)*, 184-193

Jaafar, A. S. (2007). *Organisasi Industri: Teori dan Aplikasi.* Sintok: Penerbit Universiti Utara Malaysia.

Jeon, B. N., Olivero, M. P. and Wu, J. (2011). Do foreign bank increases competition? Evidence from emerging Asian and Latin American banking markets. *Journal of Banking and Finance, 35*, 856-875.

Kamaruddin, B. D., Safa, M.S., and Mohd, R. (2008). Assessing production efficiency of Islamic banks and conventional bank Islamic windows in Malaysia. *International Journal of Business and Management Research, 1*, 31-48.

Kamaruddin, B. D. (2007). *Efficiency evaluation of Islamic banking in the dual banking system: An analysis of commercial banks in Malaysia*. PhD Thesis, University Utara Malaysia.

Kashi, F. K. and Beynabadi, J. Z. (2013). The degree of competition in Iranian banking industry: Panzar-Rosse Approach. *African Journal of Business Management*, *7*(43), 4380-4385.

Kondeas, A. G. (1998). *Bank efficiency in the European Union: 1989-1995*. UMI Dissertation Service: A Bell and Howell Company.

Kumar, S. and Gulati, R. (2008). An examination of technical, pure technical and scale efficiencies in Indian public sector banks using data envelopment analysis. *Eurasian Journal of Business and Economics, 1*(2), 33-69.

Kuzucu, S. (2015). Concentration and competition in Turkish banking industry: The evidence from 2000 to 2010. *International Journal of Finance and Banking Studies*, *4*(3), 1-10.

KwokaJr, J. E. 1985. The Herfindahl index in theory and practise. *Antitrust Bulletin, 30*, 915-947.

Lipczynski, J., Wilson, J. and Goddard, J. (2005). *Industrial Organization: Competition, Strategy, Policy*. England: Prentice Hall.

Macit, F. (2012). Recent evidence on concentration and competition in Turkish banking sector. *Theoretical and Applied Economics*, *19*(8), 19-28.

Marfels, C. (1971). Absolute and relative measures of concentration reconsidered. *Kyklos, 24*, 753-766.

Marginean, S.C & Toma, R. (2011). Some issues concerning sector concentration: evidence from Romania. *Journal of Business Economics and Management, 12*(1), 110-130.

Matthews, K., Murinde, V., and Zhao, T. (2007). Competitive conditions among the major British banks. *Journal of Banking and Finance, 31*, 2025-2042.

Mensi, S and Zouari, A. (2011). Banking industry, market structure and efficiency: The revisited model to intermediary hypotheses. *International Journal of Economic and Research*, *12*, 23-36.

Meilak, C. (2008). Measuring export concentration: The implications for small states. *Bank of Velatta Review*, *37*, 35-48.

Mlambo, K. and Ncube, M. (2011). Competition and efficiency in the banking sector in South Africa [Electronic version]. *African Development Review, 23*, 4-15.

Molyneux, P., Lloyd Williams, D. M. and Thornton, J. (1994). Competitive conditions in European banking. *Journal of Banking and Finance, 18*, 445-459.

Molyneux, P., John, T. and Lloyd-Williams D. M. (1996). Competition and market contestability in Japanese commercial banking. *Journal of Economics and Business*, *48*(1), 33-45.

Moschandreas, M. (2000). *Business Economics*. 2nd edition. London: Business Press.

Mostafa, M. (2007). Modelling the efficiency of GCC banks: A data envelopment analysis approach. *International Journal of Productivity and Performance Management, 56*, 623-643.

Mostafa, M. M. (2011). Modelling Islamic banks' efficiency: A non-parametric frontier approach. *International Journal of Islamic and Middle Eastern Finance and Management, 4*, 7-29.

Muhamad, A.W. (2017). Comparing the competition of Malaysia Islamic and conventional banks: Evidence surrounding the global financial crisis. *Journal of Islamic Accounting and Business Research, 8*(1), 23-40.

Murjan, W. and Ruza, C. (2002). The competitive nature of the Arab Middle Eastern banking markets. *International Advances in Economic Research, 8*, 267-274.

Naceur, S. B., Ben-Kendhiri, H., and Casu, B. (2009). What Drives Efficiency of Selected MENA Banks? A Meta Frontier Analysis. *Cass Business School Working Paper Series*.

Nathan, A. and Neave, E. H. (1989). Competition and contestability in Canada's financial system: Empirical results. *The Canadian Journal of Economics*, *22*, 576-594.

Nawrocki, D. and Carter, W. (2010). Industry competitiveness using Herfindahl and entropy concentration indices with firm market capitalization data. *Applied Economics, 42*, 2855-2863.

Njie, Mattar. (2007). The impact of financial liberalization on bank spreads in Malaysia. *Journal of Economic Cooperation, 27*, 163-194

Panzar, J. C. and Rosse, J. N. (1987). Testing for "monopoly" equilibrium. *The Journal of Industrial Economics, 35*, 443-456.

Perera, S., Skully, M. And Wickramanayake, J. (2006). Competition and structure of South Asian banking: a revenue behaviour approach. *Applied Financial Economics, 16*, 789-801.

Podpiera, A. (2007a). *Competition and Efficiency in the Czech Banking Sector.* CNB Financial Stability Report.

Podpiera, A., Weill, L. and Schobert, F. (2007b). *Market Power and Efficiency in the Czech Banking Sector*. Czech National Bank Working Paper Series.

Rajesh, K. (2009). Competitiveness and emerging markets. *Business Strategy Series, 10*, 90-95.

Repon, M. A. H and Islam, K. M. Z. (2016). Competition and concentration in Bangladeshi banking sector: An application of Panzar-Rosse Model. *Finance and Banking Studies 5*(1), 16-29.

Repkova, I and Stavarek, D. (2014). Concentration and competition in the banking sector of Turkey. *Economic Interferences*, *16*(36), 625-640.

Rezitis, A. N. (2010). Evaluating the state of competition of the Greek banking industry *Journal of International Financial Markets, Institutions and Money,* 20, 68-90.

Rinkeviciute, V. and Martinkute-Kauliene, R. (2014). Impact of market concentration on the profitability of Lithuanian banking sector. *Business: Theory and Practice, 15*(3), 254-260.

Samad, A. (2008). Market structure, conduct and performance: Evidence from Bangladesh banking industry. *Journal of Asian Economics*, *19*, 181-193.

Samuelson, P. A. and Nordhaus, W. D. (1998). *Microeconomics*. 16th Ed. Irwin/McGraw-Hill: Boston.

Schaeck, K. and Cihak, M. (2008). How Does Competition Affect Efficiency and Soundness in Banking: New Empirical Evidence. European Central Bank Working Paper.

Scitovsky, T. (1955). *Economic Theory and the Measurement of Concentration*. Universities-National Bureau (ed.) Business Concentration and Price Policy. Princeton University Press.

Seelanatha, L. (2010). Market structure, efficiency and performance of banking industry in Sri Lanka. *Banks and Bank Systems, 5*, 20-31.

Selamat, J., Jaafar, N. and Boon, O. H. (2009). Technology acceptance in Malaysian banking industry. *European Journal of Economics, Finance and Administrative Sciences, 17*, 143-155.

Shahimi, S., Ismail, A. G., and Ahmed, S. (2006). A panel data analysis of fee income activities in Islamic banks. *Islamic Economics, 19*, 23-35.

Sharma, M. K. and Bal, H. K. (2010). Bank market concentration: A case study of India. *International Review of Business Research Papers, 6*, 95-107.

Sleuwaegen, L. and Dehandsschutter, W. (1986). The critical choice between the concentration ratio and the H-index in assessing industry performance. *The Journal of Industrial Economics, 35*, 193-208.

Smith, R.T. (1998). Banking competition and macroeconomic performance. *Journal of Money Credit and Banking, 30*(4), 793-815.

Smith, R. and Tripe, D. (2001). *Competition and Contestability in New Zealand's Banking System.* Paper presented at the 14th Australian Finance and Banking Conference.

Staroselskaja, J. (2011). The influence of concentration on the competition in the banking industry. *Economics and Management, 16*, 373-379.

Stavarek, D. Repkova, I. (2011). Estimation of the Competitive Condition in the Czech Banking Sector. Munich Personal RePEc Archive Paper.

Sufian, F., Abdul Majid, M. Z. (2007). Bank ownerships, characteristics and performance: A comparative analysis of domestic and foreign Islamic banks in Malaysia. *Munich Personal RePEc Paper.*

Sufian, F. (2011). The nexus between financial sector consolidation, competition and efficiency: empirical evidence from the Malaysian banking sector. *IMA Journal of Management Mathematics, 22*, 419-444.

Sufian, F and Habibullah, M. Z. (2013). Financial sector consolidation and competition in Malaysia: An application of the Panzar-Rosse method. *Journal of Economic Studies 40*(3), 390-410.

Tirole, J. (1998). *Theory of Industrial Organization*. Cambridge: MIT Press

Trung H. Le. (2015). Market concentration and competition in Vietnamese banking sector. *Review of Business and Economic Studies*, *3*(1), 67-79.

Turk Ariss, R. (2010a). Competitive conditions in Islamic and conventional banking: A global perspectives. *Review of Financial Economics, 19*, 101-108.

Turk-Ariss, R. (2010b). On the implications of market power in banking: Evidence from developing countries. *Journal of Banking and Finance*, *34*, 765-775.

Turk-Ariss, R. (2009). Competitive behaviour in Middle East and North Africa banking systems. *The Quarterly Review of Economics and Finance*, *49*, 693-710.

Uddin, S.S.M. and Suzuki, Y. (2011). Financial reform, ownership and performance in banking industry: The case of Bangladesh. *International Journal of Business and Management*, *6*(7), 28 – 39.

Uddin, S.S.M. and Suzuki, Y. (2014). The impact of competition on bank performance in Bangladesh: an empirical study. *International Journal of Financial Services Managemnet*, *7*(1), 73-94.

Vander, V. R. (2002). Cost and profit efficiency of financial conglomerate and universal bank in Europe. *Journal of Money, Banking and Credit*, *34*, 254-282.

Waldman, D. E. and Jensen, E. J. (1998). *Industrial Organization: Theory and Practise*. New York: Addison-Wesley Educational Publishers Inc.

Waterson, M. (1984). *Economic Theory of the Industry*. Great Britain: Cambridge University Press.

Weill, L. (2011). Do Islamics bank have greater market power? *Comparative Economics Studies, 53*, 291-306.

Wong, J., Wong, E., Fong, T., and Choi, K.F. (2006). Competition in Hong Kong's banking sector: A Panzar-Rosse Assessment.

Yeyati, E. L. and Micco, A. (2007). Concentration and foreign penetration in Latin American banking sectors: Impact on competition and risk. *Journal of Banking and Finance, 31*, 1633-1647.

Yokoi-Arai, M and Yoshino, N. (2006). *Concept of Competitiveness in the Financial Sector, Financial Research and Training Center*. Discussion Paper Series.

Yuan, Y. (2006). The state of competition of the Chinese banking industry. *Journal of Asian Economics, 17*, 519-534.