CHAPTER TWO
LITERATURE REVIEW

2.1 Preface

This chapter elaborates theories as foundation of this research. The theories discussed are related to asset growth, office branches and channelling, human capital, interest rate, inflation, and industrial production index. Research data trend is presented to support theories elaborated in each variable. Several technical terms are also explained to provide an overview for each variable of the research. Furthermore, previous studies that support the research model are discussed in depth to arrive at an appropriate justification of the model. Finally, theories on statistical tools to be adopted in this research are elaborated to gain better understanding.

2.2 Asset Growth

'Growth' in Oxford Dictionary is simply defined as the process of growing or something that has grown or is growing. Therefore, Islamic bank's asset growth refers to growing total asset of Islamic banks from one period to another. The growing process hence is considered as one way to measure banking operational efficiency (Khusro et. al, 1971). Ayub (2008) suggests that growth is a major objective of economic policy in the overall purpose of development and happiness of the population. Hence it is also the main objective in banking development as stated on the website of the biggest bank in Indonesia in term of asset, Bank Mandiri as its motto: "Leading Trust. Enabling Growth.

Asset growth in the bank is important because it determines banking going concern principle, as it can exist for a long period of time as financing intermediary to support the economy. Hence, growth in bank's asset is a paramount indicator for evaluation and future strategic plan. Bank Indonesia has three pillars that represent three area of tasks to oversee among others growth of banking industry. The full three areas are formulating and implementing monetary policy, regulating and ensuring a smooth payment system, and regulating and supervising the national banking system (Indonesia Banking

Directory, 2009-2010). Therefore, Bank Indonesia's main function is to regulate and supervise all banks in Indonesia with its policies and discretions to develop the banking system in Indonesia with cooperation from other government institutions in the country. Several regulations released by Bank Indonesia from time to time are meant to ensure the system is on the right track, including regulation that governs bank's asset.

Further, Levine (2003) describes the role of banks as a part of financial system in the country and serves as financial intermediary. Asset growth in the context of financial development occurs when financial instruments, markets, and intermediaries improve. Thus, financial development involves improvements in the (i) production of ex ante information about possible investments, (ii) monitoring of investments and implementation of corporate governance, (iii) trading, diversification, and management of risk, (iv) mobilization and pooling of savings, and (v) exchange of goods and services. Each of these financial functions may influence savings and investment decisions and eventually economic growth.

2.3 Number of Office Branch & Channelling

Mishkin (2009) argues that more office branches would enable customers to reach the banks, which then would minimize risk in asset management. It means large pool of customers would diversify the risk as compared to small number of customers. This strategy would also stimulate the growth of banks' assets with the lowest risk possible.

With the above theoretical foundation, it can be argued that it is necessary to increase office branches of Islamic banks to stimulate its asset growth. Purnomo (2009) compares the office branches to locomotive as they drive the asset growth and stimulate financing and funding activities of Islamic banks.

The efforts to increase Islamic banks' asset growth have been facilitated by Bank Indonesia through the issuance of regulation concerning office location of banks, such as Bank Indonesia Regulation No. 8/3/PBI/2006 dated 30 January 2006 concerning *shariah* service or known as "office channelling" that can be exercised in conventional offices. Chapter 1 Article 1 Number 20 defines *shariah* service as *activity of funding that is exercised by Branch Office and or Office*

under Office Branch for and on behalf of Shariah Branch Office from the same bank. The regulation highlights the seriousness of Bank Indonesia in supporting Islamic banking development through expansion of office locations in the format of office branches and channelling offices in every district in Indonesia.

Table 2.1 Islamic Banks' Office Branch and Channelling Development

Description	2005	2006	2007	2008	2009
Total of Banks					
Commercial Banks	3	3	3	5	6
Islamic Business Units	19	20	26	27	25
Islamic Rural Banks	92	105	114	131	138
Total of Office Networks	550	636	711	953	1139
Commercial Banks	304	349	401	581	711
Islamic Business Units	154	182	196	241	287
Islamic Rural Banks	92	105	114	131	138
Office Channeling					
Total of Banks	-	10	17	21	19
Total of Services	-	456	1,195	1,470	1,803
Detail of Office Networks					
Head Offices	22	23	29	32	31
Branch Offices	189	209	224	273	339
Sub-Branch Offices	105	116	123	283	344
Cash Units	142	183	221	234	287

Source: Islamic Banking Statistics, Bank Indonesia Statistics, 2009

From the above table, it is shown that number of Islamic banking services through office branch and office channelling experienced increasing trend for the past four years. This can be seen from additional outlets of Islamic banking services of up to 287 offices by the end of 2009, both branch and sub-branch offices from Islamic Commercial Bank and Islamic Business Unit. Also additional of 333 Islamic banking services provided by conventional banks at their branch offices (through office channelling scheme). In sum, by the end of 2009 there were 1,139 Islamic bank offices operated by 6 Islamic Commercial Banks and 25 Islamic Banking Units together with 1,803 Islamic banking services via office channelling.

The significant increase in the past four years was first due to the opening of a new Islamic commercial bank namely *Bank Syariah Mega Indonesia* in 2004 and another three Islamic commercial banks in 2008 and 2009, i.e. *Bank Rakyat Indonesia Syariah, Bank Bukopin Syariah* and *Bank Panin Syariah* (Table 2.2) with minimum capital requirement Rp.1.000.000.000.000 (rupiah one trillion) as

stipulated in Bank Indonesia regulation no. 11/3/PBI/2009. In addition, they managed to aggressively expand their office branches during the period thus contributed to the asset growth.

Table 2.2 List of Major Islamic Commercial Banks in Indonesia (in million rupiah)

No.	Major Banks	Date of Establishment	Total Asset
1	Bank Muamalat Indonesia	1 November 1991	12,596,715
2	Bank Syariah Mandiri	25 October 1999	17,065,638
3	Bank Syariah Mega Indonesia	25 August 2004	3,096,203
4	Bank Rakyat Indonesia Syariah	16 October 2008	482,898
5	Bank Bukopin Syariah	27 October 2008	606,055
6	Bank Panin Syariah	6 October 2009	167,000

Source: Respective Annual Report 2008 and 2009 (Data is reorganized)

Table 3.2 above shows major banks in Indonesia that existed during the period of the research. The above five banks contributed 68% of the aggregate total asset in 2008. It means, the above six banks and especially the first three i.e. *Bank Muamalat Indonesia, Bank Syariah mandiri* and *Bank Syariah Mega Indonesia* have played important roles in ensuring the growth of their assets.

As of 2010 development, Bank Indonesia has issued licenses for four new full-fledged Islamic banks such as *Bank BCA Syariah, Bank Victoria Syariah, Bank BNI Syariah* and *Bank Jabar-Banten Syariah,* and that has summed the total of Islamic commercial banks in Indonesia to 10 banks. It is expected these new players would expand their offices and channelling soon hence would accelerate the growth of the whole total assets.

However, the above achievement is still far below the speed of conventional banks' growth that reached the total of 12,837 offices till the end of 2009 increased from 10,868 in 2008. Therefore, it is not surprising that conventional banks have larger asset than Islamic banks.

Realizing the above, almost all Islamic banks have formulated growth on office network strategy. Through several media, major banks in Indonesia such as *Bank Syariah Mandiri (BSM), Bank Syariah Mega Indonesia (BSMI), Bank Rakyat Indonesia Syariah (BRIS), Bank Muamalat Indonesia* and *BNI Syariah* (in the process of spin off) have declared to expand their office networks. For 2010, BSM is planning to increase its office networks by 130 offices, which will make

up its office network total to 500 offices. BSMI is ready to launch 500 outlets called “Mitra Mega Syariah” and 60 Mega Syariah Galleries. Meanwhile, BRIS and BNIS will optimize their conventional outlets all over Indonesia, which have existed through their conventional banks’ offices (channelling office program). In sum, by the end of year 2010, number of Islamic banking offices is projected to reach more than 2,100 offices (Antara News, 2009). This network expansion is expected to facilitate more customers to reach Islamic banks.

For the purpose of this research, channelling office is included in the total of Islamic banks’ office branches because it has contribution to the total assets. Undeniable that office channelling has played significant role ever since the strategy was launched in 2006. This strategy has stimulated an increase in third party fund from 59.6% to 84% for the past three years. Indeed, office channelling has become a new engine for third party funding, which has average share of Rp.0.7 billion per office channelling. However, it is suggested to continue the concerted effort to increase number of office channelling from time to time as the door for opportunity is still open widely.

Understanding Bank Indonesia regulation on office channelling, the following are the characteristics of office channelling:

a. The office channelling is a special counter in conventional offices where conventional staff attends to Islamic banks’ customers for certain product and services offered. The transaction is directly connected to Islamic banking data centre. Therefore, it would not cause double counting with conventional office branches.
b. Product and service offered currently is limited to account opening, deposit and withdrawal.

2.4 Number of Human Capital

Becker (1993) asserts that in the presidential campaign, both President Clinton and President Bush emphasized the importance of improving education and skills of American workers. They did not even shy away from using the term “investing in human capital” to describe the process of improving the quality of labour force. In general that is how human capital is meant and becomes an issue in every country and place especially in the job environment.

Human capital is also a major issue referred to in every discussion of how to accelerate Islamic banking development in Indonesia. Joyosumarto (2008) in the Proceeding of The International Seminar on "Challenges in Human Resource Development, Acceleration Growth in Islamic Finance" mentions that the rapid development of Islamic banking and finance globally demands highly qualified professionals. He added that in line with the *Shariah Acceleration program* for banking sector in 2008 to achieve 5% market share, there is a need for approximately 14,000 *shariah* professionals in Indonesia.

This conclusion is shared by Hadad and Danuwirana (2010). Hadad mentions that lack of shariah human capital will be a hindrance for the development of Islamic banking system. In the meantime, Bank Indonesia has set target for year 2010 that the total asset of Islamic bank will reach Rp.97 trillion, hence, it is necessary to have qualified *shariah* personnel. Danuwirana (2010) continues to emphasize that in searching for the qualified *shariah* personnel, there are four levels of competencies to fulfil. *First*, core competency: personnel must have the same vision and mission about Islamic banking system. *Second*, behaviour competency: the personnel must have Islamic spirit, flexibility with high curiosity. *Third*, functional competency: Islamic bankers must possess skills and credential, such as Islamic banking concept and operations, financial administration, and financial analysis. *Fourth*, managerial competency: this is for a team leader who must be able to rapidly seize any business opportunity, cope with the challenges, and maintain relationship with other Institutions.

As banking regulator, Bank Indonesia has released several regulations concerning the issue of human capital, such as:

a. Bank Indonesia Regulation No. 7/25/PBI/2005 dated 3 August 2005 concerning Risk Management Certification for Management and Officers of Commercial Bank
b. Bank Indonesia Regulation Number: 10/32/PBI/2008 dated 20 November 2008 concerning *Shariah* Banking Committee

Besides, to fulfil the demand for human capital, some initiatives have been undertaken to set up formal and informal educational institutions. Formal educations have been established under the license of Ministry of Religious

Affairs and Ministry of National Education. Focused institutions offered bachelor degree program in Islamic banking among others are Sekolah Tinggi Ekonomi Islam Tazkia, Sekolah Tinggi Ekonomi Islam SEBI, Sekolah Tinggi Ekonomi Islam Hamfara etc. While others offer concentration program or study program in their economic and management faculty such as Universitas Indonesia, Padjajaran University, Assafiiyyah University, University of Trisakti, etc. As for informal education, short courses on Islamic bank are available. It is offered either by the mentioned formal institutions above or by certain concerned parties such as consulting firms and training firms.

2.5 Strong Product and Service Development

Product and Services is another important issue where the variety of products and services offered could be an attractive marketing tool for Islamic banks. Mishkin (2009) argues that more products and services offered will be another advantage for (Islamic) banks in diversifying its risk in asset management. Benaissa et.al (2005) asserts from international perspective that financial institutions that cater to Islamic banking segment are growing much faster than conventional banks, because of the strong demand among consumers for products and services that comply with *shariah*. This is mainly due to the uniqueness and speciality of Islamic banking products and services with superior marketing and customer service skills.

With the purpose to promote Islamic banking product and service (LPPS, 2007), Bank Indonesia has issued regulation and circular letter on product labelling. The regulation and circular letter were stipulated under 1) Bank Indonesia Regulation Number: 10/17/PBI/2009 dated 25 September 2008 concerning Product of Islamic Bank and Islamic Business Unit and 2) Bank Indonesia Circular Letter Number: 10/31/DPbS dated 7 October 2008 concerning Product of Islamic Bank and Islamic Business Unit. The Circular Letter highlighted the implementation of Codification of Islamic Banking Product and specified the writing of “iB” on every product and services offered. The logo itself has been launched by Governor of Bank Indonesia on 2 July 2007.

2.6 Interest Rate

According to Karl Case and Ray Fair (2004), interest rate is the annual interest payment on a loan expressed as a percentage of the loan. From Islamic perspective, interest rate as a rate is not the one rejected but applying interest rate on the loan given to the borrower or seeking worldly compensation is not permissible (Ayub, 2008:75).

Among the three macroeconomic variables in this research, interest rate is the most debatable one because all Islamic banks in Indonesia and some other countries are benchmarking their margin to interest rate. However, it is not wrong to include time value of money (how interest rate is determined) in the margin calculation of Islamic banks (Ayub, 2008:89). The Islamic Fiqh Academy of the Organization of Islamic Countries (OIC) and *shariah* boards of all Islamic banks approve the legality of the difference between two prices of goods, between cash and credit. It is definitely different from charging interest rate on the money loaned to customers as that is considered as one type of *riba* transaction. In addition to verses in the Al-Qur'an, Prophet Muhammad S.A.W during his business life also condemned *riba*. He encouraged trading activities and abandoned usury (*riba)* transactions in the economy as example for his followers (Antonio, 2009:96).

Therefore, buying or selling goods, both on cash payment and credit, for the purpose of earning profit is permissible. Pricing the goods, keeping in mind the time given for payment of the price in credit transactions, is also permissible. In other words, this is tantamount to the acceptance of time value of money in the pricing of goods sold by Islamic banks.

As a benchmark, certainly interest rate plays important role in funding and financing activities of Islamic banks. Interest rate is a benchmark to determine margin offered to funding and financing activities. The banks charge their financing customers i.e. for *Murabahah* transactions certain margin that is equivalent (higher or lower) for certain period of time. As in the case of Indonesia, *Murabahah* is the highest product ranking in Islamic banks, with 56% share of total financing (Islamic Banking Statistics, 2009). Nevertheless, study on real sector index as reference index for Islamic banks' return has been conducted

by Bank Indonesia. This undertaking is to provide an alternative and avoid debates over the interest rate as a benchmark. This may not be that straightforward since Indonesia has dual banking system, in which the two types of banks i.e. conventional and Islamic shall be operating side by side.

As for profit sharing mechanism, it applies on other products such as *Mudharabah* and *Musyarakah*. This can be exercised not only to the financing customers who get fund from Islamic banks but also to funding customers who place their fund in Islamic banks.

For this research, interest rate quoted as independent variable of the research model is Bank Indonesia Certificate Rate (SBI rate). As far as the rate is concerned, it serves as one monetary policy of Bank Indonesia to stabilize the economy. Desia (2003) asserts that Bank Indonesia exercises open market operation as one monetary instrument through SBI trading and placement, with the purpose to influence money market liquidity. SBI rate itself is determined by several factors such as inflation and exchange rate and SBI rate acts as important parameter to determine interest rate in Indonesia. Therefore, instability of SBI rate will give impact to investment climate and economic growth in the country.

2.7 Inflation

Blanchard (2009) defines inflation as a sustained rise in the general level of prices, and inflation rate as the rate at which the price level of prices rise. Further, he states on page 54, the reason why inflation has become one macroeconomic variable that many economists care is due to the following:

a. During a period of inflation, not all prices and wages rise proportionately and inflation affects income distribution.
b. Inflation leads to other distortions. Variations in relative prices also lead to more uncertainty, making it harder for firms to make decision about the future, such as investment decision.

In relation with Islamic banks, a study proved that inflation does influence the customers demand to deposits or financing from the banks (Islamic Banking Outlook 2010). As far as this research is concerned, total asset consists of financing as the highest-ranking component. Therefore, it gives impact on the financing side since customers prefer not to take financing from the bank for their

investment in goods and services due to the price hikes.

2.8 Industrial Production Index

OECD Glossary of Statistical Terms defines production index or industrial production index as an index that cover production in mining, manufacturing and public utilities (electricity, gas, and water), but excluding construction.

Industrial production indices are normally complied at monthly or quarterly frequency to measure increases and decreases in production output. Indices of industrial production that are compiled in Indonesian Statistics (BPS) used as a main short-term economic indicator because of the impact that fluctuations in the level of industrial activity have on the remainder of the economy.

Industrial Production Index (IPI) has been a very important macro-economic indicator to monitor progress and fluctuation of industrial sector production in the Indonesia economy (Rosidi, 2000). As this index covers several variables of GDP, it has positive relationship over a period of time (Ilias and Lankanathan, 2009).

Robinson (1952) in Ozun and Cifter (2007) argues that financial sector has minor effect on growth. Economic development creates demand for financial intermediates leading to growth in lending facilities of the credit institutions. On the other hand, Schumpeter (1911) in Ozun and Cifter (2007) already stresses the importance of financial intermediaries for economic development. Patrick (1966) in Ozun and Cifter (2007) argues that financial sector contributes significantly to industrial growth in emerging markets, while the industrial growth increases demand for financial sector services in advanced economies. Though that argument might be accepted as valid in Latin America in 1990's, the financial crises in Mexico, Argentina and Brazil are extreme features of this relationship.

Ozun and Cifter (2007), at the end of their research find positive causal relationship between industrial production and banking sector as the industrial production plays important role as credit driver. This is also supported by Inggrid (2006) that argues in the case of Indonesia as a developing country, there exist bi-directional causal relationship between financial sector and industrial output (real output/GDP).

2.9 Government Support

As its name suggests, government refers to executive, regime, authority, or powers that exist in a country (Oxford Dictionary). Therefore, its action, instruction and support will influence country activities. Islamic bank in its early development begs government to support this so called new banking system, to exist side by side with the existing conventional system. This is merely to offer alternative and solution for public, thus encourage them to flourish the whole banking system and eventually will contribute to the growth of national economy.

The first Islamic bank as mentioned in the Chapter One was established due to government involvement, which in this case was the leader of this country. The enactment of Islamic Banking Act No. 21 Year 2008 and amendment of Value Added Tax Act No. 42 Year 2009 on PPN *Murabahah* were also due to the government support including House of People' Representative (DPR). Therefore, the argument to place government support as one variable that affects Islamic banking development is inevitable.

For this research, government support is referred to the enactment of Islamic Banking Act No. 21 Year 2008, effective date 17 June 2008, VAT Act No. 42 Year 2009, effective date 15 October 2009. The policy issuance on *Hajj* fund placement to be specifically pooled at Islamic banks has also been urged by Islamic banking practitioners. They argue that the policy is required to achieve optimistic projection scenario of Islamic banking development in Indonesia (Islamic Banking Outlook 2010). Therefore, it is necessary to call for government support.

2.10 Previous Studies

Derina and Dasril (2006) investigate empirical relevance of the impact of economic and financial crisis on market structure of banking sector and economic growth. The study shows a relationship between market structure and economic development changes in the period before and after the financial crisis in 1997. Before the crisis, the market structure negatively affects the economic growth. After the crisis, market structure of the banking industry promotes the growth in the economy. The study also found that credit channelling from banks to domestic manufacturing industry is not adequate enough to support the economic

growth to the level prior the crisis. Derina and Dasril (2006) use a model that was previously developed by Cetorelli and Gambera (2001) on growth model as follows:

Growth: constant + a Bank Development + b Bank Concentration + d Per capita GDP + e Faction of value added + f Period Dummy + Error

Where,

a. Bank Development is the amount of credit that the banking sector supply for productive uses is one of the most significant measures of financial development. This is measured by ratio of private domestic credit (supplied to manufacturing industry) to GDP, expected to have positive sign.
b. Bank Concentration is measured in total assets of 3 biggest banks due to the contradictory theory may have negative or positive sign.
c. Fraction of value added is value added shares of each sector in manufacturing industry captures an industry specific convergence effect. Theoretically, sectors that have already grown substantially in the past are unlikely to continue to grow at a high rate in the future. The coefficient is expected to have a negative sign.
d. Per capital GDP captures the convergence effect of the economy as a whole to the long-run steady state, expected to have a negative sign.
e. Period Dummy:
   1 = Pre Crisis (1994 – 1997)
   0 = Post Crisis (1998 – 2003)

The researchers insert dummy variables i.e. period before and after the crisis that explained a structural break between the two periods. They also performed Chow test to justify the use of dummy variable to separate periods of before and after the crisis in the overall model. This research employs similar model as described above except all dummy variables such as strong product and service development and government support are excluded due to period of time constraint. The above model shows perfect time to insert dummy variable there to separate the impact of the growth model before and after the crises in separation of three and four years' impact.

Permono (2004) present his hypotheses that there is positive relationship between interest and economic growth. Lower interest rate will increase economic growth through investments. There is a negative relationship between interest and investment demands in one hand, a positive relationship between investment and economic growth on the other hand. It means that lower interest rate will increase the demand of inflation due to the fact that interest rate is a factor of investment cost. The multiple increases in investment will increase banks' asset growth hence boost economic growth. The process will be just on opposite; higher interest rate means decrease in investment demand that will lead decrease in banks' asset growth and followed by economic growth. The model employed in Permono (2004) such as the following growth function:

$$YG_t = \chi_0 + \chi_1 RD_t \times \chi_2 XKG + \chi_3 SFY_t + \chi_4 DUM_1 + \chi_5 DUM_2 + \varsigma t$$

Where,

YG = rate of GNP growth – in percent,

RD = real deposit rate of interest rate (12-month deposit minus inflation) – in percent,

XKG = rate of growth in export – constant price in percent,

SFY = foreign saving/GNP ratio – in percent,

DUM = dummy variables

The estimation results above show that there is a significant relationship between national saving rates, economic growth rate and national saving in the previous period. Furthermore, interest rate variable seems not to have effect on the rate of national saving. This research has similar hypotheses on relationship between interest rate, inflation and growth. However Permono (2004) chooses GNP Growth for the case of Indonesia and this research chooses Islamic banks' asset growth. It is noted that the dummy variables in Permono (2004) have reasonable assurance to be placed in the model.

Islamic Banking Development Report/*Laporan Perkembangan Perbankan Syariah* (LPPS), Bank Indonesia (2007:33) shows its research finding on the impact of number of human capital and number of office branch and channelling to the asset growth. The finding of the research that was conducted by researchers at Directorate of Islamic Banking, Bank Indonesia shows the following:

a. From 456 office channelling units that rose to 1.195 office channelling units or 987 to 1.792 office branches and channelling units have recorded a significant increase in asset growth of Islamic banks. From office channelling units, it recorded the contribution of third party fund collection about 2.5% or Rp.700 billions at the end of period from 2006 to 2007.
b. Aggressive growth of office branch and channelling required more human capital to join the banks. Hence the success of office expansion coupled with the success of human capital readiness had eventually contributed to the increase in asset growth of Islamic banks.

Indirani (2006) finds that number of office branch as micro variable influencing Islamic banks' asset growth. The purpose of the research is to identify what are the factors that give impact to total asset of Islamic banks in Indonesia and to measure the size of the impact. The finding shows that total of assets in Islamic banking industry are influenced by factors such as GDP, real interest rate in conventional banking, and inflation. Economic growth influences asset growth of 0.99 percent indicates 1 percent economic growth in the past three months leads the increase in total assets for 0.99 percent. Interest rate and inflation influence asset growth of Islamic banks for -0.68 that indicates when interest rate and inflation five months ago experience 1 percent therefore asset growth of Islamic banks is reduced by 0.68 percent. As per inflation, the finding shows its elasticity reaches -0.94. It means if inflation experience 1 percent changes, it will reduce Islamic banks' asset for 0.94 percent. On the other hand, micro variables that influence asset growth are ROA, NPF and number of offices. The sizes of its elasticity are 0.84 (ROA), 0.0007 (NPF) and 94.1318 (number of offices). It explains that if number of office is increased for 1 unit therefore the growth of asset will increase for 94.1318 percent.

Adiyanto (2009) examines strategic analysis on promoting housing credit (KPR) in PT. Bank X. The purpose of the research are as follows (1) to identify dominant factors influencing KPR promotion strategy at Bank X Bogor Branch; (2) to analyse perception of the developer towards KPR product at Bank X Bogor Branch and (3) to arrive at alternative strategy in KPR promotion that can be

implemented at Bank X Bogor Branch. Factors identified in the research are product characteristics, market characteristics, level of competitiveness, targeting and positioning, consumer behaviour, and human capital. The research concludes that human capital i.e. Consumer Sales Manager as the most influential factor in KPR promotion that leads to increase in sales then banks' asset.

Lindiawatie (2007) investigates whether there is an impact from external and internal factors in Islamic banks towards their non-performing financing. Also whether previous period factor also exists and which factor gives the most significant impact. External and internal factors identified in her model are GDP, interest rate, inflation, equity, FDR and financing. Time series data from 2001 to 2006 are collected from Islamic Banking Statistics and Indonesian Statistics on Economics and Finance, Bank Indonesia. The method employed is Vector Autoregression (VAR) with the focus on Impulse Response Function and Variance Decomposition analysis. The research finding shows external factors such as GDP, interest rate and inflation contribute little impact and direct or positive relationship towards non-performing financing in Islamic banks. Meanwhile, internal factor such as changes in equity has closed relationship with non-performing financing or negative relationship. Factors of previous non-performing financing have closed relationship with the present non-performing financing in Islamic banks.

LPPS, Bank Indonesia (2007:62-65), also published a research finding on macroeconomic indicators influencing asset growth of Islamic banks. Variables used in the research are asset growth, financing growth, third party fund growth, consumption, GDP, inflation, interest rate. The research reveals several findings such as the following:

a. GDP has positive relationship with that of asset growth of Islamic banks during period of observation between 2006-2007. Up to the fourth quarter in 2007, the asset experienced 36.7% growth or reached the total to Rp.36.5 trillions.
b. Interest rate has negative correlation with that of asset growth of Islamic banks during period of observation between 2003-2007. Fluctuating trend of interest rate started from average of 8% in 2003 to

average of 11% (occurred in 2005 as the highest rate during period of observation) and returned to average of 8% in 2007 affected the asset growth. The growth was recorded at average of 9% in 2003 jumped sharply to average of 3.5% in 2005 and climbed up slowly to 4% in 2007.

c. Inflation has negative correlation with that of asset growth of Islamic banks. Inflation rate that slowly decreased from average of 19% to average of 6% during period of observation from 2006 to 2007 has affected the growth of Islamic banks positively. It stimulated the real sector to grow and respond the banks' offers.

Ilias and Lankanathan (2009) exercise industrial production index as mechanism or proxy of GDP. Their research proves that it has positive relationship over a period of time. When industrial production index is decreasing GDP is decreasing, and vice versa. They continuously explain that in the case of Malaysian economy, GDP and Industrial Production Index show positive relationship towards the performance of banks in Malaysia in 2009 by showing the increase in banks' asset growth. Presently, Malaysia's Islamic banking assets reached USD65.6 billion with an average growth rate of 18-20% annually (Overview of Islamic Finance in Malaysia, http://www.bnm.gov.my).

Inggrid (2006) attempts to investigate whether financial development leads to growth in developing country like Indonesia. It is found that there is stable long-run equilibrium relationship between the development of financial sector and the real output. Granger Causality test suggests the bi-directional causality for real output and credit volume and one-way causality from spread to real output. Vector Error Correction methodology results seem to give strong support to the hypothesis that financial system can be an engine of growth in this country.

This research adopts the same research method such as Granger Causality Test, VAR and continued to VECM to analyse bi-directional causality between Islamic banks' asset growth and industrial production index. The finding will be then confirmed by VECM i.e. Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) analyses. Both analyses will also confirm the hypotheses on each variables such as number of human capital, number of

office branch and channelling, interest rate, inflation and industrial production index affecting asset growth.

2.11 Modelling Technique, Granger Causality Test, Vector Autoregression (VAR), and Vector Error Correction Model (VECM)

2.11.1 Modelling Technique

Muslich (2009:7-8) asserts that there is no guidance or automatic method in modelling technique. Modelling technique can be based on imagination and art besides possessing technical knowledge. In business, quantitative method modelling involves specification and interaction of variables. For that purpose, problems are stated in mathematical term. However, in reality, as the problem is complex, there is "no right way" for modelling technique. Muslich continues to suggest that the quantitative modelling technique can be exercised in three steps as follows:

a. Environmental study; someone has to study problems that occur and what attracts him to explore further and put effort to suggest solution.
b. Formulation of problem; someone has to analyse basic concept on how to simplify assumptions, choose alternatives and make decisions.
c. Arrangement of problem in mathematical term; this step shows an integrated process between formulation and arrangement of the model. It also involves technical process that relates to mathematical adjustment and what tools to be employed.

2.11.2 Reasons Adopting Granger Causality Test

Equation model usually adopts economic theory to describe relationship between variables. After the model is established, estimation is generated to test relevance of empirical hypothesis from the theory. Nonetheless, economic theory itself is not sufficient to determine the correct specification. Probably the theory is too complicated therefore it is not straightforward to establish a correct specification. Perhaps, the theory is not at similar condition with the model. Therefore, several tests are required to link the theory and the model also to prove if true the model is supported by the theory.

The reasons why the above method is employed for this research are as

follows:

1. Based on the above framework, it is assumed that asset growth, number of office branch and channelling, number of human capital, interest rate, inflation and industrial production index are perhaps endogenous variables. However, it is still uncertain to address the variables are endogenous or exogenous. Inggrid (2006) shows that there exist bi-directional causality between financial sector and real output (GDP) for the case of Indonesia. Alfirman and Sutriono (2006) finds that there exist relationship between government spending with GDP (Keynesian) while Wagner's Law shows that there is an impact from GDP to government spending. Therefore, the two types of variables are considered as endogenous.
2. From the above framework, the values of each variable besides influenced by its own variable in the past, it is also influenced by values of other variables in the model in the past. Therefore, model is established with dynamic characteristics by stating each variable specification under lag structure. In the meantime, economic theory is not sufficient to show clear specification from dynamic relationship of the variables. Simultaneous equation model in general is structural or based on the existing theory. Estimation is then conducted to suits to the theory. Simultaneous equation does not involve endogenous variables in the two sides of the equation and does not quote each lag from each variable.

Gujarati (2009) asserts that although regression analysis deals with the dependence of one variable on other variables, it does not necessarily imply causation. Granger (1969) in Gujarati (2009) states that regression involving time-series data, the situation may be somewhat different because time does not run backward. That is, if event A happens before even B, then it is possible that A is causing B. However, it is not possible that B is causing A. In other words, events in the past can cause events to happen today. Future events cannot. That is the rough idea of Granger Causality Test, which examines two variables at the same time whether the two deal with bilateral causality. This test is extended

through the technique of Vector Autoregression (VAR). Before Granger causality test is illustrated, there are several things that need to be noted (Gujarati, 2009):

a. Two variables are stationary
b. The number of lagged terms to be introduced in the causality tests is important. The direction of causality may depend on the number of lagged terms included.
c. It has been assumed that the error terms entering the causality tests are uncorrelated.
d. Results of F Test is sufficient
e. Spurious variable should not be discussed as it may lead to wrong conclusion

The reason why Granger Causality test is conducted is to find out if an endogenous variable can be treated as exogenous variable. Granger causality is carried out from no information to examine impact among variables. Let's say there are two variables X and Y that are tested with no information of the impact between the two variables. If there are two variables of X and Y, therefore a question aroused is whether X is a cause of Y or Y is a cause of X or there exist bi-directional causality or not at all. X variable is a cause of Y variable means values of Y at the present period can be explained by values of Y and X at the earlier period. Granger Causality is only testing relationship between variables and do not make any attempt to estimate the model. As quoted from Alfirman and Sutriono (2006), bi-variate regression in Granger test is as follows:

$$Yt = 0 + \alpha 1\, Yt\text{-}1 + \ldots + \alpha n\, Yt\text{-}n + \beta 1\, Xt\text{-}1 + \ldots + \beta n\, Xt\text{-}n + \varepsilon 1$$

$$Xt = 0 + \alpha 1\, Xt\text{-}1 + \ldots + \alpha n\, Xt\text{-}n + \beta 1\, Yt\text{-}1 + \ldots + \beta n\, Yt\text{-}n + u1$$

F-statistics is Wald statistics with the following hypothesis:

$\beta 1 = \beta 2 = \ldots\ldots = \beta n = 0$

Null hypothesis is:

Ho= X does not Granger cause Y for first regression and Y does not Granger X for second regression.

Do not reject if X does not Granger cause Y but reject hypothesis if Y does not Granger cause X therefore there exist only uni-directional causality that is Y cause X.

Therefore there are four possibilities:

a. if $\beta 1 = \beta 2 = \ldots = \beta n \neq 0$ for equation 1 and $\beta 1 = \beta 2 = \ldots = \beta n = 0$ for equation 2, means X Granger cause Y and not vice versa
b. If $\beta 1 = \beta 2 = \ldots = \beta n = 0$ for equation 1 and $\beta 1 = \beta 2 = \ldots = \beta n \neq 0$ for equation 2, means Y Granger cause X and not vice versa
c. if $\beta 1 = \beta 2 = \ldots = \beta n \neq 0$ for equation 1 and $\beta 1 = \beta 2 = \ldots = \beta n \neq 0$ for equation 2, means X Granger cause Y and Y Granger cause X
d. If $\beta 1 = \beta 2 = \ldots = \beta n = 0$ for equation 1 and $\beta 1 = \beta 2 = \ldots = \beta n = 0$ for equation 2, means relationship between X and Y does not exist.

2.11.3 Reasons Adopting Vector Autoregression (VAR)

VAR simply illustrates the inter-variable causative relation in the system by adding intercept. This method developed by Sims in 1980 (Ascarya, 2008), which considered all variables in the system is endogenous (defined in system) so this method is known as a-theoretically model (theory-free base). If data employed is stationary at first difference and not at level, VAR model will be combined with correction on fault model and turns to VECM. Impulse response function analysis is illustrated to see the response of endogenous variable on other variable shocks in the model. Variance decomposition analysis is also presented to find relative contribution of variable in explaining variability of endogenous variable.

The following are some advantages adopting VAR method compared to other econometrical methods:

a. VAR method is free from economic theory limitation that often appears, such as spurious variable (endogenous and exogenous), because it works based on data;
b. VAR sets up a model in a complex system (multivariate), therefore it can explain all variables in the equation;
c. VAR test can avoid bias parameter due to the absence of relevant variables;

d. VAR test can detect relationship between variables in the system at the same time by converting all variables to endogenous variables;
e. VAR method is simple because it does not require to determine which variable is endogenous and exogenous;
f. VAR method is simple, because OLS method can be implemented on each equation separately; and
g. Estimated prediction output (forecast) obtained by VAR method in most of the cases is better than estimated output from more complex simultaneous equation.

Some limitations of VAR method according to Gujarati (2009), among others:

a. VAR model is theory-free, because it refers to lesser information from previous theories, unlike simultaneous model where the variables setting plays important role in model identification;
b. VAR model is less suitable for policy analysis, because it emphasizes more on prediction (forecast);
c. The selection of lag size is another obstacle, because if many variables with long lags, it will cause longer parameters that will reduce degree of freedom and requires bigger sample size;
d. All variables must be stationer. If not, the data has to be appropriately transformed (for example, by first-differencing). Required long relationship in analysis will be disappeared in transformation; and
e. Impulse Response Function, that becomes the main analysis in VAR method is still debatable

The reasons why this research adopts VAR because VAR is model that can explain the dynamic model structure mentioned above, although it seems to be a-theory. VAR is labelled by the model of each endogenous variable in the system as function from lag values for all endogenous variables in the system. VAR is more suitable adopted to establish non-structural models (a-theory). Each of model equation is independent thus each estimation of equation can be exercised by using Ordinary Least Square (OLS).

2.11.4 Vector Error Correction Model (VECM)

VECM analysis is conducted once co-integrated of minimal one equation in VAR exists. VECM has two formats of analysis namely Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). The first format traces out the response of the dependent variable in the VAR system to shock in the error term (Gujarati, 2009:789). As for the second format, FEVD explains size of impact of each variable against other variable in the model.

2.11.5 VAR and VECM

This research as said in the earlier chapter has aimed to suggest some recommendation on the forecast of the suggested model. It is hoped this statistical method would become an appropriate tool for decision-making process on Islamic banking issues. Bank manager would refer to information provided by forecasts of several internal factors such as number of human capital, number of office branch and channeling as well as different macroeconomic variables such as interest rate, inflation rate and economic growth i.e. industrial production index.

Karimi (2008) argues that due to the above purpose, accuracy in forecasting is of great importance and he examines accuracy of VAR and VECM forecasting and finds there is no difference between the two. As stated by Lin and Tsay (1996) in Karimi (2008), the objectives of time series analysis include both improving the forecast performance of time series models and identifying relationships between variables especially the economic variables. Hence, although the VECM model, at least within the context of this study of Karimi (2008) does not seem to yield forecasts of greater accuracy compared to the unrestricted VAR in differences, the error correction method, when used together with economic theory, can be useful in terms of providing a basis for economic analyses in forecasting.

Karimi (2008) highlights number of advantages when forecasting economic time series using VAR such as; VAR is easy to estimate and the demand for knowledge of the underlying theoretical relations is minimal. One drawback of the standard VAR however, is that it is applied only to stationary time series. In most cases, stationary is obtained by differencing the series, which means that

long run information in the data is lost, thus VAR mainly exploit short run information in the data. In addition, the non-structural design of VAR leads to difficulties in economic interpretation of the dynamic interactions that produce the forecast estimates. To answer this drawback, a type of models known as VECM has received an increasing attention since it draws upon certain properties of time series in a manner that could provide an additional dimension to the standard VAR analysis. Granger (1981) in Karimi (2008) points out that although individual time series are non-stationary, some linear combinations of those series can be stationary without differencing. Such relationships are referred to as co-integration and can be interpreted as long run equilibrium relationships among economic variables. VECM uses the property of time series by allowing long term components of variables to apply to equilibrium constraints while short term components have dynamic specifications (Engle and Granger, 1987 in Karimi, 2008). Hence, VECM (as opposed to standard VAR) allow the study of both long run and short run characteristics in the same model and thereby provide information about the underlying dynamics that enables economic interpretation of the empirical results. Since model of this research is:

Asset Growth: α + β1ofc + β2hr + β3ir + β4Infl + β5ip + e

Therefore, VAR and VECM are described as the following mathematical equations:

$$\begin{bmatrix} ASSETG_t \\ \ln OFC_t \\ \ln HR_t \\ IR_t \\ \ln INFL_t \\ \ln IP_t \end{bmatrix} - \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \end{bmatrix} + \begin{bmatrix} \beta_{11} + \beta_{12} + \beta_{13} + \beta_{14} + \beta_{15} + \beta_{16} \\ \beta_{21} + \beta_{22} + \beta_{23} + \beta_{24} + \beta_{25} + \beta_{26} \\ \beta_{31} + \beta_{32} + \beta_{33} + \beta_{34} + \beta_{35} + \beta_{36} \\ \beta_{41} + \beta_{42} + \beta_{43} + \beta_{44} + \beta_{45} + \beta_{46} \\ \beta_{51} + \beta_{52} + \beta_{53} + \beta_{54} + \beta_{55} + \beta_{56} \\ \beta_{61} + \beta_{62} + \beta_{63} + \beta_{64} + \beta_{65} + \beta_{66} \end{bmatrix} \begin{bmatrix} ASSETG_{t-1} \\ \ln OFC_{t-1} \\ \ln HR_{t-1} \\ IR_{t-1} \\ \ln INFL_{t-1} \\ \ln IP_{t-1} \end{bmatrix} + \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \end{bmatrix}$$

Variable *Constant* *Parameter* *Lag Error*

$$\begin{bmatrix} \Delta ASSETG_t \\ \Delta \ln OFC_t \\ \Delta \ln HR_t \\ \Delta IR_t \\ \Delta \ln INFL_t \\ \Delta \ln IP_t \end{bmatrix} = \begin{bmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \\ \beta_{60} \end{bmatrix} + \begin{bmatrix} \beta_{11}+\beta_{12}+\beta_{13}+\beta_{14}+\beta_{15}+\beta_{16} \\ \beta_{21}+\beta_{22}+\beta_{23}+\beta_{24}+\beta_{25}+\beta_{26} \\ \beta_{31}+\beta_{32}+\beta_{33}+\beta_{34}+\beta_{35}+\beta_{36} \\ \beta_{41}+\beta_{42}+\beta_{43}+\beta_{44}+\beta_{45}+\beta_{46} \\ \beta_{51}+\beta_{52}+\beta_{53}+\beta_{54}+\beta_{55}+\beta_{56} \\ \beta_{61}+\beta_{62}+\beta_{63}+\beta_{64}+\beta_{65}+\beta_{66} \end{bmatrix} \begin{bmatrix} \Delta ASSETG_{t-1} \\ \Delta \ln OFC_{t-1} \\ \Delta \ln HR_{t-1} \\ \Delta IR_{t-1} \\ \Delta \ln INFL_{t-1} \\ \Delta \ln IP_{t-1} \end{bmatrix} - \lambda_t \begin{bmatrix} \mu_{1t} \\ \mu_{2t} \\ \mu_{3t} \\ \mu_{4t} \\ \mu_{5t} \\ \mu_{6t} \end{bmatrix}$$