PROFITABILITY DETERMINANTS OF VIETNAMESE COMMERCIAL BANKS

Is efficiency an important factor?

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MSc Banking and Finance

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By

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Abstract

This paper empirically analyses the factors that determine the profitability for an example of 31 Vietnamese commercial banks during the period of 2006-2013. It is concludes that the high bank profitability during this studied period is associated with high economic growth, larger percentage of customer deposit, small board size and good technical efficiency. Yet, there was no evident supporting the market power hypothesis. Finally the u-shape relationship between size and profitability was found which prove the existent of a threshold of scale economies.

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I/Introduction

It is witnessed the growing importance of banking system over the last decade with the increasing globalisation across nations. The severe impact of the 2008 financial crisis raised the awareness of further search and development required for the sake of building a better banking mechanism. An in-depth research about vietnam's young banking system is more experimental than studying other stable banking environment in European and Americans which have been the backbone of the world financial system with over hundred years of development.

This paper aims to better understand the bank profitability and its main determinants by using a large sample of 31 commercial banks of Vietnam over the time period from 2006 to 2013. In particular, the effects on bank profitability are divided into two aspects, environmental (external) and management-determined (internal) factors. Specifically, this paper focuses more on analysing the impact of bank technical efficiency on bank performance which have attracted many literatures in the recent. While ROE is known as accounting profitability of a specific bank, technical efficiency represents bank performance measure in other dimension which related to the performance of the whole industry. Therefore to have a better understanding of Vietnam's banking system, a comprehensive analysis of Vietnam banks technical efficiency is also essential.

Based on Dinh (2013) study of Vietnam bank profitability, GDP growth, market concentration, customer deposit, fee and commission and size are chosen as dependent variables. However to complement this study, non-accounting variable (board size) and technical efficiency are also added to expand our knowledge about effects on bank performance in different dimension. To implement this purpose, the reseach use the generalized method of moments (GMM) estimator, also referred to as the system-GMM estimator, developed for dynamic panel models by Arellano and Bover (1995) and Blundell and Bond (1998). This new technique has only been used in recent studies on determinants of bank profitability (e.g. Garcı´a-Herrero et al., 2009; Dietrich and Wanzenried, 2011). In addition, input translog distant function is used to generate technical efficiency. Technically, an ideal frontier is calculated based upon the cost of production and/or input usage of the

best practice or lowest cost firms in a sample. The inefficiency score of banks in the sample will be extracted from the translog Distant function which is the distant away from the efficient frontier.

In the technical aspect, the controversial problem of endogeneity between technical efficiency and ROE, which has not been mentioned by many literatures on profitability, is also come across through number of tests and empirical evidences in this study. In theory ROE and TE are measuring different aspects of bank performance but in practice both of measures heavily depends on the bank specific factors. This cause confusion in understand the true distribution that these measures depend on. Thus a formal test of endogeneity is required.

Moreover, to the best of our knowledge, this is one of the first study investigating the relationship between technical efficiency and bank profitability in Vietnam. The paper is structured as follows. Section 2 introduces the development of vietnam banking system. Section 3 reviews the most significant empirical studies and develops our research hypotheses. Section 4 describes the data and methodology employed in the empirical research and defines the explanatory variables. Section 5 presents and discusses the results obtained. Section 5 discusses the policy recommendation for both bank and government. Section 6 summarizes and concludes.

II/ Development of Vietnam Banking system

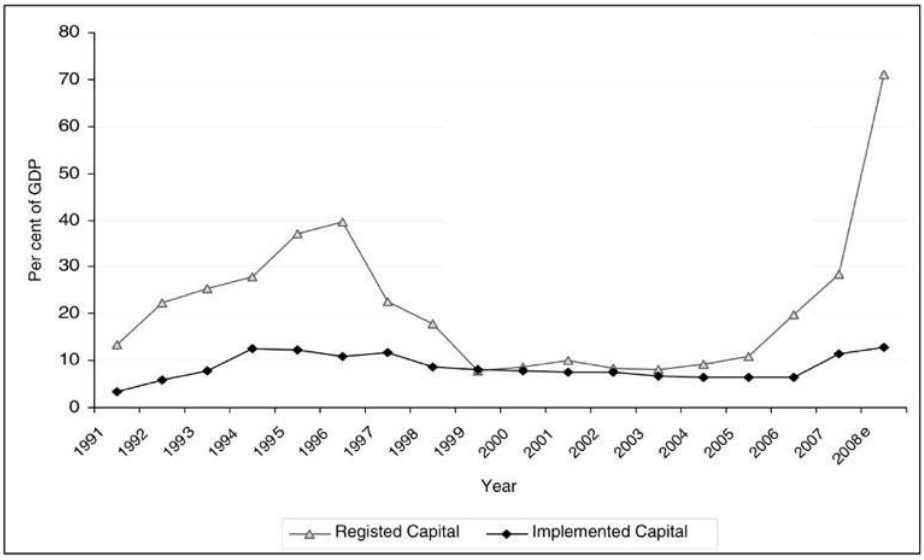
2.1 Vietnam's macro-economic development

Due to continuing economic crisis, the doi moi reform programme was inaugurated at the Sixth Party Congress in December 1986. Vietnamese economy was at alert level with inflation of over 700 per cent per year, severe shortages of food and consumer goods and exports were only half the value of imports. Western aid and Chinese aid had not been available due to the conflict with Cambodia and the war with China at the end of the 1970s. Vietnam was isolated and suffering from an American trade embargo, which lasted until 1993. Only Sweden multilateral donor agencies came to Vietnam during this difficult time,

most of other did not enter until 1993 (Van Arkadie and Mallon 2003, p95). The reform increased Vietnam openness to trade and foreign investment (still the basis of Vietnam's development strategy) and thus moved the economy towards a new path with incorporation of agricultural and industrialization development.

Two significant aspects that reflected from the reform was price reform and economy stabilisation. In the early days of doi moi, plan prices are replaced with market prices. As the result, by 1987 most non-essential consumer good prices had moved towards market prices. Trade reform ended the central government's monopoly on foreign trade by introduced tariffs to substitute for quantitative restrictions on imports in 1988. The use of tariffs In replace for direct controls make domestic prices start to move in line with world prices, leading to the important of economic decision which can affect the exchange rate (Thoburn and Howell 1999). The extremely high inflation during the crisis was dampened by trade liberalization and unofficial imports which provided an additional source of supply. Vietnam quickly moved to attracting foreign investment with direct investment reached US$1 billion a year by 1993 (VNSY 2004). Moreover another main aim of Doi Moi reforms was Economic stabilization. Evidentially in 1988/9 a restrictive monetary policy was employed to rapidly reduce inflation to single digits. Stabilization was greatly helped by the increases in agricultural production when peasants were allowed to sell produce on the open market and no longer had to belong to cooperatives. In the 1990s Vietnam reached the highest annual export growth rate in the world, nearly 28 per cent (Thoburn 2004, p129). The FDI inflow to Vietnam also increased remarkably from 1991 (see figure 1), even though after the Asian crisis in 1997, there was a sharp drop. The figure moved upward again when Vietnam decided to join WTO in 2007. It is interesting to see the immediate reaction of the economy responding to the government policy decision making.

Figure 1: FDI inflow to Vietnam (as percentage of GDP)



Source:1991–2007 FDI inflow data from GSO, Available at <http://www.gso.gov.vn>, Accessed date: 28 August 2014.

2.2 Vietnam's banking development

Vietnam banking industry is still young and on its developing process with new banking law has been set up since 12 December 1997 comprising of the Law on State Bank of Vietnam and the Law on Credit Institutions. In response to the economic climate change, the Law on State Bank of Vietnam has been amended on 17 June 2003 and on 15 June 2004 the Law on Credit Institutions has been amended.

Vietnam has built their banking system from scratch after the War ended in 1975. Vietnamese economy encountered many crisis throughout 40 years of independence such as currency crisis (1980s), Asian crisis (1997) and Global crisis (2008). State bank of Vietnam has confirmed its important role in every reform to keep the balance of Vietnamese economy when facing the economic turbulence. The Law on State Bank of Vietnam defines the role of SBV as ''The State Bank shall conduct the state's management over monetary and banking activities, is the issuing bank, the bank of credit institutions and the bank

providing monetary services for the government. The operations of the State Bank shall aim at the stabilization of the value of the currency, contribute to securing the safety of banking activities and the system of credit institutions, facilitate the socio-economic development in a manner consistent with the socialist orientation.'' (Article 1, the law on SBV)

SOCBs seem to have advantage over others in term of regulation and supervision, which is embedded in the Law on Credit Institutions (Article 4). This then is accounted for the root of SOCBs' least temptation to be creative in their development process and consequently lose their market share on the hand of JSBs and FBs. Article 4 of the Law on Credit Institutions states that

''1. Unifying the management of all banking activities and developing a modern system of credit institutions which is capable of meeting the capital requirements of, banking services for the economy and population; contributing to the implementation of national monetary policy; ensuring the prudence of the system of credit institutions, protecting the lawful interests of depositors.

2. Investing capital and other resources in developing state-owned credit institutions, facilitating their key and leading role in the financial market.''

Trading liberalization has always been Vietnamese long term strategy, which is reflected in the openness policy to foreign banks. This is one of big steps has been taken to increase the competitiveness and also the efficiency of the banking system. Foreign banks from developed countries possess advantage of high tech and more efficiency. If domestic banks do not attempt change themselves to reach foreign bank standards, they will lag behind. This seems to be a risky decision of the government because there two scenarios could happen. One, domestic will work harder and improve its quality to be in the top of the game. Other, the foreign banks will expand and overtaking domestic banks in market share. Article 12 of the Law on Credit Institutions states that ''The State shall, depending on the need for the socio-economic development of the country, permit the establishment of joint venture credit institutions and non-bank credit institutions with 100% foreign-owned capital in Vietnam, and the opening of foreign bank branches in Vietnam. Foreign credit institutions

may open representative offices in Vietnam; Representative offices shall not be permitted to do business in Vietnam.''

Vietnamese government conservative strategy in showing favour to SOEs still presents in the Law on Credit Institutions. Article 5 states: ''The State shall issue policies to mobilise primarily domestic resources and to make the most of overseas resources; to expand investment by the provision of credits, to contribute to freeing all production capacities, promoting the potential of all economic sectors, ensuring the major role of the state-owned enterprises''. This is also the inception of the later crisis and many corruption cases existing among Vietnamese banking industry that will be discussed in next sections.

Vietnam's banking sector comprises four major and one minor state-owned commercial banks (SOCBs), thirty-seven joint stock commercial banks (JSBs), five joint venture banks foreign banks (FBs). Overall Vietnamese banking sector are dominated by four major SOCBs.

Table 1: Banking Sector in Vietnam (percentage of banking sector markets)

	2000	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*6 Mos 2008*
Deposit market share									
SOCBs	78.4	80.8	80.5	79.5	78.1	78.6	70.0	58.0	NA
JSBs	11.3	9.2	10.1	11.2	13.2	14.3	22.0	29.0	NA
Foreign bank branches and joint venture banks	10.3	10.0	9.4	9.3	9.7	7.1	8.0	13.0	NA
Lending market share									
SOCBs	72	73	74	73	75	68	63	54	50
JSBs	11	13	15	15	14	16	27	38	50
Foreign bank branches and joint venture banks	17	14	12	13	12	16	10	8	

Source: World Bank, Vietnam Development Report 2009: Capital Matters, World Bank Report to the Vietnam Consultative Group Meeting, Hanoi, December 4–5, 2008.

From the legacies of socialist economic system, over 70% of banking market share still held by SOCBs in 2000 (see table 1). Through the privatisation reform market share of SOCBs reduced dramatically to 58% (in terms of deposit) and 54% (in term of lending in 2007) which is still high to compare with other countries in the area. In 1997, Asian crisis spread fear of a worldwide economic meltdown where Indonesia, South Korea and Thailand were

the countries most affected. Although Vietnam was least hurt from the crisis, the SOCBs were heavily laden with non-performing loans from the SOEs. The main reason was that, most of the SOEs borrowed their fund from SOCBs, therefore when the Asian financial crisis happened, the collapse of many SOEs suddenly increased banks' bad debt. This ceased formal policy lending from SOCBs to SOEs and attempted to recapitalize the SOCBs (Leung, 2009). However the path still was not clear when certain regulations still meant to support the idea of discriminating against borrowings from the private sector in favour of SOEs. For example, unsecured lending is not available to private enterprises at start-up businesses from SOCBs but only to firms with at least two consecutive years of profits. In addition, private businesses were struggled to use land as collateral due to the difficulties with accessing land- use rights in urban areas. Lastly, assets of SOCBs are belonging to state, and according to law any loss of state assets is still considered a capital offence. There is no doubt that for the fear of potential losses to the SOCBs, loan officers would have excessive caution in lending to the private sector (Leung, 2009).

SOCBs showed its weakness with conservative policy which lead to its downturn. Evidentially for both 2006 and 2007, the average return on assets rate of three major SOCBs were below the average for Asian banks, and their capital adequacy ratios are below the regional averages of 13.1 per cent for Asia and the Pacific, and 12.3 per cent for East Asia (IFC 2008) although meeting the international requirements of 8 per cent. Kovsted et al. (2005) explained the poor performance as the result of low competitiveness mong the industry which lead to the lack of movements in lending and deposit rates even after the interest rate deregulation in the period 1996 to 2002. Most of SOCBs seem to be lay back and depending on government support. With growing competition from JSBs, SOCBs was lagged behind and lose their market share to JSBs. Statistically, JSBs held only 11% of lending market in 2000 but their market share increased remarkably to over 50% in 2008. This is a very impressive figure reflecting the rapid growth of JSBs. In 2010 largest JCBs, namely Eximbank, ACB, Techcomback, and Sacombank, have chartered capital ranging from about VND9,000 billion to about VND10,000 billion. Middle-sized JCBs that have chartered capital of about VND5,000 billion include Military Bank, Maritime Bank and South East Asia Bank. Most of other JCBs have chartered capital of around VND2,000-3,000 billion. When

the socialist economic system becomes history, SOCBs have to work on their quality rather than depending on government help, otherwise the collapse of the empire is unavoidable.

As the SOCBs keens on lending to SOEs, JSBs are left with the private sector and households. Lax regulation over the JSBs and conservative policy of SOCBs in funding SOEs increased the systematic risk of Vietnamese economy. The lax regulatory environment was clearly showed in the licencing of eleven credit institutions as banks in urban areas where credit demand was growing in such high speed. As the result, credit growth amongst the JSBs reached almost 95 per cent in 2007. Fortunately instead of going into productive investments, significant portions of loans going into speculative activities which lead to booming real estate and stock markets in later period. The stock crisis in 2008 reqired the stabilization measures to tighten bank liquidity, raising deposit interest rates. In addition, bank profits were also squeezed by the regulatory cap on lending rates (World Bank 2008). JSBs' damages were showed in the significant increase in non-performing loan due to the investor lost caused by 60 per cent fall in the stock market index and 50 per cent in house prices. Until then Vietnam banking system still did not have a formal standard for annual report which made it impossible to estimation the non-performing loan to calculate the reserve requirement. In response to this demand, according to the Article 7 of State Bank Decision 493 taken in 2005, banks are given three years to set up their credit classification system to allow the calculation of the non-performing loans and loan provisioning that is closer to the international financial reporting standard. As yet this was not strictly complied by banks thus by end-2008, only two out of over eighty commercial banks have completed this process.

Secondly, there was a wave of large non-financial SEOs' expansion into banking industry by obtaining large share of JSBs equity (Leung, 2009). Responsively, the government has restricted equity holdings by any single enterprise group in JSBs to under 30 per cent. Also the State Bank were more strictly in issuing new banking licences and refused many of the fifteen applications from large SOEs. This new wave is dangerous to the economy. Particularly, when the non-financial SEOs are successful in transforming into banks, they will increase lending to their business group with little consideration of risk. Certainly the money of depositors is put at risk and also the economy as a whole. This is also the lesson from

other countries such as Japan, Chile, and Indonesia. In 2007 when Vietnam joined WTO, it is required to give freedom to foreign banks to trade which increased the competitiveness within the industry and forced both SOCBs and JSBs to be more efficient. Large FBs in Vietnam such as HSBC, Citibank, ANZ, Standard Chartered and Deutsche Bank have taken major steps in expanding their operating network. In 2010, Citibank and Standard Chartered officially launched its retail banking in Hanoi while HSBC opened two new branches in Danang City and Cantho City. In addition, some FBs have been holding stakes in domestic JCBs. For example, Standard Chartered had the holdings of about 12% in ACB in 2011; HSBC owned 20% of Techcombank in 2013, ANZ held 10% of the total shares of Sacombank in 2010; and Deutsche bank had the holdings of 10% in Habubank in 2010. The FBs have their advantage of well trained staffs, high technology in transaction deliver and also security system which make them become big competitors in both retail and whole sale markets. Vietnamese banking system are turning into a new chapter of reform to fight with the corruption and inefficiency existing among banks leaders.

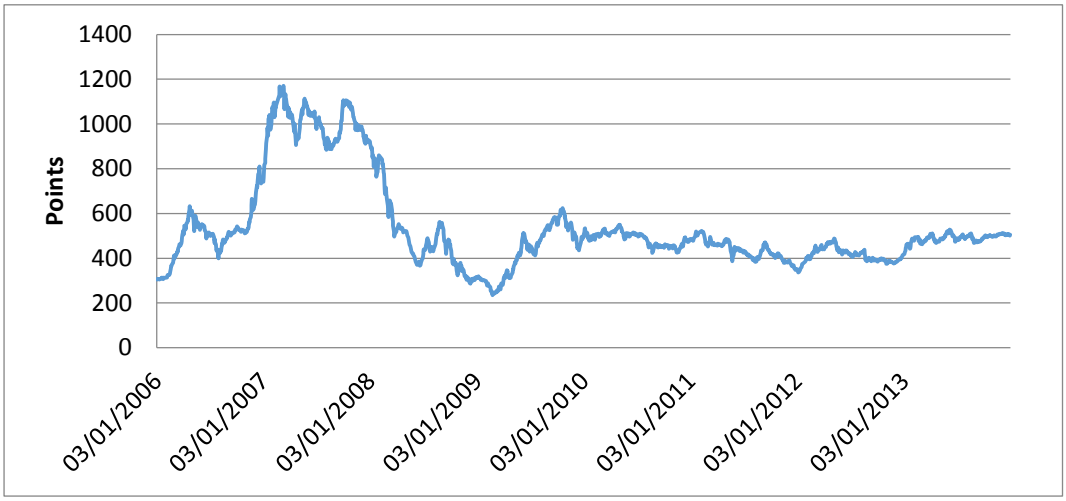
The current banking reform aims to privatize SOCBs up to an appropriate level to boost the competitiveness of banking industry. Up to now, Viettinbank and Vietcombank among other SOCBs are privatized the most with 35.54% and 22.9% in 2013 respectively (Viettinbank annual report, 2013 and Vietcombank annual report, 2013). Currently, the government also seeks to equitize more SOCBs either through formal auctions or as IPOs; and BIDV is the third SOCB under the privatization plan (BIDV annual report, 2012). Agribank is expected to be the last SOCB for the privatization plan. Vietnamese government seems to be on the right track for further development of banking sector. More specifically, once the stake owned share reduced, it will reduce SOCBs' incentive to recklessly lend to SOEs whom will have no more temptation to create unprofitable project for the sake of private benefit. This helps government to save wasted resource, stabilise the economy and gain confident from public.

2.3 Highlighted economic events affecting banking system (2006-2013)

2006-2007 events: The young Vietnamese Stock Market experienced a Stock Market Crash in 2008 which was built up from 2006 by reckless risk taking investors. Financial Times

(2007) stated that “Vietnam’s emerging middle class is in the throw of stock market mania and students, civil servants and state enterprise managers with cash to spare are all rushing to buy shares and dreaming of windfall profits.” With the gambling blood running through their vein, the investors invested all their saving to earn easy money without any concern about the profitability of the firm. The consequence of this stock mania was a reduction in productivity of enterprises because authorities were struggling to get stock market-obsessed civil servants to focus on their day jobs. However a big fall of VNINDEX in the third quarter of 2006 still did not end the investors’ hope (see figure ...). When their saving was washed away, more loans has been borrowed for their sake of get back what they lost.

Figure 2 : VNINDEX 2006-2013



Source: 03/01/2006-31/12/2013 VNINDEX, Available at <http://www.cophieu68.vn/export.php >, Accessed date: 28 August 2014.

2007-2008 events: end of 2007 Vietnam underwent a significant reform by becoming a member of the World Trade Organization (WTO). Some of the benefits of trade liberalization include “(a) a predictable and transparent regime for international trade, (b) a substantial reduction of tariffs for domestic manufacturers and exporters, (c) elimination of all export subsidies considered illegal by the WTO, and (d) liberalization of services such as banking, distribution, construction, health care, tourism, insurance, and business services

(VDR, 2012, p15)". The significant outcome from of trade liberalization include a significant boost to foreign direct investment, a resilient export sector, lower prices, and improved quality of goods and services. With the Bilateral trade agreements and WTO commitments, Vietnam has led to introduce important modifications in its institutional and administrative systems. For instance, as part of its WTO commitments, "Vietnam publishes an official journal of all the laws, regulations, and administrative procedures of general application before enforcing them. Moreover, the full texts of the legal acts are posted on a government website at least 60 days prior to approval so agencies, organizations, and individuals can submit comments. (VDR, 2012, p15)"

2008-2009 events: 2008 global financial crisis has its root from America and spread widely around the world. Although the US Administration deployed economic stimulus packages, their effects were not strong enough to recover the economy. They experienced negative average growth rate of -0.15%, a high inflation level with the average rate of 3.8% (2.9% in 2007) and unemployment rate unexpectedly went up to 7.2% (4.9% in 2007). Euro zone was also adversely affected by the world economic crisis, leading to low economic growth of 0.75% only (2.6% in 2007), average inflation rate hiked to 3.3% (2.1% in 2007) and unemployment rate of at 8% (7.2% in 2007). In Asian developing countries China's growth rate decreased to 9% from over 10% in the previous years; the Philippines's growth also declined to 4.6% from 7.2% in 2007; Singapore's economy expanded 1.5% compared to the high growth rate of 7.7% in 2007 (SBV annual report, 2008) . As can be seen, although the crisis started in America in 2008, it took one year to have significant effect on Asian developing countries. Vietnam is also not an exceptional case where in 2009, GDP growth rate reached 5.32%, the lowest level in the past 10 years, lower than that of 6.18% in 2008 (SBV annual report, 2009). The unemployment rate in urban areas slightly increased to 4.66% from 4.65% in 2008. Overall Vietnamese economy, have suffered from the strong impact of the financial crisis. To stabilise the macroeconomic environment, in the first 6 months, the SBV took uniform monetary were used in a flexible manner to absorb banknotes in circulation, and at the same time to ensure liquidity of the economy and the market, and to manage exchange rate by market forces. Based on positive results of inflation control, the SBV had gradually loosened the monetary policy for the second half of 2008 to promote production and business and prevent the risk of economic recession. In

term of banking regulation, Right at the beginning of 2009, to support credit institutions' funding of the economy and to prevent economic downturn, the SBV reduced the reserve requirement ratios applied to VND deposits of below 12 months twice, from 6% to 5%, and to 3%; and to VND deposit of more than 12 months, from 2% to 1% (SBV annual report, 2009, p22). Overall, 2008 financial crisis has severely effects on global market during a short time period due to an increasing economic globalization.

2009-2010 events: After the stock market and real estate market collapsed end of 2008, investing gold was an alternative of most of investors in Vietnam. "People will switch to gold as a shelter," said Le Xuan Nghia, vice chairman of the National Financial Supervision Commission, which advises Prime Minister Nguyen Tan Dung. "The current situation with the dong will spur people to increase their gold holdings (Bloomberg, 2010a)." However many individuals and credit institutions took advantage of the event to push the gold price higher. For example, Nguyen Duc Kien, resigned chairman of ACB bank, one of four biggest bank of Vietnam was arrested in 2012 for illegally manipulating the gold price during 2010. Local gold prices jumped to a record 29.95 million dong per tael on Aug. 25, Thanh Nien reported, referring to the unit that is about 1.2 ounces (Bloomberg, 2010a).". In order to ease the condition, the SBV required credit institutions to close gold trading floors and clear their gold trading positions on accounts held abroad and allowed gold export and import to regulate the market. As the result, the domestic gold price moved accordingly with international gold price.

2010-2011 events: Soon after the economy been recovered from the recession, Vietnamese economy was hit by a collapse of Vinaline, Vietnam Shipbuilding Industry Group. Duong Chi Dung, the former chairman of Vinalines and Mai Van Phuc, its former general director were sentenced to death for embezzling 10 billion dong ($474,000) each (Bloomberg, 2013). Risk (2011) stated that ''The incident severely impacted on the economy when S&P downgraded Vietnam's long-term foreign currency sovereign credit rating to BB- from BB and its local currency rating to BB from BB+. ''Vietnamese banks seemed to be suffered the most because Vinashin, defaulted on $60 million of loan repayments in December 20011, triggering a flood of ratings downgrades. The credit ratings of leading Vietnamese banks was hit, despite the State Bank of Vietnam's efforts to shore up sound risk management practices at financial institutions during the past couple of years . This seems to be the

result of Vietnamese government policy on lending to SOEs without in-depth consideration of risk management. With easy money from banks SOEs started to establish unprofitable project just to borrow money. Unsurprisingly, the burdens caused from these projects are put on banks' shoulder.

2012-2013 events: after many serious corruption cases and rumour of conflict within the party, the people started to lose their confident and believe in the government which have been built through the war. This pushed the government to take action on cleaning up corruption and thus Central Internal Affairs Commission was established end of 2012 as government department specialised in anti-corruption. Mr Nguyen Ba Thanh was appointed Head of Central Internal Affairs Commission who is famous for tough stance on corruption, especially among traffic police and is said to always deliver what he promises (Tuoitre News, 2013). We do not know whether this is government's short-term strategy to ease the current condition or it really is a reform of the banking system. However pointing out few single corruption cases is not enough but a big change in the mechanism of the system itself is more desired.

III/Literature review and research hypotheses

In generally, the determinants that influence bank's profitability are classified as external and internal factors. With the high leverage nature, bank can severely impact on the development of the economy (Pathan et al., 2007). 2008 financial crisis was an instance that confirms the important of banking. On the other hand, as an intermediate bank require large deposit and also credit seeking from house hold and companies, thereby an downturn of economy would significantly draw down the inputs and outputs of bank. This is known as macro factors. Banking systems are highly concentrated and interconnected therefore the industry specific factor also highly affect bank's performance. Both macrofactors and industry specific factors are accounted for external factor. Finally the internal factors such as management efficiency, human resource or risk management directly impact on bank performance through clear visions and strategies of Board. This makes it crucial to conduct the analysis of bank profitability determinants which can bring the bank toward the most profitable in the area.

In literature, empirical studies on the bank profitability classifies into two types, one focused on a specific country and other concentrate on a panel of countries. For example of cross countries studies, Molyneux and Thornton's (1992) study of bank profitability across 18 European countries over the period 1986-1989 was one of the first that examines the determinants of banks profitability and found a positive association between the return on equity and the level of interest rates, bank concentration and the government ownership. Demirguc-Kunt and Huizinga's (1999) study of the internal and external determinants of banks profitability in 80 countries over the period 1988-1995 found that a larger bank asset-to-GDP ratio and a lower market concentration ratio lead to lower profits. They also reported that domestic banks are less profitable than foreign banks in developed countries, while the opposite holds in developing countries.

The single country studies of bank profitability include the US (Berger, 1995b; Angbazo, 1997), Colombia (Barajas et al., 1999), Malaysia (Guru, Staunton and Balashanmugam, 2002), Brazil (Afanasieff et al., 2002), Greece (Mamatzakis and Remoundos, 2003; Kosmidou, 2006), Tunisia (Naceur, 2003), India (Badola and Verma, 2006), China (Heffernan and Fu, 2008), Taiwan (Ramlall, 2009), Switzerland (Dietrich and Wanzenried, 2009), Pakistan (Javaid, Anwar, Zaman and Gafoor, 2011), Japan (Lui and Wilson, 2010), Korea (Sufian, 2011) and Vietnam (Dinh, 2013)

Berger (1995) examined the relationship between the return on equity and the capital asset ratio for a sample of US banks for a time period of 1983-1992 and find positive relationship. Naceur (2003) investigates the impact of banks characteristics, final structure and macroeconomic indicators on banks net interest margin and profitability in Tunisian Banking Industry for the 1983-2000 periods. He found that inflation and growth rates have negative and stock market development has positive impact on profitability and net interest margin. In Switzerland case, Dietrich and Wanzenried (2009) find that significant differences in profitability between commercial banks and these differences can to a large extent be explained by the factors included in analysis. It is found that, bank seem to be more profitable if it is better capitalized. Also, in case that a bank's loan volume is growing faster than the market, there will be an increase in bank profitability. They find that banks with a higher interest income share are less profitable. If the GDP Growth increases the impact on

bank profitability is significantly positive, which is accounted for the most important factors. While, the effective tax rate and the market concentration rate, both have a significantly negative impact on bank profitability in Switzerland. The research in Pakistan, Javaid et al. (2011) find larger size may not necessarily lead to higher profits due to the diseconomies of scale and higher loans contribute towards profitability but not significant. Also the equity and deposits was found to have significant effect on profitability. Liu & Wilson (2010) studied 685 Japanese banks over the period 2000 to 2007 and reported that industry concentration, Gross Domestic Product (GDP) growth and the extent of stock market development play an important role in determining the profitability of Japanese banks.

To my knowledge, there is limited number of Vietnamese bank profitability studies. Thus Dinh's paper (2013) is an important research on the determinants of banks' profitability in Vietnam with the sample of 51 commercial banks from 2000 to 2012. He pointed out the difference between profitability's determinants of foreign banks and domestic banks in Vietnam. Cost, equity and GDP growth rate are important in explaining profitability of domestic banks, while, market share and other incomes are found to be positively correlated to profitability of foreign banks in Vietnam. Together with finding the profitability determinants, he also investigated the determinants of accounting efficiency (proxied by net interest margin) of banks in Vietnam. For foreign banks, equity, loans and loan loss provisions are important in explaining net interest margin of domestic banks, whereas cost and market share are found to have positive effects on net interest margin.

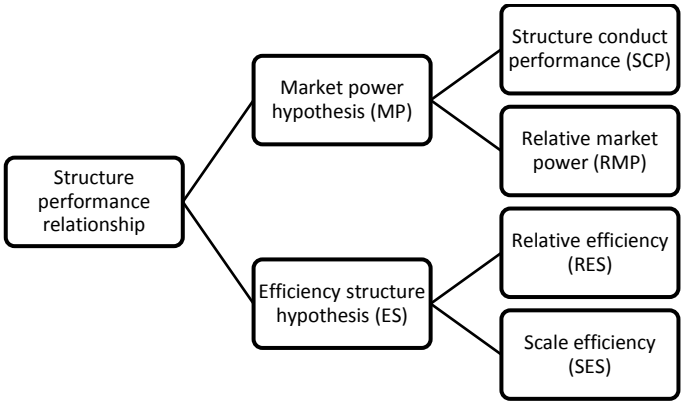
The following is the external and internal bank profitability determinants that will be consider in this study. The external determinants include economic growth, industry concentration. Risk management, board size, bank size and technical efficiency are accounted for internal factors.

Economic growth

During a downturned economic, loan portfolio fall in quality, generating credit losses and increasing the provisions that banks need to hold, thereby reducing bank profitability. By contrary, booming economy improves the solvency of borrowers, increases demand for credit thus positively affecting on the profitability of banks (Athanasoglou, 2008; Calza, 2003; among others). Thus, we hypothesize the following relationship:

Hypothesis 1: There is a positive relationship between economic growth and bank profitability.

Industry concentration



Market power hypothesis (MP) explains how the degree of sector concentration affects bank profitability though Structure conduct performance (SCP) and Relative market power (RMP) hypothesis. SCP and RMP assume that a higher bank concentration (or market power) allows a higher degree of cooperation between them. These banks might set higher prices and consequently gain substantial profits (Mason, 1939; Heggested, 1977; Sathye, 2005; Al-Muharrami and Matthews, 2009). Demsetz (1973) was the first to introduce an alternative explanation on market structure-performance relationship and proposes the Efficiency Structure Hypothesis (ES). ES theory argues the positive relationship between concentration and profitability as an indirect consequence of efficiency. In other words, the better managed banks (or those with more efficient) lead to more profitable and thus resulting a higher degree of their market shares. Complementing this argument, Berger complete test (1995) claims that the positive relationship between profitability and market power only valid if there is no relationship between market power and efficiency found. However Berger and Humphrey (1997) find that when frontier efficiency analysis is applied the cost efficiency hypothesis seems to be more important than the market-power theory in explaining bank profitability. Overall previous literature show inconclusive empirical evidence on the relationship between concentration and profitability. While Claeys and Vander Vennet (2008), Goddard (2004) and Maudos and de Guevara (2004) report a positive relationship between market concentration and profitability, other studies do not find such

a relationship (see e.g. Berger, 1995). In Vietnam, a direct association between industry concentration and bank profitability is hypothesized.

Hypothesis 2: There is a positive relationship between the concentration of the banking sector and the bank's profitability.

Risk management

In terms of risk management we consider two aspects of balance sheet, one is the financing structure and other is income.

Financing structure: through the 2008 great regression, there was a deposit war among banking sector due to the difficulties in assessing international funding markets. In this context, a higher share of customer deposits in bank liabilities should increase a bank's profitability, considering that deposits constitute a cheap and stable financial resource compared with other financing alternatives (Claeys and Vander Vennet, 2008; Garcı´a-Herrero et al., 2009). For this reason, we investigate whether there is a direct relationship between the proportion of customer deposits in a bank's total liabilities and the bank's profitability.

Hypothesis 3: There is a positive relationship between the proportion of customer deposits of a bank and the bank's profitability.

Income structure: Kundid et al, (2011, p179) argued that core deposits are for profitable and stable banking activity due to its lower funding costs in comparison to other financial resources and increased generation of fees and commissions from the account maintaining. Therefore, an increase of the level and forms of banking services as well as of fee and commissions business activities are generally accepted as potential sources of an even more profitable banking sector in its entirety. To the extent, we can hypothesize as following

Hypothesis 4: There is a positive relationship between the fee and commission and the bank's profitability.

Board size

The board of directors and managers play an important role in effective corporate governance and has become important to banks and their regulators especially following the global financial crisis. This is confirmed among previous literature. First, Subrahmanyam et al. (1997) demonstrate that the US bank board structure are quite differs from that of non-bank firms because bank directors are accountable not only to shareholders, but also to depositors, clients and regulators. Second, banks' high leverage makes banks' role in the economy even more important. Third, as banks are opaque, the agency problems are particularly crucial (Levine 2003; Caprio and Levine 2002) due to information asymmetries (Furfine 2001). Fourth, deposit insurance worsens the situation by ameliorating the 'moral hazard' problem among bank shareholders and debtholders. Demirgüç-Kunt and Detragiache (2002) argued that countries with more generous deposit insurance schemes have higher tendency of suffering banking crises. Overall, Skully (2002) contends that good bank corporate governance can reduce the risk of taxpayer funds being used in mitigating a crisis and helps diminishing connected lending. Empirically preceding studies found significant relationship between board size and bank's performance. Yermack (1996) and Eisenberg et al. (1998) reported that board size and performance are negatively related which reflected the inefficiency of corporate governance. The inefficiency shows in director's difficulties in expressing their ideas and opinions in large boards during the limited time available at board meetings (Lipton and Lorsch 1992, p. 65). In contrast, Kiel and Nicholson (2003) studied the top Australian banks and found a statistically significant positive association between corporate board size and firm performance. In explanation, they believe that larger boards should provide more networking and additional skilled personnel to contribute towards better performance. This confirms the existent of a threshold in which the board can improve bank's performance up to.

Hypothesis 5 a: There is a positive relationship between the board size and the bank's profitability.

Hypothesis 5 b: There is a positive relationship between the board size and the bank's profitability.

Bank Size

There is consensus in the literature that in banking the average cost curve has a relatively flat U-shape, with medium-sized banks being slightly more scale efficient than either large or small banks. (Antonio Trujillo-Ponce, 2013). In other words, Athanasoglou (2008) explained the nonlinearity of the effect of size that profitability initially increasing with size and then declining for bureaucratic and other reasons. Clearly, a larger size banks may obtain economies of scope which results from the joint provision of related services. However, Barros (2007) find that the over diversified banks normally poorly perform and unable to efficiently reduce asymmetric information problems associated with lending. Complementing preceding arguments (Berger et al., 1999) found a relatively inverted U-shaped relationship between size and profitability. In principle, through economies of scale larger banks are expected to experience more significant increases in profitability. Nevertheless, diseconomies of scale can arise above a certain threshold of size, making the over size of the bank will hinder its profit growth.

Hypothesis 6: There is an inverted u-shaped relationship between bank size and bank profitability.

Technical Efficiency

Following the works of Benston (1965) and Bell and Murphy (1968) on bank performance, many empirical Studies have been focused on this subject. Initially, bank performance studies only emphasis on the analysis of scale and scope economies engaging a cost function with an assumption of approximately the same efficiency levels among banks. The results show a relatively flat U-shaped average cost curve and reports higher efficiency levels for medium-sized banks than either large or small banks (Berger et al., 1999). However until recently the most attention of literature has turn to frontier efficiency or X-efficiency which measures inefficiency as the deviation from the efficient frontier where best-practice firms operate. In principle, the cost efficiency of a bank is measured by an estimated performance of the best bank which efficiently minimize costs or input usage in the industry, holding scale and output mix constant. Related to the alternative notion of bank performance

Berger and Humphrey (1991) concludes that, the range of 20 to 30% cost inefficiencies dominate the effect of scale and scope, meanwhile diseconomies generally found to be in the range of 5 to 10%. Nevertheless, the efficiency concept, functional form, and estimation technique are still in the early stage of development, thus, there are no consensus among researchers for the most accurate efficiency measure.

Regarding to the estimation techniques, literature offers two main methods for measuring efficiency, namely, non-parametric methods, such as data envelopment analysis (DEA) developed by Charnes et al. (1978), and parametric methods, such as the stochastic frontier approach (SFA) developed by Aigner et al. (1977). The parametric methods strike to establish the frontier through a functional form such as Translog by several econometric techniques such as Stata. On the other pole the non-parametric methods do not presume any functional form for the frontier but construct it from the observed input–output ratios using mathematical programming techniques. Unfortunately, the non-parametric methods do not allow any shocks to production and cost or consider any deviation from the frontier as inefficiency. Take into account this restriction, non-parametric approach, based on a composed error model, and are considered superior to non-parametric frontiers in measuring efficiency (Yildirim and Philippatos, 2007). Rationally, we employ SFA for this research.

Allen and Rai (1996) research is an example of frontier efficiency approach applied to international data, which employed both the 'stochastic frontier'(SFA) and the 'distribution free'(DFA) approaches to estimate a standard translog functional form for 15 developed countries over the period 1988–1992. The sample was divided into two groups of banks, namely 'universal' or 'functionally separated' banking which based on whether a bank is headquartered in a country, and then they further classify each group into 'large' and 'small' sub-samples. They report that the cost inefficiency lie in the range from 15% for large banks in universal banking countries to 27.5% for large banks in functionally separated banking countries. Overall, functionally separated banks are less cost efficient than their universal counterparts. Finally they found higher profitability, lower total cost, smaller bank size and higher level of loans is associated with greater efficiency is associated with

Berg et al. (1993) use data envelopment analysis to study the efficiency in Scandinavian banking markets and reports the efficiency scores of the average Swedish bank (78%),the average Norwegian bank (57%), and the average Finnish bank (53%). To measure the effect of increased competition on bank efficiency among the European banking industry, Bikker (1999) employs the stochastic cost frontier approach. The results show, banks in Luxembourg, Belgium and Switzerland stand out to be the most efficient, while, Spanish, French and Italian banks appear to be less efficient than those in Germany, the Netherlands and the UK. Finally, Maudos et al. (2002) analyse the cost and profit efficiencies of banks for ten countries of The European Union by applying panel data frontier approaches. They report average cost and profit efficiency levels of 82.7% and 45% respectively, for ten countries considered. In their study, Austria and Germany emerge as the most cost-efficient countries while the most profit efficient is accounted for Luxembourg and Portugal.

As a developing country, Vietnam has been undergone many reforms recently in its economic development progress, which make it become more attractive for researchers to study the change in efficiency in banking sector. One of the first studies about Vietnamese banking efficiency was Nguyen (2007), which reported that the average cost efficiency of 13 commercial banks from 2001 to 2003 is about 60.6% by using DEA. It is noticeable that many researchers found a decreasing trend in the efficiency of Vietnamese bank. For instance, using SFA, Vu and Turnell (2010) found a reduction in cost efficiency of 56 commercial banks in Vietnam during studied period from 2000 to 2006 with average of 87%. Consistently, a decreasing trend in technical efficiency for the whole Vietnamese banking system through the period of 1990-2010 was found in Ngo (2012) as the size of the banking sector increases and financial market is more liberate. Importantly, he claims that only two-third of its capacity Vietnamese banking system was efficiently used and limitedly contribute to the economy. When studying 15 commercial banks in Vietnam from 2003 to 2006, Nguyen and DeBorger (2008) also found a decreasing trend in efficiency which is explained by the rapid extension of the Vietnamese banking industry, especially in terms of network expansion and branching. In regarding to the bank type, Nahm and Vu (2013) classifies his example of 56 commercial banks from 2000 to 2006 into three groups, namely SOCHs, JSCBs and FBs and study the different in efficiency among the group. They reports that the price efficiency scores of SOCBs were much higher than those of JSCBs and FBs, implying the existence of

market power for SOCBs in pricing bank products in Vietnam. SOCBs stand out to be more profit efficient than FBs and JSCBs.

Overall there are limited studies about the relationship between X-efficiency and profitability. Therefore to complementing the Berger (1995a) argument of positive impact of X-efficiency on profitability, implied in Efficiency structure hypothesis (ES), we add direct measure of x-efficiency to the empirical analysis. The relationship is hypothesized as following.

Hypothesis 7: There is a positive association between the X-efficiency and the bank's profitability.

IV/Methodology

Our sample is an unbalanced panel of 31 Vietnamese banks through the period of 2006-2013, which includes 26 Joint stock commercial banks (JCBs)[1] and 5 State-owned commercial banks (SOCBs)[2]. The list of banks in the studied sample is shown in the table 12 in the appendix.

This research is fuelled with data from Bankscope Database, individual bank annual reports and World Bank Data. First, Bankscope Database was the main source to download banking accounting data, where the data of 610 observations from 61 Vietnamese financial institutions from 2006 to 2013 were collected. Then all financial companies, foreign banks and Vietnam central bank were removed from the sample. Further, to be included into the studied sample, banks should meet the following conditions. They must have total assets, loans, fixed assets, equity, gross interest and dividend income, interest expenses, personal expenses, loan loss provision, total common equity, average loans and positive average equity. Eventually, the remaining were an unbalanced panel data of 31 banks and the number of observations fell to 169. For the non-accounting data, number of Directors and Senior Managers was manually collected from individual bank annual reports. Finally World

[1] jointly owned by both the public and private sectors.
[2] largely owned by the government or state sector.

Bank Data was utilised to obtain the macroeconomic data (GDP deflator, GDP growth, broad money growth).

4.1 Efficiency

Koopmans (1951) provided a formal definition of technical efficiency: ‘‘A producer is technically efficient if an increase in any output requires a reduction in at least one other output or an increase in at least one input, and if a reduction in any input requires an increase in at least one other input or a reduction in at least one output.’’ In the practice of banking system, a bank is technically efficient if it maximizes the quantity of outputs while minimizing the quantity of inputs. Using panel data over the period 2006 to 2013, technical efficiency of 31 banks in Vietnam are estimated by Translog Distant Function (introduced by Shepherd, 1970)

Technically, financial liabilities and physical factors are used as inputs into a translog function to produce outputs, measured by various financial assets. An ideal frontier is calculated based upon the cost of production and/or input usage of the best practice or lowest cost firms in a sample. The inefficiency score of banks in the sample will be extracted from the translog Distant function which is the distant away from the efficient frontier. Translog Distant Function possesses many advanced features to compare with other alternatives such as Translog Cost Function or Tranflog Profit Function. Significantly, stochastic cost is restricted in measuring relative efficiency in the service sector with multiple outputs because as a dependent variable, only a single output production process can be modelled (Drake and Simper, 2003). This makes it inappropriate to be used in banking analysis with a wide range of services or outputs. However, Translog Distant Function has confirmed its advantage of flexibility in permitting the modelling of a multi-input, multi-output production process without the need to specify a behavioural objective (e.g., cost minimisation or profit maximisation). More importantly, input prices are not require, which avoids bias in price. Moreover, as it is a function of outputs and inputs, the stochastic distance frontier produces a relative efficiency measure which is directly comparable to the technical efficiency obtained from non-parametric (Drake and Simper,

2003). Unfortunately this is not possible in Cost Function[3]. Having discussed this, distance function turns out to be the most suitable method to estimate technical efficiency of the Vietnamese banking system.

Depend on the nature of input and output management ability, two types of distant function that can be applied, namely input distant function and output distant function. Specifically, when firms have more control over inputs than outputs, input distance functions tend to be used and in reverse order output distance function would be a better option. In the case of banking sector, banks tend to have more control over their inputs than outputs, thus input distance function is chosen for this research. Important properties of the distance function are that it is non-decreasing, linearly homogeneous and concave in inputs, and non-increasing and quasi-concave in outputs. Thus, in this research the input-oriented translog distance function with 3 inputs (x) and 3 outputs (y) for the panel data is:

$$\ln d_{it} = \alpha + \sum_{n=1}^{3} \beta_n \ln x_{nit} + \sum_{r=1}^{3} \theta_r \ln y_{rit} + \frac{1}{2}\sum_{n=1}^{3}\sum_{m=1}^{3} \delta_{nm} \ln x_{nit} \ln x_{mit} + \frac{1}{2}\sum_{r=1}^{3}\sum_{s=1}^{3} \xi_{rs} \ln y_{rit} \ln y_{sit} + \sum_{n=1}^{3}\sum_{r=1}^{3} \phi_{ns} \ln x_{nit} \ln y_{rit} + \tau t + \kappa t^2 \quad (1)$$

d_{it}	the input distance
β, θ, δ, ξ, φ, τ, κ, π and v	parameters to be estimated
x_{nit}	the n-th inputs of the i-th bank at time t
y_{rit}	the r-th outputs of the i-th bank at time t
v	random variable accounted statistical noise in dit.
t and t^2	time[4]

3 Efficiency produced by the stochastic cost function is associated with both allocative efficiency (best possible use of given inputs to benefit the society) and technical efficiency (maximal output from given inputs). In contrast, the relative efficiency measures derived from non-parametric approaches typically relate only to technical efficiency. Thus, the relative efficiency measures derived from the stochastic cost function and techniques in non-parametric approaches are often not directly comparable

4 The time components, t and t^2 are added as the longer the panel, the less likely technology remains constant. This makes it desirable to include time along with other regressors as a proxy for technical change (Kumbhakar and Knox-Lovell, 2003, p.107).

This function is nondecreasing, linearly homogenous, and concave in inputs. Setting $\beta_n \geq 0$, $lnd_{it} = u_{it}$ and $\beta_1 + \beta_2 + \beta_3 = 1$, the equation (1) will be transformed into:

$$-\ln x_{1it} = \alpha + \sum_{n=2}^{3} \beta_n \ln \frac{x_{nit}}{x_{1it}} + \sum_{r=1}^{3} \theta_R \ln y_{rit} + \frac{1}{2}\sum_{n=2}^{3}\sum_{m=2}^{3} \delta_{nm} \ln \frac{x_{nit}}{x_{1it}} \ln \frac{x_{mit}}{x_{1it}}$$
$$+ \frac{1}{2}\sum_{r=1}^{3}\sum_{s=1}^{3} \xi_{rs} \ln y_{rit} \ln y_{sit} + \sum_{n=2}^{3}\sum_{r=1}^{3} \phi_{nr} \ln \frac{x_{nit}}{x_{1it}} \ln y_{rit} + \tau t + \kappa t^2 + \varepsilon_{it} \quad (2)$$

The residual term extracted from the model (2) can be decomposed:

$$\varepsilon_{it} = v_{it} - u_{it}$$

Where $u_i = lnd_i$ is inefficiency

v_{it} is the statistical noise

Denoting u_{it} as the inefficiency component, TE can be defined as

$$TE_{it} = E[\exp(-u_{it})\, I\varepsilon_{it}] = \frac{1}{d_{it}} = \exp(-u_{it}) \quad (3)$$

Inputs and outputs

As discussed above, Distant Function allow multi-inputs and multi-outpouts, yet, there are other aspect in inputs and outputs selection process that needed to be considered. Production approach and intermediation approach are two distinctive bank services measurement methods. Under the first approach, banks are considered as production firms employing capital and labour to produce services for both depositors and borrowers. Thus, the numbers of deposit and loan transactions over time are measure of outputs and inputs are operating expenses. On the other hand, the latter approach treats banks as financial intermediaries between borrowers and depositors, where output is treated as a stock (measured by value of loans and investments), and total costs consist of operating costs and interest costs. Following Humphrey (1992), Berger (1993) and Esho (2001), this paper adopts the intermediation approach. It is noted that non-interest operating income (off balance sheet measure) is added as the third output. Jagtiani et al.(1995) and Stiroh (2000) argue that as the derivative and securitization are fast growing markets, outputs may be understated if researchers measure solely the banks' balance sheets. Therefore it is essential to take into account these output measurement in this study.

Multiple inputs (x_{nit}) and outputs (y_{rit}) as presented in following table:

Table 2 : Distant function Inputs and outputs selection

Inputs	Outputs
x_1 = total interest expenses x_2 = personal expenses x_3 = other operating expenses	y_1 = gross loan y_1 = other earning assets y_1 = total non-interest operating income

Notes:

Total interest expenses (x1): interest expense on customer deposits plus other interest expense

Personal expenses (x2): collected from income statement which contribute to total non-interest expenses.

Other operating expenses (x3): obtained from income statement and contribute total non-interest expenses.

Gross loan (y1): consisting loans and reserves for impaired loans.

Other earning assets (y2): represents investments and is listed in balance sheet.

Total non-interest operating income (y3): represents off-balance-sheet activities. It includes net gains (losses) on trading and derivatives, net gains (losses) on other securities, net gains (losses) on assets, net insurance income and net fees and commissions

In the presence of inflation, the value of inputs and outputs are magnified from the real value, leading to the distortion of efficiency estimation. Technically, GDP deflator comes as a solution for these impacts in which selected inputs and outputs are adjusted based on GDP deflator to reflect their real changes. Specifically, inflation rate of Vietnam is considerably high which make the adjustment more desirable. In this research, the year 2006 is selected as the base year, thus 2006 GDP deflator is given 100. The summary of Vietnam GDP deflators for the studied period is listed in the table 3.

Table 3 : The summary of Vietnam GDP Deflators

Year	2006	2007	2008	2009	2010	2011	2012	2013
DGP deflator	100	109.63	134.49	142.85	160.09	194.13	215.34	234.53

Macroeconomic influence

Each bank reacts to the macroeconomic influence differently, depending on its scale and role in the economy. This makes it vital to take into account the macroeconomic factors in Technical Efficiency estimation process. Pessimistically, where to put the Z-variable (macroeconomic variable) is still a controversial debate among literature. In existing literature, there are two ways to accommodate macroeconomic factors: one-step model and two-step models.

A two-stage estimation consists of two stages. The first stage involves the estimation of a stochastic frontier production function and predicting the technical efficiency scores. In the second stage, the technical efficiencies are regressed upon macroeconomic factors through specification of a regression model to estimate the relationship. However, there is an inconsistency in this two-stage method. The stochastic frontier production function is estimated in the first stage under the assumption that the inefficiency effects are identically distributed, while the predicted technical efficiencies are regressed upon a number of factors in the second stage, suggesting the inefficiency effects are not identically distributed (Battese and Coelli, 1995). Wang and Schmidt (2002) performed Monte Carlo simulation to investigate the performance of the one-step and two-step estimators and found that the one-step estimators are based on a correctly specified model and are asymptotically optimal. Kumbhakar and Knox-Lovell (2003, p.264) also argued that the first step of the two-step procedure is biased if x and z are correlated. For these reasons, only early empirical studies (see Pitt and Lee, 1981 and Kalirajan, 1989) employed two stage estimation approach, meanwhile, most of the recently paper tend to prefer one stage estimation (see Kumbhakar, Ghosh and McGuckin (1991), Battese and Coelli (1995). Concerning these evidences and arguments, one step estimation approach is considered in this research.

Under one-step model, macroeconomic variables (z variables) are incorporated directly into the frontier production function (distant function) to estimate the efficiency in one-step using maximum likelihood estimation. Inefficiency term (u_{it}) is made an explicit function of a vector of environmental characteristics, z_{it} , by specifying that the u_{it} are independently (but not identically) distributed as nonnegative truncations of a general normal distribution of the form:

$$N(m_{it}, \sigma^2) \text{ or } N\left[\delta_0 + \sum_{j=1}^{M} \delta_j z_{j,it}, \sigma^2\right] \quad (4)$$

Where δ_0 and δ_j are parameters that need to be estimated.

Gamma

The gamma model[5] appears to offer a promising alternative to the half-normal and exponential models for the stochastic frontier because the likelihood ratio and LM tests strongly reject the restriction of these models which may have a large influence on the pattern of the estimated inefficiency (Greene, 1990, p158).

Simulating the equation (2) and (4) through maximum likelihood estimation using econometric programs, the value of unknown parameters (α, β_n, δ_0, δ_j, σ_u^2 and σ_v^2) are obtained to compute TE. However these programs use the reparameterisation (Coelli, 1992 and 1994):

$\sigma^2 = \sigma_v^2 + \sigma_u^2$ and gamma $(\gamma) = \frac{\sigma_u^2}{\sigma^2} = \frac{\sigma_u^2}{\sigma_u^2+\sigma_v^2}$ n

This has advantages during estimation because the value of gamma must lie between zero and one. Basing on the manual of frontier introduced by Coelli (1996), the computed gamma (γ) is the variance ratio, illustrating the total variation in output from the frontier level of output attributed to technical efficiency. It is used to test whether the stochastic frontier production function is best fit. Practically the value γ of must lie between zero and one. As the efficiency is determined by the disturbance errors of the model, if γ is close to one, the estimated efficiency scores across different banks are highly varied within one year. By contrary, if γ is close to zero, the estimated efficiency scores would be the similar for each individual bank within one year. Either case will cause problem in estimating accurate bank efficiency scores. Therefore, in this study an acceptable model should have the value of gamma γ lies between 0.2 and 0.7.

Battese and Coelli (1993) also present an expression for the conditional expectation of TE, given ε_{it}

$$TE_{it} = \left\{\exp\left[-\mu_{it} + \frac{1}{2}\sigma_*^2\right]\right\} \times \left\{\Phi\left[\frac{\mu_{it}}{\sigma_*} - \sigma_*\right] \Big/ \Phi\left[\frac{\mu_{it}}{\sigma_*}\right]\right\} \quad (6)$$

Where $\Phi(.)$ denotes the distribution function of the standard normal random variable

[5] The Gamma frontier model was proposed by Greene (1980)

$$\mu_{it} = (1-\gamma)\left[\delta_0 + \sum_{j=1}^{M} \delta_j z_{j,it}\right] - \gamma\varepsilon_{it}$$

And

$$\sigma_*^2 = \gamma(1-\gamma)\sigma^2$$

By replacing the unknown parameters in (4) with the maximum likelihood estimates we get an operational predictor for the technical efficiency including the influence of environment factors. To obtain net technical efficiency, researchers replace $\sum_{j=1}^{M} \delta_j z_{j,it}$ into (4) with $\min[\sum_{j=1}^{M} \delta_j z_{j,it}]$ and recalculate the technical efficiency predictions. Net efficiency scores are the efficiency levels when all firms are assumed to face identical environmental conditions.

4.2 Profitability determinant

My paper aim to analyse the factors that allows the Vietnamese banks to become more profitable from 2006 up through 2013, 5 years after the onset of the current financial crisis. To do this, we use the generalized method of moments (GMM) estimator which is preferred over the OLS and static panel estimators. There are two reasons for this main econometric specification choice. First Nickell (1981) point an immediate problem in applying OLS and static panel estimators is that lag variable is correlated with the fixed effects in the error term, which gives rise to "dynamic panel bias[6]". (Roodman, 2009, p102) SGMM works around this endogeneity by two ways. It can transform the data to remove the fixed effects or instrument lag variable and any other similarly endogenous variables with variables thought uncorrelated with the fixed effects. This shows the weakness of OLS and static panel estimators in not allowing the use of internally generating instruments. Second, many authors argue that the dynamic panel model is specially developed for a situation in which "N" is bigger than "T" so as to control for dynamic panel bias (see Bond, 2002;; Roodman, 2007; and Baltagi, 2008). This make GMM more suitable to my study's panel data set consisting 31 banks (N) over the 8-year period (T). Finally, dynamic panel model allows a separate analysis of the short and long-run effects of institutions on economic performance, whereas the static panel estimates and the OLS cannot identify (Baltagi, 2008). There

[6] Dynamic panel bias example: a firm experiences a negative employment shock for some reason not modeled in 1980, thus, the shock appears in the error term. In 1981, lagged employment and the fixed effect will both be lower. For a study period from 1975 to 1985, this positive correlation between a regressor and the error violates an assumption necessary for the consistency of OLS (Roodman 2009, p 101).

reasons explain why the dynamic panel model is considered the most appropriate econometric technique for the estimation in this study.

In general there are two popular type of GMM estimators: difference-GMM (DGMM) developed by Arrelano and Bond (1991) and system-GMM (SGMM) introduced by Arrelano and Bover (1995) and Blundell and Bond (1998). In this research, SGMM, which has been used in many recent studies on determinants of bank profitability (e.g. Liu and Wilson (2010); Dietrich and Wanzenried (2011); Antonio Trujillo-Ponce (2013)) was preferred over DGMM for several reasons. First, DGMM can perform poorly when the autoregressive parameters are too large. To improve the work of Arellano and Bover (1995), Blundell and Bond (1998) makes an additional assumption on a systems estimator, that first differences of instrument variables are uncorrelated with the fixed effects. This can dramatically improve efficiency by allowing the introduction of more instruments (Baltagi, 2008)). Second, Blundell and Bond (1998) demonstrated, DGMM performs poorly for close to be a random walk variable because past levels convey little information about future changes, so untransformed lags are weak instruments for transformed variables. Finally, (Roodman, 2009, p. 19) DGMM estimation has a weakness of magnifying gaps which make it unsuitable for the unbalanced nature of our data set. Overall, SGMM seems to be an advanced estimator over DGMM. To estimate the effects of bank-specific (including TE), industry-specific, and macroeconomic factors on the profitability of Vietnamese bank, this study uses the following model:

$$Y_{it} = \alpha Y_{i,t-1} + \beta_{it} + \xi X_{it} + \delta V_{it} + \lambda Z_{it} + \varepsilon_{it}$$

Where:

i	: individual bank
t	: year
Y	: the dependent variable
Y_{t-1}	: the one period lagged of Y
X, V and Z	: bank-specific factor (including TE), industry-specific factor and macroeconomic factor variables
α	: coefficients of the lagged Y

β : the bank specific intercept

ξ, δ and λ : vectors of regression coefficients

ε : the error term

4.2.1 Endogeneity

Endogeneity is one of the most major challenges in econometric analysis, which causes biased OLS estimates and hence rejecting a hypothesis that in fact is true (Type I Error) or fail to reject a hypothesis that in fact is false (Type II Error). Wooldridge (2002) explained that endogeneity can arise for three different circumstances: omitted variables, simultaneity, and measurement error. In the context of banking performance, estimations all three reasons may apply. First, omitted variables are correlated with one or more of the included independent variables. Second, a simultaneity problem may occur when ROE and TE both correlated with error term. Third the unbalance data, financial statement manipulation and data from different sources may be subject to a measurement error.

Another issue arose in applying SGMM when the endogeneity of TE on ROE is concerned because the instruments for TE are also included if it is endogenous. In this model, TE is suspected to be endogenous to ROE, meaning both ROE and TE are affected by the same factors inside the disturbance term.

The first reason for this suspicion is that. Technical efficiency reflects the effectiveness of banks to produce outputs (i.e. gross loan, other earning assets and non-interest operating income in this paper) given a set of inputs (i.e. interest expenses, personal expenses and other operating expenses), hence it is largely effected by bank specific factors such as poor risk management, inefficient screening and monitoring, or making loan decisions without anticipating changes in the business cycle. The endogeneity of TE on ROE can be derived from previous studies. For example Manlagnit (2010) reported a positive relationship between deposits-to-liabilities ratio and efficiency. On the other hand, a positive association between deposits-to-liabilities ratio and ROE was found by Claeys and Vander Vennet (2008). This shows that ROE and TE are affected by the same disturbance system under deposits-to-liabilities ratio which is one of the selected independent variable of this model.

It is easy to understand because both ROE and TE are measure of bank performance, leading the similar effect. Once again, these empirical evidences clearly illustrated the existent of endogeneity.

The second reason is the effect of macroeconomic factors. As mentioned above, the one-stage estimation is employed in TE estimation process, which incorporates macroeconomic variables in the input distant function. This implies the effect of macroeconomic factors on TE. There is a general agreement among researchers on the effect of macroeconomic factors on ROE (see Athanasoglou, 2008 or Calza, 2003). It can be concluded that the error term drew from macroeconomic variable can be another source causing endogeneity problem.

To clarify, the endogeneity test is run on TE.

4.3 Definition of variables

Dependent variable

The two main profitability measurements are return on assets (ROA) and return on equity (ROE) which is widely employed in the banking literature as the dependent variable. The first of these, the return on assets (ROA), is an important ratio for comparing the efficiency and operational performance of banks which considers the returns generated from the assets that the bank finances. It is primarily an indicator of managerial efficiency, although it may be misleading because of off-balance-sheet activities. Second, the return on equity (ROE) is a measure of the return on shareholder funds which is used this research. This is because ROE is considered better as it can reflect both the essence of ROA and the equity multiplier[7] explaining the funds management efficiency (Rose and Hudgins, 2013). This performance proxy has been used in many previous studies (see Tregenna, 2009 and Lipunga, 2014).

[7] $\text{Equity multiplier} = \frac{\text{Total assets}}{\text{Total equity capital}}$. $\text{ROE} = \text{ROA} \times \text{Equity Multiplier}$

Independent variables

As mentioned in the literature review, profitability determinants are divided into three types, namely, macroeconomic factors, industry-specific factors and bank-specific factors.

Macroeconomic factors

To test the hypothesis 1, the annual growth rate of the real gross domestic product (GDPGR) is used which allow exploring the association between economic growth and profitability (ROE). Related to the bank balance sheet, GDPGR is expected to have positive impacts on supply and demand for loans and deposits and so increase bank profit. a positive relationship between GDP growth and banks' profitability was found by many other research (see Bikker (2001) and Athanasoglou et al. (2008)).

Industry-specific factors

Concentration ratio (CR5) is chosen as proxy for industry concentration to evaluate the hypothesis 2. It is calculated as the total assets held by the five largest banks divided by total assets. Regarding to the SCP hypothesis (Berger, 1995a), banks in highly concentrated markets tend to collude and thus earn abnormal return. Nevertheless, Boone and Weigand (2000) argue that a tougher competition in the banking industry may be resulted from a higher bank concentration, which would suggest a negative relationship between profitability and market concentration. Therefore, the relationship between CR5 and ROE can be mixed results. Noticeably, an improvement in efficiency can lead to higher profits and hence higher concentration, the finding of a positive relationship between concentration and profits may be a spurious result. Berger (1995a) argues that, if the result indicates that CR5 is positively correlated with ROE there is also a need to show that efficiency does not have effects on concentration and market power to validate the existence of the SCP hypothesis.

Bank-specific

In term of risk management, customer deposit to total liability ratio (DEPLIA) (capital structure related) and fee and commission income to total asset ratio (FEEASS) (source of income related) are chosen to analyse the effect of risk management on the profitability of

the banks (Hypothesis 3 and 4). A positive relationship between DEPLIA and ROE was suggested by Claeys and Vander Vennet (2008); Garcı´a-Herrero et al., (2009). This can be understood that as a stable and cheap source of funding higher customer deposit reduce risk and increase bank profit. Relatedly, higher customer deposit possessed will produce more fee and commission. This means that higher fee and commission also lead to a better risk management and thus higher profit. Kundid et al, (2011) found FEEASS positively associate with ROE.

To assess the hypothesis 5, number of board of directors and managers (BODM)are chosen to examine the effect of board size on bank profitability. From our sample of 31 Vietnamese banks through study period 2006-2013, the average of number of director is 8.2, which is relatively small to compare to those in developed countries, with 17.97 directors in Adams and Mehran(2012) using a sample of over 30 US banks from 1986 to 1999 and with 15.78 directors in Andres and Vallelado (2008) using a sample of 69 banks in OECD countries from 1996 to 2006 or in developing countries, with 13.8 directors in Liang and et al. (2013) using a sample of 50 largest Chinese banks during the period of 2003–2010 and with 11.14 directors in Pathan (2007) studied 12 biggest Banks in Thai Lan from 1999 to 2003. Looking back the history, Vietnamese banking industry is still young and developing which can explain the small scale of banks and therefore the small board size. Within a small scaled organisation, I also acknowledge the important of board of management in bank operation. Therefore, differ from previous studies about board size which using the number of director, this research define board size as number of directors and senior managers.

To analysis the inverted u-shape association between size and profitability, hypothesis 6, we employ both lnSIZE (ln total asset) and $lnSIZE^2$ (ln total $asset^2$). Theoretically if lnSIZE and lnSIZE2 turn out to be positive and negative respectively, then there will be an inverted U-shape relationship. This is in the line with Tregenna (2009) who studies the effects of structure on US Bank profitability from 1994 to 2005.

As discussed above, Technical efficiency (TE) is the level of managerial efficiency of a bank determined by comparing its actual costs to the best practice minimum costs to produce the same output under the same conditions. Regarding to ES hypothesis, technical efficiency is expected to have a positive relationship with ROE. In fact, a positive relationship between

technical efficiency and banks' profitability was found in many studies (see Maudos, 1998 and Timme and Yang, 1991).

Table 4: Summary of dependent and independent variables

Hypothesis	Defined determinants		formula	Expected sign
	Return on equity	ROE	$\frac{\text{Net income}}{\text{Equity}}$	
H1	The gross domestic product growth	GDPGR	The annual change of the GDP	+
H2	The concentration ratio	CR5	$\frac{\text{The assets of the 5 largest ban}}{\text{The assets of all banks}}$	+
H3	Customer deposit to total liability	DEPLIA	$\frac{\text{Deposits \& Short term fundin}}{\text{Total Liability}}$	+
H4	Fee and commission to total asset	FEEASS	$\frac{\text{Net Fees and Commissions}}{\text{Total Assets}}$	+
$H5_{a,b}$	Board Size	BODM	Number of Directors + number of Senior Managers	+/-
H6	Natural log of total assets	lnSIZE,	ln(total assets)	+
H6	Natural log of total assets square	lnSIZE2	$\ln(\text{total assets})^2$	-
H7	Technical efficiency	TE	From the translog input distance function	+

4.4 SGMM validation tests

To validate the final results, there are 7 main tests was run, namely, the Angrist-Pischke (AP) F statistics test, Underidentification test, the Anderson-Rubin (1949) test and the Stock-Wright (2000) S statistic test, Endogeneity test, Autocorrelation test and the Hansen test.

The Angrist-Pischke (AP) F statistics identifies weak individual endogenous regressors. It is constructed by "partialling-out" linear projections of the remaining endogenous regressors. "Weak identification" occurs when the excluded instruments are weakly correlated with the endogenous regressors. Estimators will perform poorly when instruments are weak, and they are robust to weak instruments differently (Stock and Yogo, 2005). The code “ivreg2” in Stata automatically reports this test, which is an F version of the Cragg-Donald Wald statistic. The null hypothesis is that endogenous regressor is weekly identified, therefore, the AP test will fail to reject if a particular endogenous regressor is weekly identified. Critical values for weak identification in the AP F test are not standardized, alternatively the Stock-Yogo (2005) critical values for the Cragg-Donald F statistic (when number of endogenous regressors = 1) can be used. Together with the results of the AP test, selected instruments should be significantly correlated with the endogenous regressor (i.e. TE).

The Stata code “ivreg2” also conducts the underidentification test automatically which is an LM test of whether the equation is identified. This test the rank of a matrix and the null hypothesis is that the equation is underidentified. The statistic is distributed as chi-squared with degrees of freedom = (L1-K1+1), in the case of L1 is the number of excluded instruments and K1 is the number endogenous regressors. A rejection of the null shows that the matrix is full column rank, meaning the model is identified.

The Anderson-Rubin (1949) test and the Stock-Wright (2000) S statistic test robust to the presence of week instruments thus are employed to test the joint significance of endogenous regressors. The null hypothesis for both tests is that the coefficients of the endogenous regressors in the structural equation are jointly equal to zero. Under “ivreg2”, the Anderson-Rubin statistic is a Wald test and the Stock-Wright S statistic is a GMM-distance test. Both test statistics distributed as chi-squared with L18 degrees of freedom (see Dufour (2003), Chernozhukov and Hansen (2005) and Kleibergen (2007) for further discussion)

[8] L1 is the number of excluded instruments

As TE was suspected as endogenous, endogeneity test is run to clarify. The null hypothesis is that the specified endogenous regressors (TE in this research) can actually be treated as exogenous, the test statistic is distributed as chi-squared with degrees of freedom equal to the number of regressors tested. The test can be run using the “endog” code under the “ivreg2”. If TE is exogenous, it is treated as a normal variable in Xtabond2. Otherwise we need it add its instruments in Xtabond2

The test for autocorrelation in the disturbance term is the next test. The SGMM approach assumes linearity and that the error terms are not autocorrelated, or in other words that the applied instruments in the model are exogenous. As a result, the test for the presence of first-order and second-order autocorrelation in the error term is particularly important (Efendic et al., 2008, p. 12). According to Arrelano and Bond (1991), the GMM estimator requires that there is first-order serial correlation but no second-order serial correlation in the error terms. To serve this purpose, one needs to reject the null hypothesis of there is no first-order serial correlation, yet fail to reject the null hypothesis of there is second-order serial correlation.

Finally, the Hansen test of overidentifying restrictions needs to be implemented. The null hypothesis is that the instruments are valid instruments and uncorrelated with the error term. Complying with this test, one can exclude the invalid instrument correctly. The test statistic is distributed as chi-squared in the number of overidentifying restrictions. A rejection casts doubt on the validity of the instruments, but “do not reject” may cast the risk of generating results that are invalid and appear valid due to too many instruments (Roodman, 2009b). Roodman (2009b) claims that there are no such clear rules defining how many instruments is “too many”, but there are some rules of thumb and telltale signs which can be used. The number of instruments should not exceed the number of observations. Besides that, the p-value under the Hansen test should have a higher value than the conventional 0.05 or 0.10 levels, at least 0.25 (Roodman, 2007, p.10).

The Angrist-Pischke (AP) F statistics test, Underidentification test, the Anderson-Rubin (1949) test and the Stock-Wright (2000) S statistic test, Endogeneity test, Autocorrelation test and the Hansen test.

Table 5: Summary of Validation tests

Test	**Null Hypothesis**	**SGMM requirement**
Angrist-Pischke (AP) F statistics test	Endogenous regressor is weekly identified	Reject $H_{0,}$ selected instruments and endogenous regressor are correlated
Underidentification test	That the equation is underidentified	Reject H_0
Anderson-Rubin (1949) test and Stock-Wright (2000) S statistic test	The coefficients of the endogenous regressors are jointly equal to zero	Reject H_0
Endogeneity test	The specified endogenous regressors can actually be treated as exogenous	Either reject H_0 or fail to reject H_0 different code will be used
Autocorrelation test	H_{01} no first-order serial correlation H_{02} no second-order serial correlation	Reject H_{01} and fail to reject H_{02}
The Hansen test.	The instruments are valid instruments and uncorrelated with the error term	the p-value > 0.05 or 0.10 or at least 0.25

V/Analysis

5.1 Data descriptive

Table 6: Data Descriptive

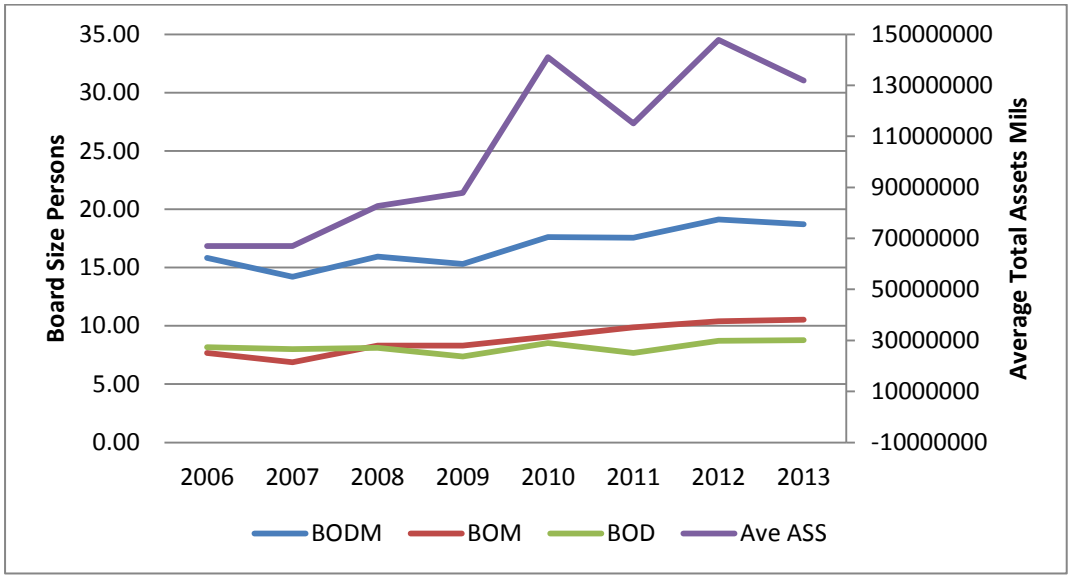
Variable	Obs	Mean	Std.Dev.	Min	Max
ROE	169	0.4111	0.7374	-0.8621	5.6474
GDPGR	169	5.9812	0.6537	5.2474	7.1295
CR5	169	56.3411	9.3846	46.5400	80.1800
DEPLIA	169	0.8202	0.0792	0.3338	0.9350
COASS	169	0.0030	0.0027	-0.0044	0.0174
lnSIZE	169	17.5132	1.5305	13.2545	20.2371
lnSIZE2	169	309.0411	52.7166	175.6816	409.5380
BODM	169	14.5266	7.6174	10.0000	35.0000
TE	169	59.0007	13.9138	23.5660	92.2714

The Data Descriptive table reflect high volatility in our data with high standard deviations and wide range between maximum value and minimum value. This instability completely makes sense during a studied period filled with many significant economic events. In order to have a clear understanding of profitability determinants, it is crucial to have an in-depth analysis of banks profitability (ROE). The maximum ROE 5.64 (564%) was achieved by Sacombank in 2010, which appear to be the best practiced bank in recapitalisation after the great crisis. However Tien Phong Bank is accounted for the least profitable bank with -0.86 in 2011 and was forced to restructure for being categorised as “weak bank” under the Restructuring Financial Institutions 2011-2015 programme (Tienphong, 2014).

The figure also shows a significant drop in market concentration from 80.18% in 2006 to 46.54% in 2011, implying the remarkable growth of JCBs to compare with SOCBs. There is no doubt for the result as the corruption are growing fast within SOCBs, for example Nguyen Duc Kien, founder of ACB bank was sentenced 30 in jail for illigale gold trading) and Huynh Thi Huyen Nhu, formal risk manager at Viettin Bank was sentenced life time in fail for $200 Million fraud).

Although average total assets of banks increase dramatically more than two times from 2006 to 2013, number of director maintains stable around 8 directors. However the number of managers appears to increase significantly from 7 to 11 managers, resulting an increase in number of directors and managers. In other word, the expansion of banks did not lead to demand of directors but rather managers. Having discussed this we can predict that, board of directors have improved their communication, efficiency and workload rather than their size in order to manager bigger size banks.

Figure 3 : Board Size and Bank Size



Source: Bankscope data

TE appears to have the second highest standard deviation of 13.91 with mean of 59%. To my knowledge, TE is a new profitability determinant, which has not been used in many bank profitability researches; therefore this paper will examine the variable in-depth in 2 dimensions. First, the efficiency are examined cross banks in the sample, thus, the average efficiency score through 8 years are calculated for each bank. In addition, banks are also studied based on both efficiency scores and ranking. Second is the cross panel analysis so the average efficiency score across the sample are calculated for each year.

5.1.1 Cross banks -Efficiency analysis

Using the Stochastic Distant Function, Technical Efficiency of 31 Vietnamese banks throughout 2006-2013 was generated. With the average score of each bank, the histogram below provides an overview of technical efficiency in Vietnam banks. As can be seen, there is an even managerial efficiency within the industry, where majority of banks centralise in small range of 55%-70% efficient. This can be illustrated by the low standard deviation of 6.78. From the statistical descriptive table, the average efficiency is 60.08% which is very close with the reported result (around 55% for the period of 2006-2012) in Ngo (2012) study of Vietnamese banking system from 1990 to 2010. We can interpret this result as 40% of Vietnamese banking industry resources have been used inefficiently to compare with well managed and most efficient banks. Regarding to these findings, more effort should be exerted on reducing cost and producing more quality outputs to boost the efficiency. The most efficient bank scored 73% efficient while 48.91% was the lowest efficient achieved. However, Berger et al. (2005) argues that the use of efficiency ranks is preferred over the efficiency scores as the ranks are more comparable across time. To compare the efficiency between banks, the ranking table will be established in the next section.

Figure 4: Average Technical Efficiancy of Vietnamese bank (2006-2013)

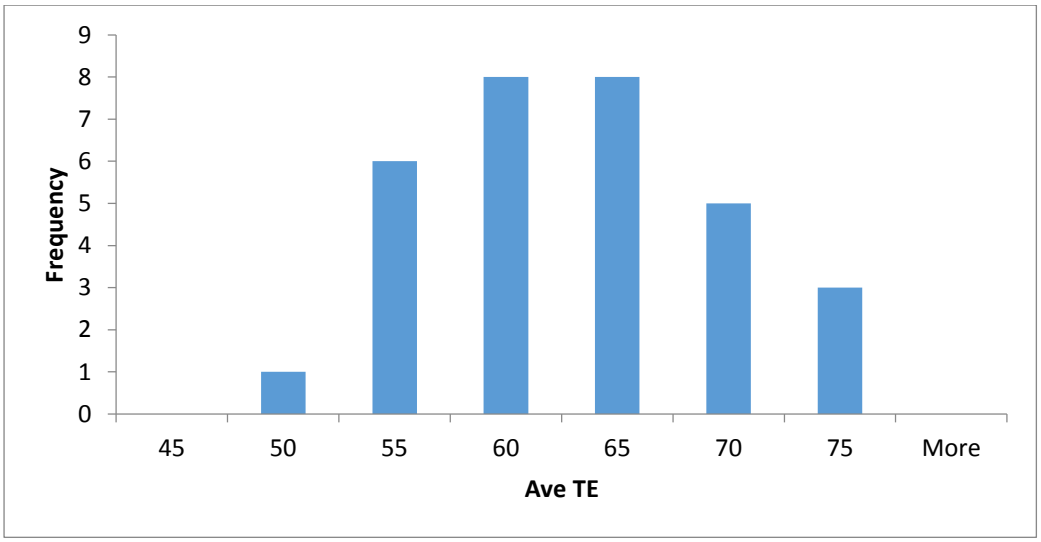


Table 7: Average Technical Efficiancy of Vietnamese bank (2006-2013)

Statistic Descriptive

Mean	60.08
Median	60.02
Standard Deviation	6.78
Range	24.09
Minimum	48.91
Maximum	73.00

The efficiency scores only reflect the dispersion of efficiencies within the studied sample and say nothing about the efficiency of one sample relative to the other (Coelli et al., 2005, p.314), therefore efficiency ranks can provide a better picture of the studied sample by expressing how an individual bank is more efficient than others in the sample. The ranks are then converted to a uniform scale over [0,1] using the formula: (order-1)/(n-1) where order is the average ranking of efficiency ; n is the number of banks. The bank with the lowest cost efficiency level is ranked 0 and the bank with the most cost efficiency level has the highest rank of 1. There is a fixed distribution of [0,1] for the ranks in every time period, while, the distributions of efficiency levels may be very different due to the change in conditions through the time period. Find the following table for converted efficiency ranks:

Table 8: Average Technical Efficiency of each bank

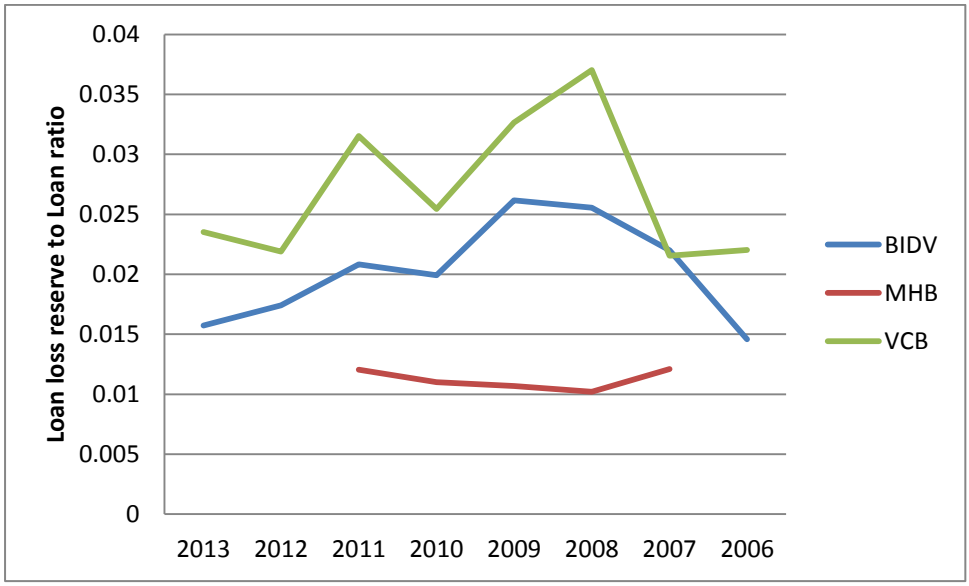
	Bank Name	Ave TE	Berger rank	Ave Total Assets	Asset ranking
JB	Vietnam Technological and Commercial Joint-Stock Bank - Techcombank	73.00	1.00	132186260.80	6
JB	Vietnam Maritime Commercial Stock Bank	71.72	0.97	102126260.00	10
JB	Nam A Commercial Joint Stock Bank	71.34	0.93	22394950.00	21
SB	Housing Bank of Mekong Delta-MHB	69.47	0.90	38533518.50	20
JB	Mekong Development Joint Stock Commercial Bank	69.23	0.87	12034978.33	27
JB	Bao Viet Commercial Joint Stock Bank	67.78	0.83	13409700.00	26
JB	Petrolimex Group Commercial Joint Stock Bank (The)-PG Bank	65.57	0.80	15782397.82	25
JB	Vietnam Prosperity Joint Stock Commercial Bank-VP Bank	65.15	0.77	61555785.57	14
JB	VietNam International Commercial Joint Stock Bank - VIB	63.79	0.73	83168625.00	11
SB	Vietnam Bank for Agriculture and Rural Development - Agribank	63.75	0.70	447743014.29	1
JB	Saigon Thuong Tin Commercial Joint-Stock Bank- SACOMBANK	62.38	0.67	108644812.50	8
JB	Tien Phong Commercial Joint Stock Bank	62.30	0.63	20742289.40	22
SB	Vietnam Joint-Stock Commercial Bank for Industry and Trade	60.90	0.60	358791128.57	2
JB	Asia Commercial Joint-stock Bank	60.53	0.57	154032225.00	5
JB	Orient Commercial Joint Stock Bank	60.50	0.53	16216385.71	24
JB	An Binh Commercial Joint Stock Bank-ABBANK	59.18	0.50	45799775.00	18
JB	Southern Commercial Joint Stock Bank	57.51	0.47	9115671.00	30

JB	Southeast Asia Commercial Joint Stock Bank-SEA Bank	57.18	0.43	65499467.25	12
JB	Lien Viet Post Joint Stock Commercial Bank	57.18	0.40	50898185.20	17
JB	Nam Viet Commercial Joint Stock Bank-Navibank	56.42	0.37	17776365.03	23
JB	DongA Commercial Joint Stock Bank	56.23	0.33	52774120.29	16
JB	Vietnam Asia Commercial Joint-Stock Bank	55.70	0.30	9945354.00	29
JB	Saigon Commercial Bank-Saigonbank	55.37	0.27	56558350.50	15
JB	Saigon - Hanoi Commercial Joint Stock Bank	55.36	0.23	62343394.43	13
JB	VID Public Bank	51.97	0.20	6163937.50	31
JB	Military Commercial Joint Stock Bank	51.95	0.17	106774812.29	9
JB	Vietnam Export Import Commercial Joint Stock Bank	51.58	0.13	114582285.71	7
SB	Bank for Investment and Development of Vietnam	51.34	0.10	339234987.50	3
SB	Joint Stock Commercial Bank for Foreign Trade of Vietnam- VIETCOMBANK	50.57	0.07	299987825.00	4
JB	Saigon Bank for Industry and Trade	50.31	0.03	11030250.00	28
JB	Ocean Commercial Joint Stock Bank	48.91	0.00	40632783.33	19

From the table above, 5 best practice banks appear to account for four JCBs : Vietnam Technological and Commercial Joint-Stock Bank – Techcombank, Vietnam Maritime Commercial Stock Bank, Nam A Commercial Joint Stock Bank, Housing Bank of Mekong Delta-MHB and Mekong Development Joint Stock Commercial Bank and Housing Bank of Mekong Delta-MHB is only a small scale SOCB (38 533 518.50 million of average total assets). 5 most inefficient bank accounted for two large scale SOCBs, namely Bank for Investment and Development of Vietnam (339234987.50 million of average total assets) and Joint Stock Commercial Bank for Foreign Trade of Vietnam- VIETCOMBANK

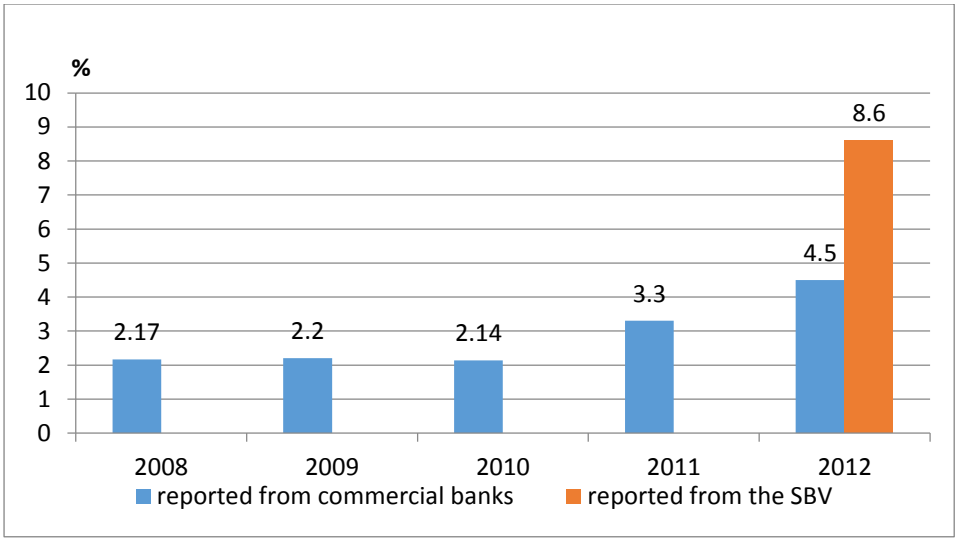
(299987825.0050 million of average total assets), and three JCBs are Vietnam Export Import Commercial Joint Stock Bank, Saigon Bank for Industry and Trade and Ocean Commercial Joint Stock Bank. The noticeable feature of the detected results was that a small scale SOCB falls in the best group, while the worse group contains two large scale SOCBs. The inefficiency of large SOCBs is unavoidable within a low credit quality industry which is expressed in the Figure 6. Bad debts to toal loan ratio increased from 2.17 % in 2008 to 4.5% report from Commercial Banks of 8.6% reported from State Bank of Vietnam. For the purpose of risk management, banks need to preserve more for bad loan. However the large SOCBs are under more strict regulation and supervision than small SOCB thus they need to reserve more for bad loan. Evidential reserve ratio of MHB fluctuates around 1.1 % while approximately 2.5% is accounted for BIDV and VCB (See figure 5). This certainly reduces the efficiency of large SOCB. Also, four largest SOCBs owns more than half of Vietnamese assets [9], which emphasis large influence of these banks to Vietnamese economy. Therefor the higher loan loss reserve to loan ratio is totally understandable for the sake of safer economy.

Figure 5: Risk management factor of SOCB



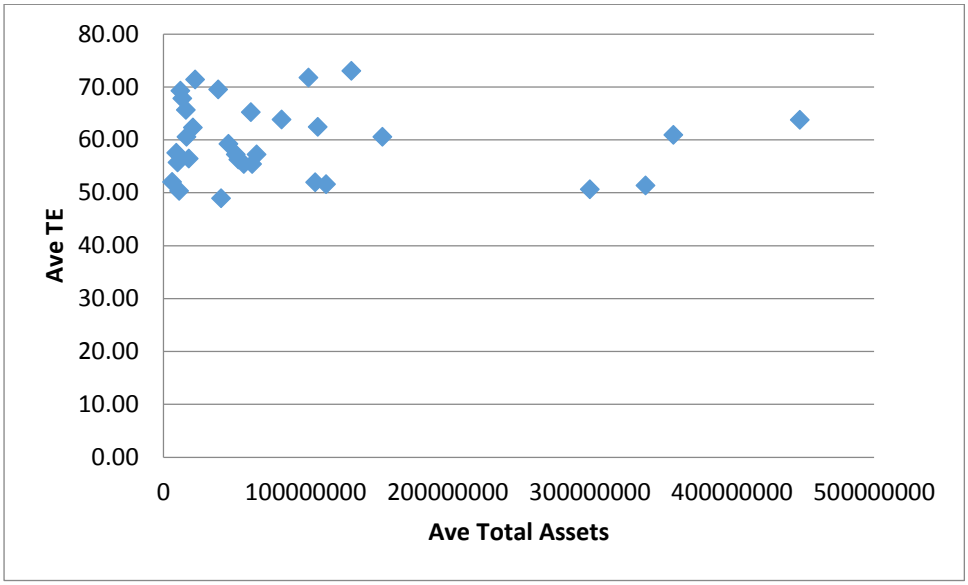
[9] http://www.centralbanking.com/central-banking-journal/feature/2251387/state-bank-of-vietnam-needs-a-single-mandate-not-independence

Figure 6: Bad debts-to-total loans ratio



In term of economy of scale, there is no sign of efficiency advantage for large banks. Evidentially, four SOCBs namely Argibank, Viettinbank, BIDV and Vietcombank step out to be the four biggest banks of Vietnam, nevertheless two of them fall into the lowest efficient group and the others achieved average efficiency (see table 8) In addition the efficiency of four smallest banks Saigon Bank for Industry and Trade, VID Public Bank, Vietnam Asia Commercial Joint-Stock Bank and Southern Commercial Joint Stock Bank fall in the range from 50.31% to 57.51 %. The evidences imply the randomness in size effects on efficiency of Vietnamese banks sample, which is in line with the findings of Berger and Mester (1997) and Pi and Timme (1993).

Figure 7: Size effect on Technical Efficiency of banks



5.1.2 Cross time panel-Efficiency analysis

To serve the purpose of across time comparing, average efficiency of the sample in each year is calculated and illustrated in the figure 10. The extreme fluctuation of the results can partially reveal the instability of Vietnamese economy during 8 years studied period. Vietnam has undergone many economic reforms and experiences series of national and global financial shocks. Overall, a clear trend cannot be identified from the high fluctuation of technical efficiency results of Vietnamese banks, nevertheless many others studies reveal a slightly downward trend of the level of efficiency in Vietnamese banks (see Vu and Turnell, 2010; Ngo, 2012 and Nguyen and DeBorger, 2008). However most of previous researches take longer studied period, meaning a clearer trend could be obtained. It is clear from the figure 10 that gap of efficiency between the most efficient banks and the least efficient banks are widening. To have a better understanding of the patent of the result, an in-depth study on economic events happened in each studied year is carried

Statistically, in 2006 and 2007 banks suffered the lowest efficiency in the studied period, 47.06% and 43.88% respectively. Ngo (2012) also showed that the level of efficiency reached the bottom of 49.40% when investigating the performance in the Vietnamese banking system from 1990 to 2010. The significantly low efficiency from 2006 to 2007 can be explained by the instability of Vietnamese security and real estate market. The Vietnamese stock market index, called VNINDEX, hit the peak of 632.69 point on 25th April 2006 which according to Nguyen 2007 the herding behaviour of Vietnamese investors was the main cause. He reveals that the true value of securities in 2006 could be only a half of the market price. Soon after the hit VNINDEX fall to the bottom of 399.80 in 4th of August. This financial event has increased the bad loan rate of banks because many investors have borrowed banks to invest in stock market. Overpriced assets as collateral for bank loans and overpriced stock price had negative impacts on the output of banks, thus the overall efficiency. In the aspect of input, Le Duc Thuy, Chief of State Bank of Vietnam, Revealed that customer deposit saving has decreased by 50% to compare with the previous year due to the stock investment activities (Vietbao, 2007). Financial times also reported that “students, civil servants and state enterprise managers with cash to spare are all rushing to buy shares. Vietnamese companies in an array of sectors appear to be using surplus cash to punt on the

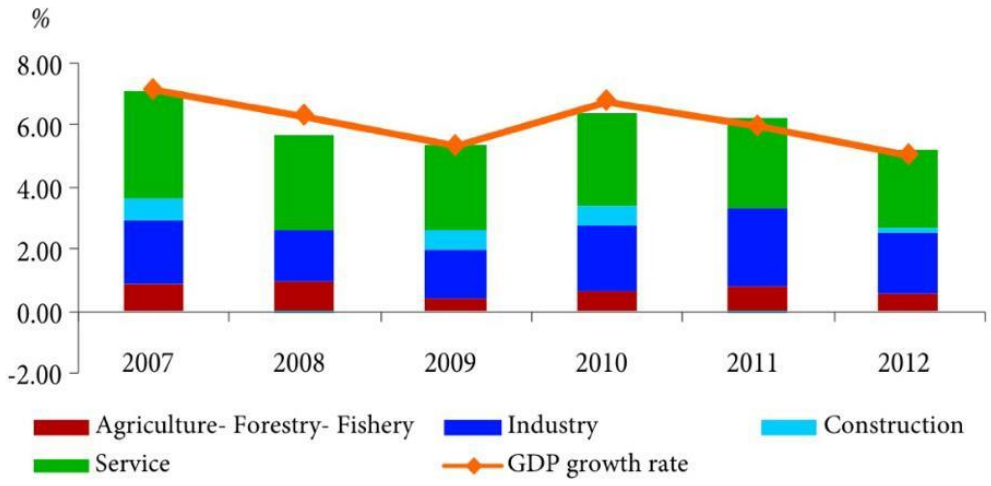
market instead of investing in their core activities (Financial Times, 2007).” As the results, to attract depositor banks need to increase their interest and also the cost of improving service quality, which negatively impact on bank inputs. Having discussed this, the overall fall in efficiency from 2006 to 2007 is understandable.

2008 was a revolution of bank efficiency enhancement from the bottom of 43.88% to the highest peak 72.80% which is consistent with Ngo (2010) results of a high average of efficiency scores of banks in Vietnam in 2008. There are three potential reason of this highlighted improvement in efficiency. First, as mentioned in the Section II, Becoming member of WTO, there was a significant boost to foreign direct investment, a resilient export sector, lower prices, and improved quality of goods and services. This certainly improved the demand of loan and also the higher customer deposit and thus the efficiency of banks. Second, beside the benefits, Vietnam also faced many difficulties when the domestic enterprises are not strong enough to confront an equal competition with foreign firms. As the result, the government, therefore, moved decisively to establish SEGs and provide them with privileged access and autonomy to enable them to compete with foreign firms on an even footing (VDR, 2012, p36). In addition, the SBV also applied a loose monetary policy in order to encourage economic growth which significantly effect on bank efficiency. In 2008, in order to meet the capital needs of enterprises, lending rate reduced to 10.8%-11.5%, 12%-12.75% and 8.5%-10% per annum for short-term, medium and long-term loans, respectively (SBV annual report, 2008, p.30). Although there is a reduction in output price, banks benefit more from higher output quantity resulting from economy expansion. Later on, the SBV lowered the base interest rate, thus lending rate offered by financial institutions continued to decrease. Finally, the entry of FBs also increases bank efficiency. The year 2008 is the first time ever 100% foreign-owned banks (i.e. HSBC, Standard Chartered and ANZ) are licensed to operate in Vietnam. Claessens et al. (2001), McFadden (1994), or Unite and Sullivan (2002) found that foreign bank entry improves the efficiency of domestic banks by narrowing interest rate spreads and reducing operating expenses.

It is clear that the decrease in banks efficiency from 72.80% in 2008 down to 51.46% in 2009 was a result of economic downturn caused by global financial crisis. Although the financial

crisis presence in America in 2008, it took one year to show the real effect on Vietnamese economy with lower foreign currency inflows from imports, remittances, tourist services, FDI, and FII as compared to those of previous years (VDR report, 2009, p20). There are two identical impacts of the crisis on Vietnamese banking system. First, in the aspect of input, from late February 2009, VND mobilizing interest rate was always under upward pressures, mainly due to the high credit demands of enterprises and manufactures for the implementation of business plans as a result of the Government's interest rate subsidy program, the funding. To the end of 2009, deposit interest rates of maturities of 1 month and above reached at 10-10.49 percent per annum. Although much effort have been given, the capital mobilisation only reach 29.88% which is not much higher than the rate of 22.84% in 2008 (SBV annual report, 2009, p16). This leads to the difficulties of commercial banks in balancing between lending and mobilization. Second, for the expensive cost of fund banks still have to reduce the lending rate due to the requirement of authorities. Evidentially, VND lending interest rate in 2009 decreased by around 1.5 – 2.5 percentage points per annum as compared to that of end – 2008 (SBV annual report, 2009, p19). It is certain that the high cost of fund and low output price have brought down the bank efficiency in 2009. Optimistically, in order to support credit institutions' funding of the economy and to prevent economic downturn, the SBV reduced the reserve requirement ratios. However this seems not enough for bank to overcome this huge economic event thus the reduction in efficiency is unavoidable.

Figure 8: Real GDP growth rate and contribution by industries 2007-2012



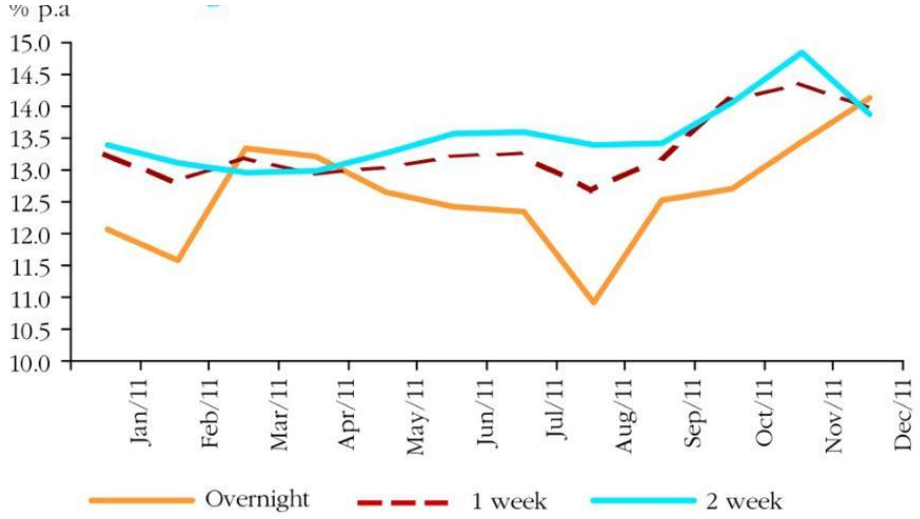
Source: SBV annual report 2012

With many efforts to recover from the great crisis, Vietnam managed to achieve higher GDP growth of 6.78% in 2010(see figure 8). The banking system has benefited from several reforms, which boost its efficiency up 73.43%, the highest figure in our studied period. Back to the recession, Dinh Nho Bang, Hanoi-based chairman of Vietnam Gold Traders said “The dong’s depreciation, which has been about 5 percent already this year, plus declines in stocks and uncertainty in the property market, will prompt investors to put their money in gold, (Bloomberg, 2010a)”. As gold is preferred investment method, it makes banks faced more difficulties in fund mobilization. However in 2010, the SBV required credit institutions to close gold trading floors and allowed gold export and import to regulate the market. This helped to cool down the domestic gold price to move with the international gold price and also increase bank customer deposits. In terms of bank supervision, SBV carried out the ‘’Development of Information systems supporting off-site supervision’’ project to develop an early warning tool for credit institutions. A tighter supervision and support from the SBV lead banks to the right direction to recapitalise and recover from the crisis, and thus increase banks efficiency in management of inputs and outputs.

In 2011, bank efficiency decrease dramatically from 73.43% in 2010 to 53.19%. One of the main reasons for this reduction was the high default rate resulted by the bankruptcy of Vinaline. Major Banks of Vietnam had to handle bad debt of $60 million from Vinashine. Also the downgrade by major credit rating agency increased bank’s cost of fund (Bloomberg, 2010b). This is illustrated in the witness of volatile and increasing trend of interbank interest (see figure 9). The second event that also negatively affected banks efficiency was the country's largest ever fraud of $200 million by Huynh Thi Huyen Nhu, a former chief of the risk management department of the ViettinBank (BBC, 2014a). She admitted to fake the documents to make loan at many different financial institutions and invested unsuccessfully. Together with Vinaline case, Huyen Nhu’s fraud trail contributed to high bad debt rate at banks. In other aspect this raised the awareness of customer on banks lax management system and thus loosing confident. Obviously, with a severe drop in credit quality, increase in cost of fund and damaged reputation, the efficiency of banks was negatively impacted. To ease the intense condition, at the beginning of 2012, government preferred bank to list Vinaline’s debt as pending loan rather than bad debt. Transport minister Thang asked banks to work with Vinashin in selling and buying businesses and funding effective projects to

restructure and recover the group (Vietnam News, 2013). As the result, Vietnam banks got back on track with higher efficiency in 2012 with 68.60%.

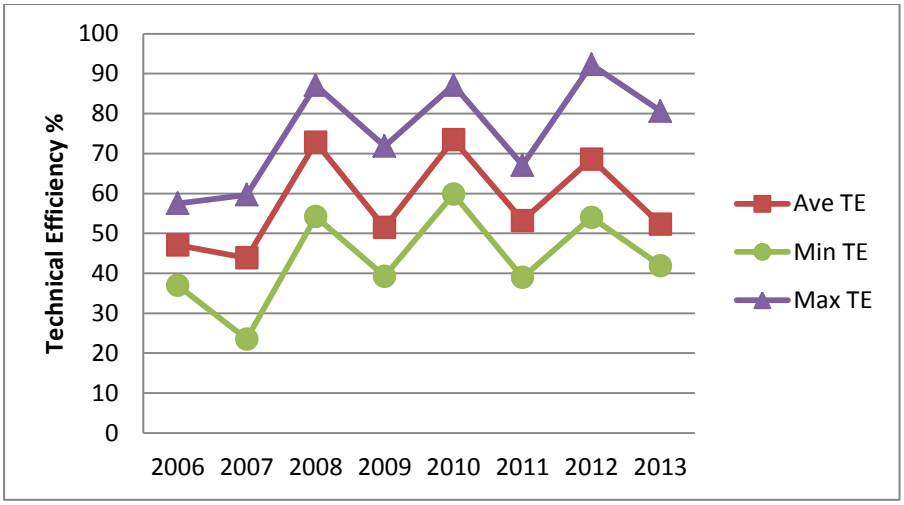
Figure 9: VNIBOR interest rate in 2011



Source: SBV annual report 2011

The year 2013 witnessed a reduction in efficiency to 52.30%, however it might not because of the external economic factors but rather the more transparency in the report resulted this figure. The Vietnamese government determined to gain the public confidence by attempting to cleanup the banking system after a series of banking corruption scandals. For example, in August 2012, the arrest of the banking tycoon Nguyen Duc Kien, co-founder of Asia Commercial Joint Stock Bank (ACB), one of the biggest JCBs, caused losses of $67 million through illegal cross-bank deposits and investments. He was also found guilty of fraud, tax evasion and “deliberate wrongdoing causing serious consequences (BBC, 2014b)”. Central Internal Affairs Commission was established end of 2012 as government department specialised in anti-corruption. For the first time, SBV announced the real bad debt rate of Vietnam bank in 2012 which is two times greater than public figure of commercial bank (See Figure 6). Vietnam is on its way to solve the hidden problem an look for a brighter future of its banking system.

Figure 10: Vietnamese Bank's Technical Efficiency 2006-2013



5.2 SGMM validity test results

First of all, the variable TE was suspected to be endogenous as discussed above therefore the ASSGDP (Total assets to GDP ratio) and COSI1 (total cost to net income ratio) was chosen as instrument.

Further, the F of the The Angrist-Pischke (AP) F test is 33.08, which is higher than the Stock-Yogo critical values of 19.93 at 10% maximal IV size. This means the bias in selected instruments in the model is only at 10% confidence level, hence endogenous regressor (TE) is strongly identified.

From the underidentification test, p-value is zero, which allow us to reject the null hypothesis that the studied equation is underidentified.

For the test of joint significance of endogenous regressors, the Anderson-Rubin test and the Stock-Wright S Statistics have p-values of 0.0166 and 0.0203 respectively. This mean the Null Hypothesis of coefficients of the endogenous regressors are jointly equal to zero are rejected at 5% confidence level

The endogeneity test reported p-value of 0.9722, meaning TE can be treated as exogenous variable. For this reason TE is added as a normal variable in SGMM. In other words, there is no need to add instruments for endogeneity problem.

The SGMM assumes that the twice-lagged residuals are not autocorrelated (Efendic et al., 2008, p. 12); hence there is a need to test for the first- and second-order autocorrelation in the error terms, which is also known as a test for the validity of instruments. According to results in the model diagnostics, the null hypothesis that there is no first-order serial correlation in residuals is rejected with p-value of 0.04 at 5% level of confidence, whereas we fail to reject the null hypothesis that there is no second-order serial correlation in residuals at 10% level of confidence due to the p-value of 0.691. This is consistent with the suggestion of Arrelano and Bond (1991).

As the prob > chi2 is 0.497, we fail to reject the null hypothesis of ''Instruments are valid instruments'' at any conventional level of significance in the Hansen test of overidentifying restrictions, which indicates that the model has valid instrumentation. Further, the p-value of 0.497 is also in line with Roodman's suggestion that the p-value should be at least 0.25 higher than the conventional 0.05 or 0.10 levels to deal with the problem of too many instruments.

Finally, there appears to be little guidance from the literature on how many instruments is "too many" (Ruud 2000, 515), because the bias is present to some occasions even with few instruments. However Roodman (2009) raised the awareness that instrument proliferation can overfit endogenous variables and fail to expunge their endogenous components. He stated that '' if the number of instruments equals the number of observations, the R2s of the first-stage regressions are 1''. In my model the instruments of 18 is smaller than number of groups (29) and number of observation (129).

Overall, the results of the tests above have strengthened the validity of the final SGMM results which based on an unbiased model.

5.3 Profitability Determinants

Table 11: System Distant Function results

ROE	Coef.	Corrected Std. Err.	Z	P>|z|	[95% Conf.	Interval]
ROE						
L1.	0.593281	0.1891747	3.14	0.00	0.222505	0.964056
GDPGR	0.130897	0.0741885	1.76	0.09	-0.01451	0.276303
CR5	0.003358	0.005867	0.57	0.57	-0.00814	0.014858
DEPLIA	1.23754	0.6084483	2.03	0.04	0.045004	2.430077
FEEASS	-18.5004	12.11178	-1.53	0.13	-42.2391	5.238203
lnSIZE	1.445825	0.6973113	2.07	0.04	0.07912	2.81253
lnSIZE2	-0.04221	0.0198122	-2.13	0.03	-0.08104	-0.00338
BODM	-0.01212	0.0051272	-2.36	0.02	-0.02216	-0.00207
TE	0.007637	0.0037802	2.02	0.04	0.000228	0.015046
_cons	-14.3142	6.533822	-2.19	0.03	-27.1202	-1.50809

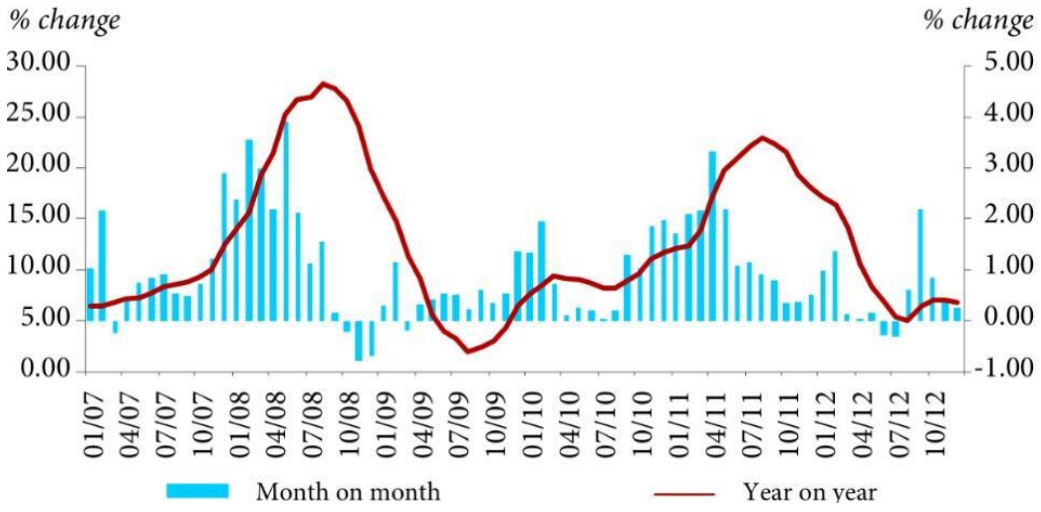
The results reveal five variables that possibly impact on Vietnamese banks profitability listed GDPGR, DEPLIA, SIZE, BODM AND TE. However Concentration ratio CR5 and risk management FEEASS do not appear to have any effects.

Macroeconomic and industry factors

GDP is usually calculated on an annual basis which includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory. GDPGR is found to be significantly correlated with ROE associated with P-value of 0.09 at 10% confident level. The result is in the line with Dietrich and Wanzenried (2014) who analyses how bank-specific characteristics, macroeconomic variables, and industry-specific factors affect the profitability of 10,165 commercial banks across 118 countries over the period from 1998 to 2012. They explained that ''banks' profits might be pro-cyclical because GDP growth also influences net interest income via lending activity as

demand for lending is increasing (decreas-ing) in cyclical upswings (downswings). In other aspect, the effect seems to be weak if we strictly consider it at 5% confident level at. Thanhnien News (2013) [10] claimed that Vietnamese GDP Growth is not sustainable even though ranks 42nd in the world and sixth in Southeast Asia behind Indonesia, Thailand, Malaysia, the Philippines, and Singapore. In explanation, together with an increase in investment, inflation and exchange rate also magnify the GDP growth. However this do not benefit banking system at all because with high inflation gold and other investment methods are more preferable than depositing. In fact, these factors hinder the positive effect of GDP growth on bank profitability. The following table illustrates the extremely high inflation in Vietnam; particularly 2008 year hit the highest inflation rate of almost 30%.

Figure 11: CPI inflation developments 2007-2012



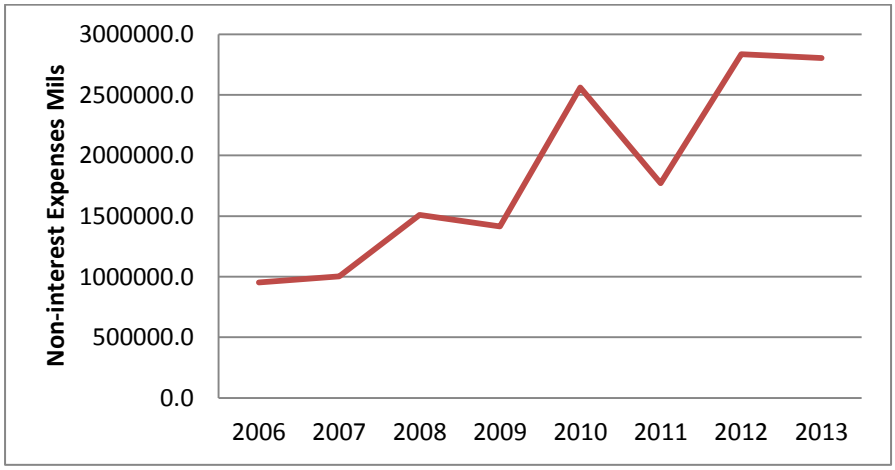
Source: GSO, estimates of the SBV

The result does not show any support for SCP Hypothesis where CR5 is found to be positive effect on profitability but relatively insignificant with p-value of 0.57. This is consistent with Berger (1995a) how suggests that the banking industry should move toward efficient structure and the improvement of the managerial practices and hence benefit from higher profit. Staikouras and Wood (2003) also reported the same result when they examined the performance of a sample of banks operating in thirteen EU banking markets. As mention

[10] http://www.thanhniennews.com/business/high-gdp-growth-easy-but-not-sustainability-economist-1578.html

above, in a higher concentrated market, large banks can increase price for being monopoly and thus higher profit. However, instead of enjoying abnormal return, large bank in Vietnam (SOCBs) faces intensive competition from new entered foreign banks and young JCBs. Boone and Weigand (2000) argues that in order to force inefficient firms to exit to obtain market concentration, banks have to participate in aggressive competition causing them suffer from increasing cost thus reduce profitability. SBV reported that in order to compete with foreign banks, domestic banks attempt to enhance their capacity in providing modern trade services to their clients through continuously improvement and diversification of their products and services, introduced e-transaction channels such as Internet,= Mobile/SMS. In 2008 80% of the Vietnamese plastic card market, had connected their ATM systems, allowing customers to do card transactions more easily (SBV annual report, 2008, p48). The figure … shows an remarkable increase in non-interest operating expenses which resulted from the modernisation revolution of Vietnam banking system.

Figure 12: average non-interest expense of Vietnam Banks



Bank specific factors

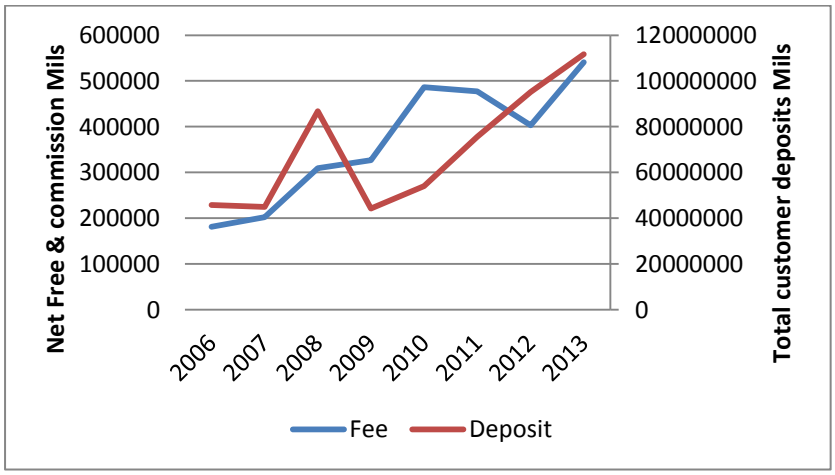
The results show the higher customer deposits attracted, the higher profit bank will earn. The positive association is proved by p-value of 0.04 at 5% confident level which is consistent with findings of (Claeys and Vander Vennet, 2008; Garcı´a-Herrero et al., 2009). In particular, with an extremely high inflation rate, attracting deposits is such a challenge for Vietnamese banks. However once banks are successful in gaining customer confident to deposit their saving in the bank, it is a big advantage. Obviously the high bad debt rate or

bad quality credit in Vietnam makes borrowing money from money market to give loan become such a gamble, thus expose bank to insolvency problem. For this reason customer deposit is always a stable source of fund.

As discussed in the literature review section, higher customer deposit associated with higher fee and commission income from online, mobile phone service and transaction fee. Nevertheless although customer deposit ratio was found to be significant positive variable, the results show no evident of the impact of FEEASS on ROE with p-value of 0.13. This is contrast with reults of Chunhachinda and Li (2014) who investigates the impact of Asian banks' income structure on competitiveness, profitability, and risk over the period 2005–2011. They report a higher percentage of net fees and commissions will lower earnings variability, market risk and asset risk, and increase profitability. In explanation, fee and commission incomes don not only comprise of customer deposit fee but also the loan application and other fee. As can be seen from the figure below, the sharp drop of customer deposits from 2008 to 2009 have brought down the fee commission but only at certain level because it still maintain an upward trend.

In developed country, banks can share their risk of loan default to the third party through securitization thus they can obtain fee with less risk level. However in Vietnam such market is not available, thus banks are totally responsible for the loans they lend out; consequently the high bad debt rate is still an unsolvable problem.

Figure 13: relationship between Net fee & Commission and Customer Deposit



Interesting results was found in bank size effects, where positive association with ROE accounted for lnSIZE (p-value of 0.04) and lnSIZE2 was found to have negative effect (p-value of 0.03). This suggests that banks do enjoy economies of scale but only up to a threshold and the scale diseconomies appear when they get too large. This is consistent with Tregenna (2009) who studied the structure and profitability of the US banking sector in the pre-crisis period. Interpreting the results, the largest banks in the sample appear to be 'optimal' in terms of economies of scale as lnSIZE is positively related with ROE. Nevertheless as the size is scaled up with lnSIZE2, it turn to be negative effect suggesting that together with considerations of optimal performance, more attentions also need for perhaps such as empire-building and incentive structures. Because that could contribute to the consolidation of giant banks, and this underlines the need for stronger regulation of banks as part of a post-crisis regulatory regime.

The results suggest a need of reduction in board size for the sake of increasing profitability as BODM was found negatively associate with ROE (p-value equal 0.02). Prior studies also find a negative relation between board size and measures of firm performance (Hermalin and Weisbach 2003). This can be explained by several factors. First as Small boards require less communication and less costs spent on coordination they are considered to be more effective and value additive for their nimbleness and cohesiveness. As well, they attract a lower degree of 'free-riding' director problems (Lipton and Lorsch 1992; Jensen 1993; Coles et al. 2007). Second large boards may cause greater difficulties in expressing their ideas and opinions in the limited time available at board meetings (Lipton and Lorsch 1992, p. 65). Although board sizes of Vietnamese banks are already small scale to compare with other countries, they still need to scale down to achieve the best efficient practice.

The research found a positive relationship between TE and ROE, which mean banks will increase profitability by improving managerial efficiency. This result is in line with Berger (1995a) and providing evident for the efficiency structure hypothesis in the Vietnamese banking sector. As the average efficiency is 60%, there is room for bank to work on its management of inputs and outputs to improve the existing 40% waste and hence increase profitability. There are two ways they can implement this plan. Once banks can maintain the

same output but focus on reducing price of input by finding cheap and stable source of fund (such as customer deposit). Other more outputs (loan and other financial service) should be produced with the same inputs. To do this they can enhance risk management to control credit quality or improve customer service to attract more creditors.

VI/ Policy discussion

In order to improve the profitability of banking industry, Vietnam must first stabilise its economy with substantial policies. The corruptions existing among SOEs can be prevented by stopping the reckless funding from SOCBs. This only can be done by changing the conservative strategy of government about the idea of prioritize SOEs or privatization of SOEs is also another option. The SOEs also see this potential solution thus they came with another contrivance to get around this by attempting to register as credit institutions. Currently, government minimises financial institutions share owned by SOEs to 30%. However, this number is still too high to be an effective solution. Thus we should stop SOEs investing in financial institution but rather focus on their production area. If these strategies are successfully implemented, banks' bad debts caused by the failure of SOEs will be reduced. Certainly, the economy and bank industry will also be more stable. This will help Vietnam gain confident from foreign investors thus attract more FDI to improve domestic production and increase economy growth. According to our result, economy was found to have positive impact on bank profitability. In other words, banking industry will benefit more from efficient control of economy which resulting high economy growth (GDP).

In term of bank specified, the results suggest banks better focus on enhancing managerial efficiency rather than expanding business as the market concentration ratio was found insignificant but technical efficiency has positive relationship with profitability. In other words, due to intensive competition in Vietnam abnormal earning from monopoly position do not exist because banks need to invest more on improving product quality. If banks can efficiently manage inputs and outputs, they can also expand business from the profits generated. Improvement of efficiency can be done by two strategies. One, with the same output, bank can reduce cost of fund by finding a cheap source of input such as customer deposit. Other bank can focus on increase interest earning from loan which can be done by advertise investment or better customer service. However in order to keep high credit

quality, risk management play a very important role. The result from size effect also supports this suggestion with the inverted u-shape relationship with profitability. This means Vietnamese banks is very close to the maximum scale efficiency therefore as we magnify the size the diseconomies scale appeared. Having discussed this, bank should focus their investment on banks facility to confirm their position in the market as the best quality bank not the biggest bank.

In the aspect of risk management, highly significant DEPLIA variable proposes that customer deposit is always a highly recommended source of fund due to its feature of stability and safe. This also free banks from dependence on borrowed fund in money market which is very sensitive to interest rate risk and market risk. Thus, more attentions should be paid on quality enhancement such as better customer service, higher transaction devices or better staff training programs.

One of the most interesting results is the negative relationship between board size and profitability which proposes that board are performing poorly and need to be reduced to efficient level. With smaller board size, bank can improve the communication quality and more importantly reduce the agency problem. More clearly, with over-size board, directors and managers can sense the lax control which increases their incentive to act in their interest rather than banks interest because they believe that there will be small chance to be got caught. To imply this strategy of reducing board size, banks need to improve the skills of directors and managers to handle more works with fewer people. In other words, banks need to improve board management efficiency before reducing board size.

Overall for a more profitable banking system, Vietnam need to work on its economic stabilisation strategies and bank also need to improve risk management, managerial efficiency and reduce number of directors and managers to efficient level.

VII/ Conclusion

This paper has examined how bank-specific characteristics, industry-specific and macroeconomic factors affect the profitability of 31 commercial banks in Vietnam over the period from 2006 to

2013. To my knowledge, very few econometric study has examined the determinants of profitability for the Vietnamese banking market, which is not surprising given that Vietnamese banking industry is still young and on developing process.

Referencing other papers studying banking profitability determinants such as Berger (1995b), Heffernan and Fu (2008), Dietrich and Wanzenried (2009), Lui and Wilson (2010) and Vietnam (Dinh, 2013), most relevant factors to the profitability of Vietnam Banking system are GDP growth (GDPGR), market concentration ratio (CR5), customer deposit to total liability (DEPLIA), number of directors and managers (Board Size), Bank Size (lnSIZE, lnSIZE2) and technical efficiency (TE). Bank performance is proxied by return on equity (ROE).

In term of technical, TE is extracted from translog input distant function using Stata program. I find evident of average 60% efficiency and the widening difference between highest efficiency and lowest efficiency score. Overall the TE result appears to be highly fluctuated due to the impact of the 2008 crisis and banking reforms. Using the same program, System GMM generates the correlation between chosen independent and dependent variables. The validation of the results was confirmed by several tests namely The Angrist-Pischke (AP) F statistics test, Underidentification test, the Anderson-Rubin (1949) test and the Stock-Wright (2000) S statistic test, Endogeneity test, Autocorrelation test and the Hansen test. The empirical results clearly show that bank profitability is mainly explained by economic growth, customer deposit to total liability, number of directors and managers (Board Size), Bank Size (lnSIZE, lnSIZE2) and technical efficiency (TE). Banks are more profitability with higher economic growth. In particular, banks possess high level of customer deposit are more profitable than banks heavily depend on the borrowed fund. In addition, efficient banks are more profitable than banks that are less efficient. The inverted u-shape relationship implied that banks can only enjoy scale economies up to a threshold. The negative correlation between board size and profitability proposes that banks will increase profitability with smaller board size.

Apart from the validation test, there are other reasons that make findings more relevant. First, findings confirm the result of other former studies on bank profitability determinants.

Second, the research extends our knowledge of bank profitability with respect to several important dimensions by using a larger set of bank- and market-specific determinants of bank profitability. Third, the period that this paper studied characterized by some important changes in the banking industry such as 2008 crisis, privatization and trading liberalization reforms. Finally, the system GMM estimator (developed by Arellano and Bover (1995)) that this study used is the most up-to-date econometric technique taking into account the issue of endogeneity of regressors.

To some extent, due to the limitation of availability, our data seem to be unbalance which reduces the validity of the final result. To overcome the difficulty, larger sample size was studied, nevertheless it only partially fixes the problem. We have found interesting result from non-accounting variable such as bank size therefore for further development it could be fruitful to include more specific information on management and board members, e.g. education, skill level, experience, gender, age all of which are increasingly important factors in understanding bank profitability.

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Appendix

Table 9: Validation tests results summary

Model diagnostics	
Number of observations	129
Number of groups	29
Number of instruments	18
Angrist-Pischke (AP) F test H_0: endogenous regressor is weekly identified Stock-Yogo weak ID test critical values for single endogenous regressor: 10% maximal IV size 19.93 15% maximal IV size 11.59 20% maximal IV size 8.75 25% maximal IV size 7.25	F(2, 118) = 33.08
Underidentification test H_0:the studied model is underidentified	Chi-sq(2) = 31.73 P-val = 0.0000
Tests of joint significance of endogenous regressors Anderson-Rubin test H_0: coefficients of the endogenous regressors are jointly equal to zero Stock-Wright (2000) S Statistics H_0: coefficients of the endogenous regressors are jointly equal to zero	 Chi-sq(2) = 8.20 P-val = 0.0166 Chi-sq(2) = 7.80 P-val = 0.0203
Endogeneity test H_0: endogenous regressors can be treated as exogenous	Chi-sq(1) = 0.001 P-val = 0.9722
Arellano-Bond test for AR(1) in first differences H_0: There is no first-order serial correlation in residuals Arellano-Bond test for AR(2) in first differences H_0: There is no second-order serial correlation in residuals	z = -2.06 Pr > z = 0.040 z = 0.40 Pr > z = 0.691
Hansen test (Robust, but weakened by many instruments) $H_{0:}$ Instruments are valid instruments	Chi2(8) = 7.37 Prob > Chi2 = 0.497

Table 10 : First-stage regression of TE – OLS estimation

TE	Coef.	Robust Std.Err.	P>|t|	t	[95% Conf.	Interval]
ROE						
L1.	1.107447	1.354388	0.82	0.42	-1.57461	3.789503
GDPGR	-7.1917	1.806253	-3.98	0.00	-10.7686	-3.61482
CR5	0.414169	0.177553	2.33	0.02	0.062565	0.765772
DEPLIA	-21.8399	19.30176	-1.13	0.26	-60.0626	16.38288
COASS	261.7993	299.0165	0.88	0.38	-330.335	853.9334
lnSIZE	4.184644	13.03277	0.32	0.75	-21.6238	29.99307
lnSIZE2	-0.09288	0.382103	-0.24	0.81	-0.84955	0.663789
BODM	-0.07723	0.120661	-0.64	0.52	-0.31617	0.16171
ASSGDP	33.86871	4.500987	7.52	0.00	24.95553	42.78189
COSI1	0.105214	0.045741	2.30	0.02	0.014634	0.195795
_cons	10.96676	114.9408	0.10	0.92	-216.647	238.5808

Included	instruments:	L.ROE	GDPGR	CR5	DEPLIA	COASS	lnSIZE	lnSIZE2
		BODM	ASSGDP	COSI1				

Table 12: Banks list

Bank type	Bank Name	Average total assets (mils)
SOCBs	Joint Stock Commercial Bank for Foreign Trade of Vietnam- VietcomBank	114795949.00
	Vietnam Bank for Agriculture and Rural Development - Agribank	9010673.71
	Vietnam Joint-Stock Commercial Bank for Industry and Trade-VietinBank	139939257.14
	Bank for Investment and Development of Vietnam-BIDV bank	193805425.00
	Housing Bank of Mekong Delta-MHBank	44882335.00
JCBs	An Binh Commercial Joint Stock Bank-ABBANK	127065937.50
	Asia Commercial Joint-stock Bank	80233432.13
	Bank for Investment and Development of Vietnam	193805425.00
	Bao Viet Commercial Joint Stock Bank	440136433.33
	DongA Commercial Joint Stock Bank	120509297.71
	Lien Viet Post Joint Stock Commercial Bank	282148119.40
	Mekong Development Joint Stock Commercial Bank	56903766.33
	Military Commercial Joint Stock Bank	93329403.57
	Nam A Commercial Joint Stock Bank	142616580.00
	Nam Viet Commercial Joint Stock Bank-Navibank	63367890.00
	Ocean Commercial Joint Stock Bank	29985611.02
	Orient Commercial Joint Stock Bank	53606300.00
	Petrolimex Group Commercial Joint Stock Bank (The)-PG Bank	20032374.50
	Saigon - Hanoi Commercial Joint Stock Bank	15577548.13
	Saigon Bank for Industry and Trade	64452525.50
	Saigon Commercial Bank-Saigonbank	39590278.50
	Saigon Thuong Tin Commercial Joint-Stock Bank- SACOMBANK	70307268.13
	Southeast Asia Commercial Joint Stock Bank-SEA Bank	105662725.00
	Southern Commercial Joint Stock Bank	161377600.00
	Tien Phong Commercial Joint Stock Bank	58817181.60
	VID Public Bank	27514772.38
	Vietnam Asia Commercial Joint-Stock Bank	4912650.00
	Vietnam Export Import Commercial Joint Stock Bank	437934485.71
	VietNam International Commercial Joint Stock Bank - VIB	140427150.00
	Vietnam Maritime Commercial Stock Bank-Ngan Hang Hang Hai	336516200.00
	Vietnam Prosperity Joint Stock Commercial Bank-VP Bank	123698984.29
	Vietnam Technological and Commercial Joint-Stock Bank - Techcombank	85462161.20