

The Productivity and Efficiency of Vietnamese Securities Firms, 2009 to 2017

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Abstract

This paper provides an examination of the impact of size, regulation and ownership structure on the productivity and efficiency of 53 securities firms in Vietnam in the years 2009 to 2017. The results show that the size of the firms and regulation has an impact on the performance of the firms. Foreign ownership also has a significant negative correlation with the firms' efficiency, while majority ownership by domestic Vietnamese, individual shareholders (as opposed to ownership by institutional shareholders) has a positive impact. In contrast, there is no significant correlation between ownership by banks and the productive efficiency of the firms.

Keywords: securities firms, productivity and efficiency, stochastic frontier analysis

1. Introduction

Securities firms are major financial institutions in many capital markets around the world, providing as they do a range of services, such as the underwriting of new securities, the creation of markets for older securities, the provision of brokerage services, delivery of financial advisory services, proprietary trading, and the provision of asset management services. Although securities firms play a significant role in the capital markets of Vietnam, there have been to date only a limited number of studies on the performance of these firms in that country. The two main studies to date are those by Nguyen, Nguyen, Nguyen and Tran, (2017) and Tran (2017). Additional work on the performance of this industry in the Vietnamese context is useful, as an efficient functional financial market is an important pre-requisite to the development of any country.

In assessing the performance of the securities firms in Vietnam it is possible to evaluate their productivity and efficiency, rather than just depend on an analysis of financial ratios. Although the use of financial ratios can be useful in determining the performance of securities firms, productivity and efficiency measures can also help to achieve this. The use of financial ratios can suffer in their use because in the past the securities industry in Vietnam has been the subject of considerable fluctuations, which has had the effect of boosting and dampening the profitability of firms, quite independently of their efficient operation. The use of productivity and efficiency analysis can also be used to identify some of the major drivers of efficiency in the industry.

In undertaking this study, it is possible to determine the impact of factors such as the market share/firms' size, regulation, and ownership structure on the efficiency performance of these companies. In much of the international literature on financial institutions there is an assumption that the market share/firms' size can have a relationship with the productivity of firms, through the creation of economies of scale and resulting lower average unit costs. In addition, it has often been argued that the regulations imposed on the financial industry, changes in commission regulations and capital adequacy requirements can have a significant impact on the efficiency performance of financial institutions, including securities firms. Finally, the different types of ownership structure - such as foreign ownership, ownership by individual shareholders (versus ownership by institutional investors), may also influence the performance of the firms as well. These aspects are presented as three hypotheses.

To this end in this paper Stochastic Frontier Analysis (SFA) is used in the first stage of the study, along with Linear Regression as part of a second stage of the analysis, to measure the efficiency performance of these firms and identify major drivers of efficiency. In undertaking this work the study provides some insights into the issues that create or inhibit the achievement of greater efficiency of the securities industry in Vietnam.

The results of this study are of interest to a number of people, both in Vietnam and internationally, such as academic researchers, regulators, those who work in the industry, and finally those who invest in, or advance credit to firms in the industry. In the latter case understanding what makes for an efficient securities firm can help to influence the behaviour of those who invest in, or give credit to, the industry. This in turn can lead to the creation of a more efficient securities industry, not just in Vietnam but also internationally.

Internationally there is to date only a limited number of studies of this sort and so the results from this study will provide additional information to researchers in other countries interested in the performance of these types of enterprises. To that end the structure of the paper is as follows. In Section 2 an overview of the Vietnamese securities industry is provided over the years of the study (2009 to 2017) as well as a description of the background to the formation of the industry from the 1990s onwards. Section 3 gives a review of the empirical studies on the performance of firms in the securities industry internationally, as well as a review of the main conclusions of these studies in terms of the efficiency performance of these types of firms. Section 4 presents the data collection used and the methodology applied in this study. Section 5 gives an interpretation of the results of the study and in the final section some conclusions are made.

2. Material Studied: the Vietnamese Securities Industry

The possibility of establishing a Vietnamese securities industry was first proposed in the early 1990s, after the commencement of Doi-moi (1986 Economic Reform), and the official establishment of the Vietnamese financial regulator, the State Securities Commission. In 1998, the general regulatory framework for the securities industry was created, and the decision was made by the Vietnamese Government to allow for the establishment of two securities trading centres (one based in Hanoi and another one in Ho Chi Minh City).¹ In July 2000, the Ho Chi Minh City Security Trading Centre was officially established and following that in 2005 the Hanoi Securities Trading Centre was established. In the first five years of the operation of Vietnam's securities markets, the number of listed firms was quite modest (see the figures provided in Table 1). By the end of 2005, there were only 13 firms qualified to be licensed for trading at the Securities Trading Centres, with a total registered capital of approximately VND 605 billion (\$US 38 million) (Loc, *et al.*, 2010). Most of these firms were wholly owned, or jointly owned by the Vietnamese Government; although in addition some were owned by the banks of Vietnam (mostly these banks were also government-owned).

Table 1. Securities Companies on Securities Trading Centres after five years of operation

Securities Companies	Trading on STC since	Capital (VND b)	Market share (%)	Ownership
Bao Viet Securities Company	2000	43	21.1	State-owned
Bank for Investment & Development of Vietnam Securities Company	2000	100	12.4	State-owned
Asia Commercial Bank Securities Company	2000	43	14.4	Bank
Thang Long Securities Company	2000	43	5.4	Bank
First Securities Company	2000	43	5.5	Private
Saigon Securities Incorporation	2000	20	23.2	Private
Industry Commerce Bank Securities Company	2000	55	7.5	State-owned
Bank for Agriculture & Rural Development Securities Co.	2001	100	2.5	State-owned
Vietcombank Securities Company	2002	60	5.7	State-owned
Mekong Securities Company	2003	6	0.5	Joint
Ho Chi Minh Securities Company	2003	50	1.7	Joint
Hai Phong Securities Joint Stock Company	2003	21.75	n/a	Joint
Eastern Asia Bank Securities Company	2004	21	n/a	Bank

Source: Loc, Lanjouw, and Lensink (2010)

The number of securities firms in Vietnam increased dramatically in the second half of the 2000s rising in number from 41 in 2006 to 105 in 2008. The global financial crisis in 2008 and 2009, however, revealed some of the limitations of this growth and the weaknesses of the securities firms in their operation, especially in terms of non-performing loans, poor risk management, and insufficient capital sources. The number of firms, therefore, peaked at 105 in 2009 to 2012 and then in middle and later years of the 2010s began to decline in number. Eventually, to strengthen performance of

¹ The Ho Chi Minh Securities Trading Centre was renamed the Ho Chi Minh City Stock Exchange in 2007, while the Hanoi Securities Trading Centre was renamed the Hanoi Stock Exchange in 2009. The Ho Chi Minh Stock Exchange (HOSE) is a trading platform for relatively large corporations' stock and Hanoi Stock Exchange (HNX) is for relatively small and medium sized enterprises stocks.

the stock markets, a restructure scheme was undertaken by the Vietnamese Government in 2012. Under this scheme, securities firms had to meet minimum capital adequacy requirements, based on the condition laid out in the Government’s Circular 226. These measures, along with the more subdued economic climate, led to a sharp fall in the number of securities firms in Vietnam, from 104 in 2013 to 85 in 2014, and 74 in 2017 (see Figure 1). These years of decline in the number of firms saw many of them be dissolved, merged, or acquired by other firms. In some cases, they were acquired by foreign firms (mainly from South Korea). In order to facilitate this foreign investment in the industry in 2015, the Vietnamese Government issued a new law on securities, which was designed to provide guidance for foreign investors in the stock markets.² There were, however, only five securities firms (among 74), which were wholly foreign owned in 2017, although a number have minority foreign ownership.³ In recent time according to Tran (2017), about 44 per cent of securities firms have some form of foreign ownership (minority or majority).

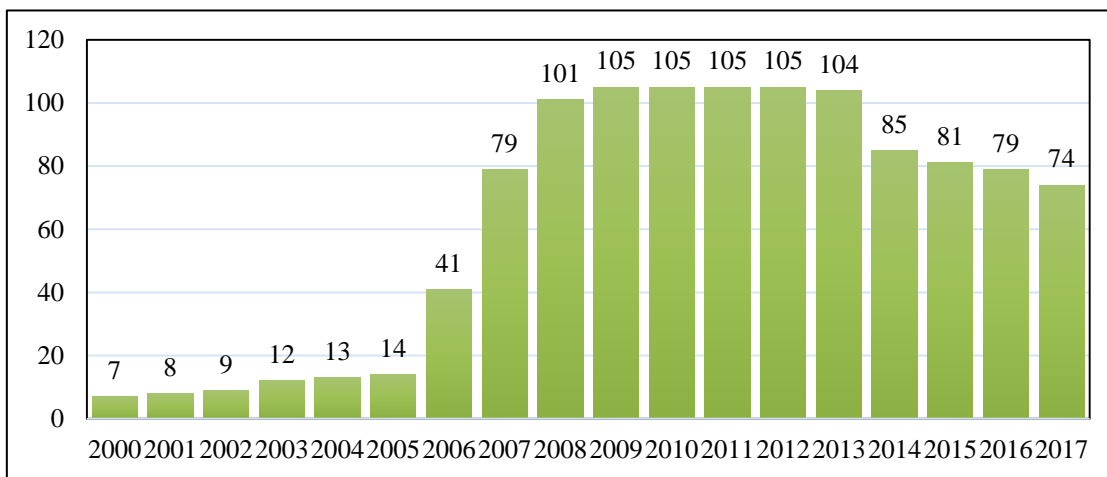


Figure 1. Number of securities companies in Vietnam, 2000 to 2017

Source: State Securities Commission of Vietnam, 2017

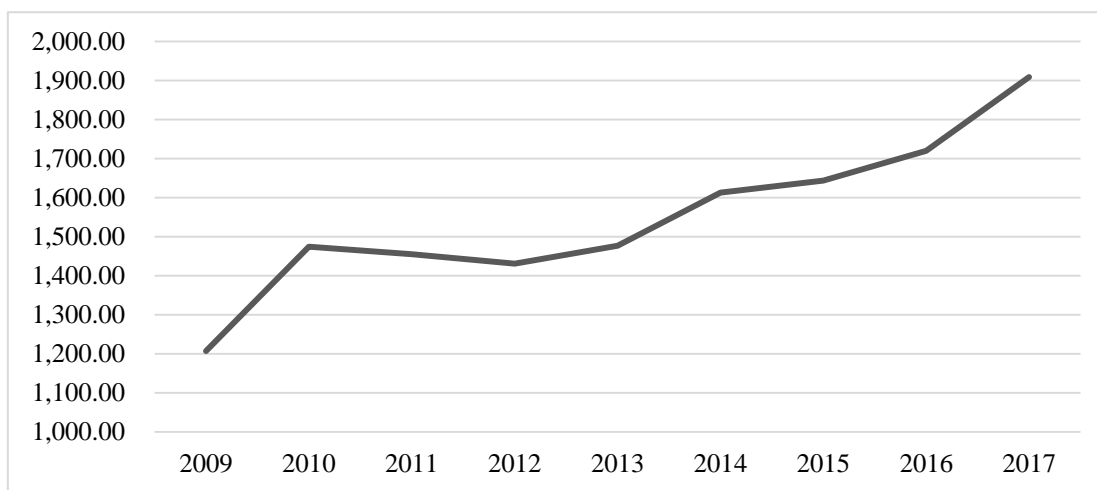


Figure 2. Charter Capital of 76 Securities Companies (US\$ million) 2009 to 2017

Source: Authors (2018)

² In 2015, the Vietnamese Government issued Decree No. 60/2015/ND-CP to guide a number of articles in the Law on Securities, especially foreign participation in the stock market.

³ Mirae Asset Securities, KIS Vietnam Securities Corporation, Shinhan Securities Vietnam, Vietnam KB Securities Company (these four Securities firms are owned by South Korean), and Maybank Kim Eng Securities Joint Stock Company (Malaysian owner)

Table 2. Selected aggregate data about Vietnamese securities industry (million \$) 2009 to 2017

	2009	2010	2011	2012	2013	2014	2015	2016	2017	Change from 2009 to 2017
Total asset	3750	4986	3321	2978	2732	3044	3385	3251	4501	20%
Current assets	3014	4196	2658	2340	2255	2667	3024	3055	4224	40%
Total equity	1549	1695	1501	1520	1594	1790	1847	1951	2452	58%
Net revenue	564	727	584	457	334	474	419	584	848	50%
Operating Profit	258	132	-129	55	94	124	132	149	333	29%
Net income	239	108	-140	63	98	140	122	117	280	17%

Source: 76 Securities firms' annual reports and by authors (2018)

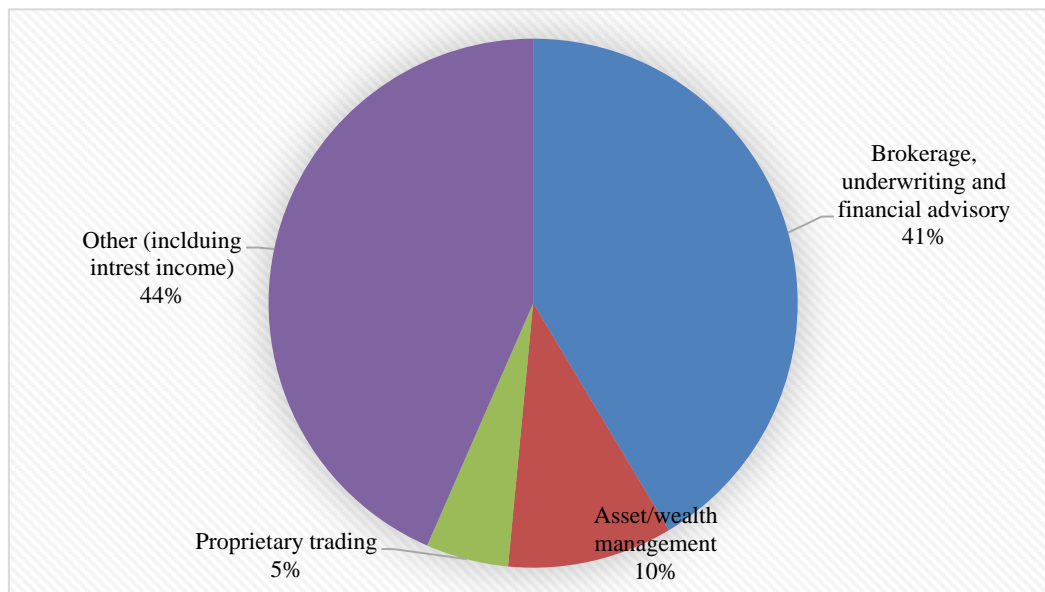


Figure 3. Breakdown of revenue for Vietnamese securities firms, 2017-2017

Source: 76 Securities firms' annual reports and by authors (2018)

After the problems of the later 2000s and the early 2010s the securities firms began to grow (see Figure 2). The growth in the size of the Vietnamese securities industry from 2009 to 2017 can be illustrated by the figures in Table 2. The net revenue of the securities firms increased by 50 per cent over this period (the revenue breakdown is shown in Figure 3). This growth in the operations of the securities firms in Vietnam at the same time that the number of them fell has meant that over time the firms have become larger, more diverse and increasingly involving some form of foreign investment. More intense regulation has also meant that the industry has become a more stable one, with fewer financial collapses of firms occurring. As the number of firms declines over time, it would be expected that the surviving firms operate with greater levels of efficiency than had previously been the case. This would indicate an enhanced performance even if their profitability had been more modest because of the more subdued levels of activity on the Vietnamese securities markets.

3. Area Description: Literature Review and Hypothesis Development

In the past there have been several studies that have been conducted on the securities industry in a variety of countries and have focused on different aspects of the industry. These aspects include such things as corporate governance, ownership, economies of scale and scope, and regulation. In terms of the productivity and efficiency of securities firms, most of studies have focused on the impact of firm size, regulation, and ownership structure on performance of the firms. The countries covered by these studies include the United States, Japan, China, Taiwan, Turkey, and Vietnam. This body of work is by no means comprehensive and there is considerable scope for additional work to be undertaken on this subject. Not only could further work be undertaken on the securities industry in the countries already covered it could be extended to other countries, especially in Europe and Asia. In terms of this study three hypotheses were developed, considering an examination of the past literature. These hypotheses are related to issues concerning: the size of firms, the impact of

regulation and ownership structures, and the relationship of these three with the efficiency performance of the firms.

3.1 Securities Firms' Size

In terms of the results of the past studies on the securities industry there has been a number of studies that have found a positive association between securities firms' efficiency and their size, especially through the creation of economies of scale and the diversification of business. These studies include those by Fukuyama and Weber (1999) on Japanese firms; Johnston and Madura (2000) on firms in the United States; Demirbag *et al.* (2016) who looked at firms in emerging markets; Lee, Kim and Kang (2014); Nguyen, Nguyen, Nguyen and Tran (2017) on Vietnam; Hu and Fang (2010) on Chinese firms; and Liao (2018) who looked at the performance of securities firms in Taiwan. In contrast to these findings, the findings of Goldberg *et al.* (1991) on the securities industry in the United States in the early 1980s found that small sized companies were often quite efficient, and that larger companies often exhibited diseconomies of scale. The findings of Harimaya and Okuyama (2006) on Japanese online securities firms supported the findings of the Goldberg *et al.* (1991) study. They found that small firms had a significant correlation with firms' efficiency. In addition, Yeh, Wang, and Chai (2010) found there is no relationship between large size companies and their efficiency in the Taiwanese securities industry.

It is possible that different markets, with different scales of firms might exhibit different levels of scale economies. In relatively small markets, for instance, with relatively small sized firms it might be possible for many firms to achieve greater economies of scale through growth. In much more substantial markets where there are substantially larger firms (like in the United States) it might be possible that some of these firms have reached a point of diseconomies of scale. Further work on this aspect of the operation of securities firms would go some way to clarifying this point. This study, therefore, is conducted in part to clarify whether there is a relationship between the size of securities firms and their efficiency performance in the case of Vietnam. In doing so it should be recognized that by international standards the Vietnamese firms are relatively small and narrowly focused in their business.

Hypothesis 1: A firm's size has a relationship with a firm's efficiency performance

3.2 Regulation

In addition to the impact of size on efficiency researchers in the past have also studied the efficiency performance of the securities industry in terms of the impact of government regulation of the industry. One common requirement in many countries of government financial market regulators is that financial institutions (including securities firms) maintain minimum levels of equity or capital funds. These required levels of capital vary between different countries, which results in different costs of capital between them, which in turn leads to differences in competitive advantages. In the case of Vietnam, the legal capital for financial advisory services, brokerage, proprietary trading, and underwriting are stipulated by law as being VND 10 billion (USD 0.5 million), VND 25 billion (USD 1.2 million), VND 100 billion (USD 5 million) and VND 165 billion (USD 7.8 million), respectively (State Securities Commission of Vietnam, 2019).

In terms of analysing the impact of these requirements McCauley and Zimmer (1991) studied the relationship between the performance of Japanese and United States securities firms and the cost of capital and found that in the case of the latter the firms had high capital requirement, compared to those in the former country. This led, they argued, to those firms in the United States having a relatively disadvantaged competitive position compared to those in Japan. Along with capital and equity requirements, an additional form of regulation is that placed on industry entry. Chen *et al.* (2005) studied the Chinese securities industry and established that the regulatory control of business entry into the industry improved the performance of securities firms. Regulatory controls on entry and their impact is a field that has been relatively under worked and could use some further study.

As well as equity/capital requirements and entry controls, it is possible to also look at the impact of central bank intervention, credit policy and deregulation of markets and their impact on the performance of firms. In studying the impact of the strong financial expansion in Japan on the efficiency/productivity of Japanese securities firms, Fukuyama and Weber (1999) established that the expansive monetary stance of the central bank of Japan was the cause of the subsequent stagnant economy in that country in the early 1990s. Deregulation of financial markets, they argued, can lead to greater cost efficiencies of firms and larger sized firms can possess a cost efficiency advantage over smaller companies. Harimaya and Okuyama (2006) studied the change in the structure of the securities industry in Japan after financial market deregulation and found that deregulation led to online firms possessing economies of scale. Goldberg *et al.* (1991) carried out an investigation of the United States securities industry and established that if regulatory burdens (Glass-Steagall) were eased then firms might earn greater brokerage industry revenue. The evidence they presented showed that the top ten firms' revenue increased and made up sixty per cent of the industry's overall value in the following decade (O'Brien, 1986). In addition, Steeley (1992) found a positive impact of deregulation (the Big Bang) on information efficiency, created by the reduction in transaction costs and boost to operational efficiency on the gilt-edged market in the United Kingdom Liu (2007), in contrast, found that the stock performance of the capital market

of Japanese securities firms tended to fall with deregulation.

It seems clear that regulation and deregulation can have an impact on the performance of securities firms. What this impact might be is, however, not entirely clear. Considering this past work, therefore, we hypothesize that regulation has a significant impact on the efficiency performance of securities companies.

Hypothesis 2: Regulation has an impact on securities firms' performance.

3.3 Ownership Structure

The third major issue that has been considered by researchers in the past internationally on the securities industry has been the influence of different ownership structures on the efficiency levels of securities firms. Ownership structure can be denoted in a variety of ways including government (state-owned) versus private ownership, domestic (Vietnamese) versus foreign ownership, and ownership by institutional investors versus ownership by individual shareholders.

To begin with, concerning the securities industry there have been conducted a few studies that have looked at the relative impact of state-owned versus private ownership on the efficiency performance of the industry. Chen *et al.* (2005) on China, and Nguyen *et al.* (2017) on Vietnam, for instance, both concluded in their studies that government-ownership had a negative impact on the performance of securities firms. Hu and Leung (2012) also found that government-owned firms in China operated less effectively than privately-owned ones. This negative performance is generally explained by the principle-agency problem, and lack of strong governance arrangements that may exist with government-owned firms. The results were found significantly strong in the studies of developing countries with government-owned firms such as China.

Regarding privately owned firms, it is possible to distinguish them into two different types – domestically and foreign owned ones. Both types of ownership can have an impact on the efficiency/productivity performance of the firms. Past empirical studies have found that this difference in ownership can have an impact on the performance of financial companies, particularly banks (see for instance Sabi, 1996; Akin *et al.* 2003; Choi and Hasan, 2005; Barros, Ferreira, and Williams, 2007; Kasman and Yildirim, 2006; Lensick and Naaborg, 2007; Isik and Hassan, 2002). In the case of securities firms, however, only a few studies have been carried out that have taken up this issue. In doing so Demirbag *et al.* (2016) found that foreign ownership can have a positive impact on the efficiency of securities firms in emerging markets. This finding was backed up by the findings of the studies by Bayyurt and Akin (2014) on the securities firms in Turkey and Nguyen *et al.* (2017) on Vietnamese companies.

In terms of ownership securities firms can also attract investment interest from banks; both domestically and foreign owned (Whalen, 1999). It is possible that banks can have potential advantages and improve the operating efficiency of securities firms. This is so if they can help to reduce operational risks through diversification of activities and by creating bigger companies that create enhanced economies of scale (Demirbag *et al.* 2016). Securities firms might also potentially gain benefits from banks through improved management and governance arrangements and through better access to finance if they are controlled by banks. These assumptions were found to be the case in the work undertaken by Nguyen *et al.* (2017) (Vietnam), Johnston and Madura (2000) the United States), and Demirbag *et al.* (2016) (in emerging markets). It is also possible that local owned firms might have greater local knowledge and flexibility than foreign owned ones. On the other hand, it is possible that foreign owned firms bring bring knowledge, capital and superior technology, that gives them an advantage. This may even be true of firms that are owned by individual shareholders as opposed to those owned by institutional investors.

In this study, Vietnamese securities firms are categorized into being either predominately foreign owned, or predominately owned by domestic, private investors. In terms of domestic private investor ownership, this ownership structure is further divided into three types; (1) those owned by banks, (2) those owned mainly by major domestic institutional investors, and (3) those owned mainly by domestic individual shareholders. In the period examined (2009 to 2017) there were not many securities firms which were owned by the Vietnamese Government. The sample of government owned firms, therefore, for a study of state versus private ownership is not large enough to provide a credible study of this issue give the methodology employed. For this reason, this issue is not taken up, even though internationally it is an important one. Concerning the larger issue of ownership, the hypothesis proposed, therefore, is as follow:

Hypothesis 3: Foreign, bank, domestic institutional and domestic individual shareholder ownership can have an impact on the efficiency performance of securities firms.

Although there is a range of other issues that might impact on the efficiency performance of securities firms in Vietnam these three areas of study have a major impact on the performance of securities firms. In doing so additional information is provided by the study that can be used to guide researchers in their future studies of the industry, both in Vietnam and internationally.

4. Methods

To undertake this study, data of securities firms was collected from the securities market regulator, the State Securities Commission of Vietnam, from the Ho Chi Minh Stock Exchange, and from the annual reports of securities firms. From this collection a data series was created which ranged from 2009 to 2017 and compiled for 53 Vietnamese securities companies (out of 74 in 2017). The study was limited to those firms for which there was readily available data for the whole period studied.

To estimate and analyse the productivity and efficiency levels of the securities companies in Vietnam, a Stochastic Frontier Analysis (Cobb-Douglas production frontier using cross-sectional data) has been estimated. To see how this methodology operates and contrasts with other methods such as Data Envelopment Analysis or Total Factor Productivity Indexes see Coelli, Rao, O'Donnell and Battese (2005).⁴ An advantage to using this approach compared to the alternatives is that it is possible to see from the results how well the firms operate compared to a hypothetical best practice frontier. Compared to the use of Total factor Productivity Indexes it also has the advantage that it is not necessary to have input and output prices to undertake the study.

The Model is defined as follows:

$$\text{Log}(Q_{it}) = \beta_0 + \beta_1 \log(K_{it}) + \beta_2 \log(L_{it}) + (V_i - U_i),$$

Where Q_{it} is the vector representing the produced quantities by the unit of production i in period t ; K_{it} and L_{it} are the vectors of inputs used by the unit of production in period t ; β is the coefficient; V_i and U_i are assumed normal and half-normal distributed, respectively. This study contains 477 observations on the securities firms.

The production approach views firms' outputs of services as having two inputs, which are labour and capital. The total production function (P) for the firms is as follow:

$$P = f(q, k, l)$$

From the function, q is the output. In most studies of the performance of securities firms' revenue is used to indicate the output (including total revenue, brokerage revenue, and commission revenue) (Demirbag et al., 2016; Fukuyama & Weber, 1999 and 2007; Harimaya & Okuyama, 2006; Bayyurt and Akin, 2014; Hu and Fang 2010). In addition, sales (Yeh *et al.*, 2010), market share (Hu & Fang 2010) and the return on assets (Nguyen *et al.*, 2017) have also been used. Given the nature of the operation of the securities firms in Vietnam, this study uses net revenue (RE) as the firms' output. It consists of the total revenue from securities brokerage, securities investment and pooling, securities depository, asset leasing, and other revenue.

Labour (l) and capital (k) are the input variables of the function. In this study, the indicator of labour is given by the cost of labour (LC), which is the total of direct and administrative labour costs (including salary, insurance, pension, and other personal cost) is taken into the test. Besides, other costs (OC) from the operation and administration are also considered into the function. Fixed assets (FA) of the firms are taken as a proxy variable representing the capital input. These inputs have also been used commonly in past studies of the industry. The descriptive statistics of inputs and outputs for the securities firms are presented in Table 3.

Table 3. Descriptive on inputs and outputs (Vnd million)

Year	N	RE mean	FA mean	LC mean	OC mean
2009	53	173,434.88	23,613.29	13,192.76	73,129.06
2010	53	233,094.06	21,928.74	18,857.08	168,781.02
2011	53	169,018.01	17,734.89	17,603.37	191,073.84
2012	53	123,297.72	12,552.14	16,064.17	91,985.84
2013	53	83,999.90	10,314.51	14,399.12	46,345.29
2014	53	115,511.42	13,214.85	17,697.88	56,417.87
2015	53	106,879.62	13,323.29	19,259.47	52,687.37
2016	53	151,833.39	12,589.59	14,275.43	83,594.17
2017	53	209,911.46	14,680.88	18,941.91	93,888.24

Source: Authors (2018)

⁴ In the past Stochastic Frontier Analysis has been used in a range of industry studies, not just of financial institutions but also of electricity utilities, manufacturing entities, airports, universities, healthcare providers, rail companies etc. (see Abbott 2018).

After the efficiency score are determined using the Cobb-Douglas production function approach, then a second stage, Linear regression analysis has been used to analyse the three main hypotheses provided earlier.

To test the first hypothesis, firm size (TS) (the logarithm of total assets) is selected. This is used as an indicator of the size of the firms.

According to the Circular 226 on prudential requirement for securities business organizations in Vietnam, all securities firms must meet the minimum requirement of capital adequacy. Common equity Tier 1 (CET1) capital is considered as one of the most important components of capital made up of common equity and other related items. The CET1 capital ratio must be at least 4.5 per cent at all time. In this study, common equity (ComEq), which consists of charter capital, ordinary shares, and retained earnings, is considered as the contingency factor for testing the second hypothesis.

There are four major types of ownership that most of securities firms in Vietnam are categorized in, which are foreign (FO), bank owned (BO), mainly domestic institutional investor owned (DomIns), and mainly domestic individual shareholder owned (DomInd) ownership. To test for the impact of ownership, the dummy variables for these types of ownership structure are used. Domestic institutional investor ownership is the base dummy.

The regression model incorporating these variables conducted is as follows:

$$\text{Efficiency}_{it} = \beta_0 + \beta_1 \log(\text{TS}_{it}) + \beta_2 \log(\text{ComEq}_{it}) + \beta_3 \text{FO}_{it} + \beta_4 \text{BO}_{it} + \beta_5 \text{DomInd}_{it} + \varepsilon$$

The results of the first stage efficiency analysis are shown in Table 4 and the results of the second stage where the three hypotheses are tested are provided in Table 5.

5. Results and Discussion

In the first stage of the study, Stochastic Frontier Analysis (Cobb-Douglas production frontier using cross-sectional data) is applied for testing the level of productivity efficiency in selected securities firms in Vietnam. According to the results presented in Table 4, the mean efficiency of the firms is 0.76860, which indicates the efficiency performance of securities firms relative to the production frontier.

In the second stage of the study, Linear Regression is used to examine the impact of size, regulation, and ownership structure on the level of efficiency of the firms. Table 5 provides a summary of regression results of the study. The p-values of F-tests of 0.000 indicates that there is strong correlation between the independent and dependent variables.

The p-value of t-test and coefficients of LogTS indicates that there is a significantly positive impact of the size of the total assets on the productive efficiency of the firms. Thus, the null hypothesis 1 is accepted, which means that the larger the size of total assets the more effective the performance of the firms. This would indicate that there are economics of scale in the operation of the Vietnamese securities firms. This is in line with some of the studies previously undertaken on securities firms internationally.

The same result is produced for the correlation between common equity and efficiency. This positive result supports the hypothesis 2. The higher common equity capital results to higher CET1 capital ratio of 4.5 per cent regarding capital requirement of the regulator.

Table 4. Technical efficiency score for observations by applying Cobb-Douglas Model

Firm	Efficiency estimate
1	0.83764
2	0.88743
3	0.79517
.	.
.	.
475	0.79134
476	0.68276
477	0.81348
Mean efficiency = 0.76860	

Table 5. Regression results

Variables	Coefficients	t	Sig.
(Constant)	.425	11.928	.000
LogTS	.037	4.152	.000
ComEq	.027	3.116	.002
FO	-.062	-6.044	.000
BO	.010	.767	.443
DomInd	.022	2.547	.011
R-square = .227			
F = 27.648			
P = .000			
N = 477			
Dependent variable: Efficiency			

Table 6. The change in revenue of 5 wholly foreign ownership firms from 2009 to 2017

	2009	2010	2011	2012	2013	2014	2015	2016	2017	%
MiraeAsset	46154	30057	41239	45954	29396	28899	38195	68771	234490	408.06
KIS	21205	13729	30873	37247	33697	61902	172071	267399	204160	862.79
NASC	1514	495	110	2205	2967	437	306	4871	8803	481.44
MSI	8677	11767	199696	147997	122108	243204	231481	159248	133785	1441.83
MBKE	122482	113258	114048	164229	115825	189003	175901	170656	213106	73.99

Source: Firms' annual reports and by authors (2018)

In terms of foreign ownership, the results show that this ownership structure has a statistically significant impact on the performance of the firms, however, it is a less effective performance compared to ownership by domestic institutional investors according to the negative value of the coefficient. This contrasts with the past studies that found a positive relationship between foreign ownership and efficiency. In 2018, there are only five securities firms which have 100 per cent foreign ownership. The firms which are owned by foreign concerns performs efficiently in the market (as seen in Table 6), however they do have challenges in competing with domestically owned ones. The same finding can be seen for firms owned by domestic individual shareholders as there is a significantly positive relationship between higher levels of efficiency and this type of ownership. In terms of bank ownership, the positive value of the coefficient indicates that bank ownership is more effective than ownership by domestic institutional investors, however, the p-value of t-test of 0.443 is statistically insignificant.

If domestic individual ownership, and domestic ownership in general is more efficient than foreign and institutional ownership then it is probably because of the greater market knowledge and flexibility that these firms can have. Ownership by institutional or foreign investors can contain levels of inflexibility, and therefore lower levels of efficiency.

6. Conclusion

The objectives of this study are to examine the productivity and efficiency of securities firms in Vietnam, by studying the impact of size, regulation, and ownership structure on the performance of 53 firms operating between 2009 and 2017. The major findings can be summarized as follow.

First, by using Stochastic Frontier Analysis (Cobb-Douglas production frontier approach) in the first stage, the mean efficiency of 0.76860 indicates that there is an efficient relationship between output (revenue) and inputs (costs and capital). The productive efficiency of 53 firms is quite close to the production frontier.

Second, there is a significant and positive impact of size of the firms on their performance. The larger the size in terms of total assets, the more productively efficient the firms are. This finding supports other works on the correlation between larger size, lower unit costs and greater economies of scale such as Fukuyama and Weber (1999, 2008), Johnston and Madura (2000), Demirbag *et al.* (2016), Lee, Kim and Kang (2014), Nguyen *et al.* (2017); Hu and Fang (2010), Liao (2018). However, it is against the finding of Goldberg *et al.* (1991) that small companies had economies, while large and diverse companies had diseconomies of scale.

Third, there is significantly positive impact of capital requirements on the productive efficiency of securities firms. The higher amount of common equity, the better the efficiency performance of the firms. This result supports the finding of McCauley and Zimmer (1991) on the investigation of the relationship between the cost of capital and performance of

firms. Regulations, therefore, that encourage higher levels of equity will not impact adversely on the efficiency of the firms.

Fourth, the firms which have foreign ownership have a less efficient performance than domestic institutional shareholder ownership. This finding is contrary to the studies of Demirbag *et al.* (2016), Nguyen *et al.* (2017) and Bayyurt and Akin (2014), however, it supports the findings of Phung and Mishra (2016) in their study on foreign ownership and listed firms' performance in Vietnam. They found that the performance of listed firms decreased when the level of foreign ownership was higher than 43 per cent. There is an insignificant correlation between bank ownership and efficiency. This result is not strong enough to support the findings of Demirbag *et al.* (2016), Johnston and Madura (2000), and Nguyen *et al.* (2017). The findings also show that there is a statistically significant impact of domestic ownership by individual shareholders on the firms' performance.

Although there are some firm results that have been derived from the study it is also true that additional work on the performance of securities firms, both in Vietnam, and internationally will help to provide additional guidance on what makes for an efficient company in this industry. As financial markets develop in Vietnam securities firms will likely grow larger, become more diverse in their operation, and attract more interest from overseas investors. Whether these firms can make a solid contribution to that country's development will depend to a large degree on whether they are able to achieve sustainably high levels of efficiency.

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