ANALYSIS OF POLICY CHANGES IN THE SEAFOOD PROCESSING INDUSTRY IN VIETNAM

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Abstract. This paper examines firms’ competitiveness in the seafood processing industry in Vietnam and policy changes for global integration. We find that trade liberalization is a very important policy change that has generally positive impacts and generates strong reactions in the seafood processing industry. Exchange rate depreciation is also an important factor and receives strong responsiveness as most of firms’ intermediate inputs are tradable and seafood products are also tradable. Increasing electricity charges that reduce profitability also generate strong reactions. Oil and petrol comprise a small portion of intermediate inputs, hence increasing the oil price does not significantly hinder the industry and does not stimulate very strong reactions. The US anti-dumping tariff strongly hurts firms’ profitability, not only seafood exporting firms but also non-exporters.

1. INTRODUCTION

Vietnam currently has a serious policy reform agenda as the country is completing its transition toward a market economy. On the external front, Vietnam has made numerous policy changes to implement a bilateral trade agreement with the USA and a regional trade agreement with ASEAN. Together with accession to the WTO, numerous laws and regulations have been passed. Twenty-seven laws will be implemented including fiscal, tax, monetary and trade laws, as well as other social and economic laws. These policy changes are expected to have a profound impact on the competitiveness of firms.

Improving firm level competitiveness is arguably one of the most important policy concerns in Vietnam after joining the WTO; competitiveness is perceived to be the key factor to maximize benefits and minimize costs associated with this global organization. The seafood processing industry plays an important role in promoting export, and accounted for approximately 10% of the nation’s total export value from 1992–2002 and generated employment at around 10% per year.1 Analysing the impacts of policy changes on firm level competitiveness would allow policy-makers to make informed decisions on the manageable magnitude and pace of the changes. The main objective of this

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1 Calculations from data collected in the Industrial Surveys in 2002, 2003 and 2004 by the General Statistics Office (GSO) of Vietnam. Data from these surveys excluded non-state enterprises having less than 10 employees.

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paper is to apply a supply model to analyse the competitiveness of seafood processing firms in different policy scenarios as envisaged in the current reform agenda. Profitability will be used as an indicator to measure the level of a firm’s competitiveness with the assumption that the higher the profitability, the larger market share and the more competitive the firm becomes. In addition, through the supply function, we measure the level of firms’ reactions in response to these policy changes in order to maximize profitability after experiencing price shocks.

The main research question concerns which policies matter for competitiveness of the seafood processing firms. To this end, we attempt to find the answers to the following sub-questions.

1. What policies are implemented in the recent reform agenda and what are their impacts on the seafood processing industry?
2. How have these policies changed?
3. How to measure changes in seafood processing firms’ profitability that have resulted from price shocks caused by policy changes?
4. What are the impacts of these policy changes on firms’ competitiveness?
5. Are the levels of impact different among different categories of firms?
6. How do firms react to these policy changes?
7. Are the levels of firms’ reactions different among different categories of firms?
8. What policy implications can be drawn from the empirical findings?

A number of qualitative and quantitative methods will be employed to address these questions. An overall picture of various aspects of the seafood processing industry will be narrated qualitatively in addition to a descriptive analysis of firms’ characteristics, cost structure and profitability using survey data of the Industrial Censuses in 2002, 2003 and 2004. Quantitative analysis will be applied using a supply response model, which in turn will empirically analyse the firm level competitiveness.

The paper is organized as follows. Section 1 presents a brief introduction, rationale and methodology. Section 2 presents an overview of the seafood processing industry in Vietnam. Section 3 provides a recent policy reform agenda that could affect the competitiveness of the seafood processing industry. Section 4 provides a quantitative framework of the paper. Empirical analyses of the seafood processing industry are presented in Section 5. Section 6 concludes with recommendations.

2. AN OVERVIEW OF THE SEAFOOD PROCESSING INDUSTRY IN VIETNAM

2.1. The roles of seafood processing industry in economic development

Vietnam’s seafood processing industry started to develop in the 1980s in the context of the rapid advancement of the processing and manufacturing industries after the Doi Moi (renovation) policy. However, this industry did not substantially take off until further trade policy reforms were implemented in 1994. SEAPRODEX was the only state-owned firm allowed to export seafood
products from its establishment in 1978 until the early 1990s. Trade reform policy in 1994 granted permission for direct exporting to other companies, including the private sector, and has stimulated a rapid expansion of seafood export and processing sector in terms of both number and scale. The contribution of this sector to national income, export value and social development is becoming more significant. From 1998 to 2004, the annual growth rate of output in the fishery sector was more than 14% and it contributed about 3.6% of GDP in the period (GSO 2003b, 2004b).

The seafood processing industry has expanded from 164 small and single seafood processing factories in 1998 to 439 processing firms with multiple branches in 2005. Production capacity of the processing sector has increased from 800 tons per day in 1998 to 3250 tons per day in 2005. 171 firms are now qualified to export to the European Union countries, in comparison with only 18 firms in 1999. There have been 300 firms meeting the Hazard Analysis and Critical Control Point System (HACCP) standards to export to the USA and hundreds of firms are allowed to export to other international markets (Anon 2005).

With the labour intensive production feature and simple processing technology, the industry plays an important role in job creation and poverty reduction for people with low skills, particularly for female workers. The annual increase of permanent employment in the processing sector was 1.8% on average in the period 1996–2000, excluding seasonal non-permanent workers (Tran 2004). Data from Industrial Censuses (GSO 2003a, 2004a, 2005a) showed that female employees of the seafood processing industry accounted for around 75% of its total employment. The seafood processing industry is therefore important for women's income generation, itself an important social and gender issue for national development.

2.2. Export performance and structure

Following the rice processing sector, seafood processing is considered the second most important sector with significant contribution to the export value of the whole food processing industry (UNIDO and DSI 1999). From 1992 to 2002 the export value of seafood products accounted for approximately 10% of total export value. Vietnamese seafood products were exported to 107 nations, ranking the country seventh among the top 10 seafood exporters in the world (Anon 2005). Apart from Japan, the traditional market, export of seafood products reached larger international market shares in other countries, including the USA, the EU, China, Korea, Taiwan, Hong Kong, Russia, the Middle East and Africa. The annual export growth rates of the seafood processing industry have averaged more than 18% since 1993.

2 Authors' calculation based on surveyed data. Only firms operating seafood processing as its main activities are calculated. Numbers of observations are 190, 597 and 634 firms in 2002, 2003 and 2004, respectively.

3 Authors' calculation based on Nguyen (2003), Anon (2005) and GSO (2004b, 2005b).
With regard to the export structure of seafood products, shrimp takes the largest proportion, followed by frozen fishes, particularly since the start of export of *tra* and *basa* (or catfish) into the US market following the bilateral trade agreement. Exported shrimps and *tra* and *basa* products are mainly originated from aquaculture. There is still a large proportion of unprocessed seafood products exported as well as sold in the domestic market.

2.3. **Ownership and scale**

With the multisector characteristic of the Vietnamese economy, the seafood processing firms are classified into different types depending on capital ownership. Two major common classifications of domestic firms are state-owned enterprises (SOEs) and non-SOEs (private enterprises). The latest Enterprise Law issued in 2005 (SRV 2005, p. 5) defines state-owned enterprise as ‘an enterprise of which 50% of total capital [is] owned by the state’. Applying this definition in this study, the state-owned sector includes: (i) central and local SOEs; (ii) central and local state-owned limited companies – these four types of firms are assumed to have total capital owned by the state; and (iii) joint stock companies with more than 50% of capital owned by the state. The rest are in the private sector except for those having foreign-owned capital. Foreign sector firms include those with 100% of foreign investment capital and different types of joint venture firms.

There was a significant increase of domestic non-SOEs in the seafood processing industry from nearly 66% to more than 80% between 2002 and 2003, not only in proportion but also in absolute value. In contrast, the state-owned sector declined with the same pace from 28% in 2002 to only around 13% and 9% in 2003 and 2004, respectively. Whereas, the foreign-owned sector still keeps a stable proportion of around 5% to 6%. These figures show a strong development of the private sector in this industry as a result of government policy reforms and recent encouragements to establish small and medium enterprises (SMEs) while priority has not been given to foreign direct investment (FDI) in this industry. State-owned seafood processing firms,

4 Firms of the two latter types are now in the transitional process of transforming their structure. Previously, firms abided by either the Enterprise Law or the Law of State-Owned Enterprises, depending on their capital ownership. Due to overlaps in these two laws, a new Enterprise Law was issued in 2005, incorporating these two laws and covering all types of firms. As a result, central and local state-owned limited companies are requested to restructure, either to become joint stock companies or to be merged with other firms, to be sold off or dissolved, depending on the existing structure, financial status and other internal and external factors.

5 While SOEs account for only a small proportion in terms of number, these firms are large in scale and still provide a large proportion of employment in the seafood processing industry. Despite a sharp reduction throughout the three years of 2002–2004, employment provided by the state-owned sector still accounted for 55, 43% and 33%, respectively, of total employment in the industry.

6 While there is a significant increase in the number of firms from 2002 to 2004, the average numbers for labour, assets and turnover reduced throughout the same period. This indicates the strong development of the SMEs, particularly within the private sector. While SMEs accounted for 57% (or only 115 firms) in 2002, this sector increased rapidly to 78% (or 482 firms) and 80% (510 firms) of the whole industry in 2003 and 2004, respectively.
including joint stock firms with more than 50% capital owned by the state, had around 800 permanent employees on average, compared with the average numbers of 146 and 164 employments in 2003 and 2004, respectively, in the private sector (non-SOEs).

2.4. Regional development

One notable characteristic of the seafood processing industry is the regional inequality of its development. Seafood processing firms are more diversified and much larger in the south (particularly, along the coastal provinces of Nha Trang and Phan Thiet to Ca Mau) than in the north of Vietnam. While in 1998, the number of seafood processing firms in the south accounted for 59% of the total firms in the country, this proportion has increased to 70% in 2003, followed by 24% of firms in the central and the number of northern firms stayed the same at 6% (VASEP 2005a).

There is a higher level of development of southern and central firms in comparison with northern ones not only in terms of production scales but also in terms of turnover and profitability. The average employment of central and southern firms was indicated to be twice as much as those of northern firms and similarly average values of annual turnovers and total assets are much higher. One of the main reasons for the regional inequality is the source of material inputs. The southern stable and favourable climate compared with the northern climate leads to a more developed aquaculture and encourages the establishment of processing firms in the south.7

2.5. Main challenges of the seafood processing industry

In the period 2000–2010, the supply of seafood products from both fishing and aquaculture to the seafood processing industry is expected to increase by 60% (MOFI 2000). In the current situation, many seafood processing firms do not make use of their full processing capacity, particularly in the northern firms. According to Thai T. D. (personal communication, 2006), only about 52% of the processing capacity of the whole industry is in operation annually. Seasonal production and supply also contribute to this limitation of material inputs. This caused a fierce competition among processing firms in purchasing inputs from aquaculture and the fishing sector and pushed the material prices up relatively high (MOFI 2000).

Nguyen and Nguyen (2005) show that service costs including transport, telecommunication, postal and other services are very high; the costs for energy inputs, particularly, are twice as much as their counterparts in the Philippines. As a result, if seafood processing firms do not improve their efficiency in the consumption of these inputs, this could be one of the factors that lowers their cost competitiveness.

7 Fishing production provides about 58% of the total seafood inputs for processing and production, compared with about 40% from aquaculture and the remaining negligible 2% to 3% from imports (Nguyen, personal communication, 2006).
There are some other obstacles to the development and the competitiveness of the industry. The low quality of material inputs and low productivity in fishing and aquaculture resulted from farmers’ lack of skills and advanced technology in fishing and aquaculture. Despite that, the seafood processing technology and procedures are considered rather standardized (Nguyen, personal communication 2006); how to purchase qualified seafood materials for processing is a big challenge for the industry. In addition, most of the seafood processing firms are considered SMEs. They have difficulties getting access to government credit and, despite different funds established to support SME development, accessibility to these funds is hardly possible and takes time.

3. RECENT POLICY REFORM AGENDA RELATED TO THE SEAFOOD PROCESSING INDUSTRY

3.1. Trade policy

Following the promulgation of the Law on Import & Export Duties in 1987, the tariff system on trade was put into effect in the early 1990s. The tariff system has been considered to be very changeable, complex and quite protective against foreign penetration with maximum tariff rates up to 150% in 1993 and 200% in 1994 (IE 2001). With the government’s commitment to the implementation of the Common Effective Preferential Tariff (CEPT) following its ASEAN membership in 1995 and WTO accession in 2007, the tariff system has been put into a process of adaptation with the new standards. Under the CEPT package set for Vietnam in 2004, the tariff system will be changed with the application of the tax rates from 0% to 5% by 2006. According to this package, all seafood products belong to the Inclusive List (IL) and the unweighted average tax rate of seafood products will be reduced to 4.82% by 2006 while their unweighted average most favoured nation (MFN) rate is now 32.42%. It is expected that tariff rates applicable to imports from countries with MFN status with Vietnam will also be reduced to 0–5% after joining

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8 Recent debates with importing countries (Canada, the USA and the EU, etc.) around the chemical residues found in the exported seafood products from Vietnam is evidence of farmers’ lack of awareness of food hygiene and safety as well as insufficient management and supervision on this issue.

9 Besides those from subsidies and non-tariff barriers, surcharges are another type of tariff that the government uses to promote its import substituting strategy.

10 According to the CEPT mechanism, ASEAN members can have the option of excluding products from CEPT in three cases: (i) temporary exclusions; (ii) sensitive agricultural products; and (iii) general exceptions. Based on this, members can extend the deadline of their tariff reduction/integration into the CEPT scheme. The Inclusion List (IL) includes most goods and products (81% for Vietnam IL) and requires the ‘fast’ or ‘normal’ track, that is, a reduction in the tax rate to 0% to 5% by 2000 (fast) and 2002–2003 (normal).

11 MFN tariff rates are applicable for imports from countries with which Vietnam enjoys MFN status. Imports from these countries accounted for about 75% of total imports in 2000. Another tariff rate is the general rate, applicable to imports from countries that do not have MFN or CEPT trade relations with Vietnam. However, imports from these countries are negligible (Auffret 2003).

12 Authors’ calculation based on the CEPT scheme for Vietnam.
the WTO. As a result, in the scenario of the tariff reduction policy, a set of two tariff reduction rates of 5% and 0% (tariff elimination) are suggested for the policy simulations in Section 5.

3.2. Foreign exchange policy

Vietnam started its unification of the exchange rate in 1989. However, the government still kept tight control on the foreign exchange market and official exchange rates. According to Decision no. 267/1998/QD-NHNN issued in 1998 by the State Bank of Vietnam (SBV), banking and financial institutions are allowed to set their foreign exchange rates based on a daily rate regulated by the SBV. According to this new mechanism, a daily rate is issued by the SBV based on the average rate of foreign exchange rates transacted in the last session of the previous day in the inter-bank markets. With this slightly higher flexibility, the Vietnamese Dong (VND) is considered to be under a managed floating exchange rate regime, with a close peg to the US dollar.\(^{13}\)

The VND has been considered to be overvalued and the official exchange rates are normally adjusted with time lag by the government (IMF 2003). There used to be a large discrepancy between the official exchange rates issued by the SBV and the exchange rates transacted in the black markets until recent years. A simplified calculation using purchasing power parity (PPP) method indicates that the consumer price index (CPI) indices of the USA and domestic CPI indices since 1989 reveals that the VND has been overvalued by 13.2%, 5.24% and 1.62%, respectively, depending on the base year (1989, 1990 or 1991).\(^{14}\) An overvalued exchange rate has substantial impacts on a firm’s revenue depending on its market orientation. It also redistributes resources from export oriented industry to import substituting industry. All outputs and most inputs of the seafood processing firms are tradable. A positive net effect on profits is expected following a depreciation of the exchange rate if the ratio of a firm’s tradable inputs over its revenue is less than unity. On the output side, the depreciation raises the value of output and therefore increases firms’ profitability. Meanwhile, on the input side, it raises the costs for tradable inputs such as oil and energy and machinery used for seafood processing. Two scenarios of 5.24% and 1.62% depreciation will be simulated in Section 5 to analyse the impact of exchange rate policy on seafood processing firms’ profitability.

3.3. Pricing policy

Despite the abolishment of the dual price system in 1989, the prices of a number of commodities, which are considered to be ‘key’ or ‘strategic’ ones such as rice, petroleum, electricity, cement, telecommunication and postal services, are still under the control of the government. A state agency called the State

\(^{13}\) The current exchange rate (Jun 2007) is $US1 = VND 16,000.

\(^{14}\) See the US Office of Budgets and Institutional Analysis (2005) for more methodology details. Calculations are available upon request from the authors.
Pricing Committee\footnote{Recently this agency has been renamed the Institute for Market and Price Research.} issues price policies on these commodities with the aim either to protect certain sectors from open competitiveness against rivals, to support prices of input materials for other sectors, or to control the supply channels. With a commitment of global integration, these interventions will be gradually eliminated. The pricing policies of these sectors therefore began to be adjusted since the early 2000s to adapt to regional prices and to meet with market demand. The price shocks of electricity, oil and gas will be discussed in the following subsections.

3.3.1. \textit{Electricity charge}

The electricity sector of Vietnam is facing many difficulties including its lack of production capacity and the growing demand. According to the Electricity Corporation of Vietnam (EVN), generation capacity in 2005 only met 42\% of the national demand. In order to meet national economic development as well as its development plan for the rural areas,\footnote{Currently, only 83.3\% of rural households were covered by the national electricity network (Vietnam News 2005) and the electricity energy for production and consumption in rural areas is still very low.} the government has decided that electricity output is expected to rise by 170\% by the year 2010 and increase four-fold by the year 2020 according to Decision no. 176/2004/QD-TTg of the prime minister. To meet this urgent demand, electricity is imported from neighbouring countries – Laos, Cambodia or China (SRV 2004a). In this scenario, the import price is expected to be VND 1002 (US 6.3 cents) per kilowatt hour (kWh), 37\% higher than the current cost of US 4.6 cents of power production (Vietnam News 2005).

According to Decision no. 215/2004/QD-TTg of the prime minister promulgating electricity selling prices, the retailed price of electricity sold to normal production sectors is set at VND 785 (US 4.9 cents) per kWh (SRV 2004b). While the latest Electricity Pricing Plan issued by EVN proposed an increase in the average retailed price to at least VND 898 (US 5.6 cents) per kWh, excluding VAT – 14.3\% higher (Vietnam News 2005). A number of studies also argued for the price of US 7 cents/kWh for the years 2005–2006\footnote{See Nguyen and Tran (2004) and Nguyen and Nguyen (2001) for further details.} – i.e. an increase of 42.8\% compared with the current set price of VND 785 (US 4.9 cents) to reach market equilibrium. This is also considered one of the short-term necessary measures to attract various financial resources into a more fairly competitive market (ASEAN, Energy News Service 2005). Based on the current trends, two scenarios will be analysed in Section 5 with a rise of either 14.3\% or 42.8\% in the electricity pricing to evaluate firms’ profitability.

3.3.2. \textit{Oil and petrol prices}

The domestic energy and fuel market in Vietnam is tightly controlled by the government. The Ministry of Finance (MOF) and the Ministry of Trade (MOT) are responsible for issuing decisions on domestic oil prices and import
tax rates according to world oil price fluctuations. However, the domestic oil price adjustments are normally lagged and less in absolute values. While the world crude oil prices changed approximately 16%, 31% and 44%, respectively, in three years between 2003 and 2005, the domestic oil prices were adjusted by only about 6%, 12% and 33%, respectively (Lee 2005).

A comparison of the domestic petrol and oil market with those of neighbouring countries shows that the domestic retailed oil price is set below the average price in neighbouring markets resulting in the trafficking of millions of litres across Vietnamese borders into Laos, Cambodia and China. According to MOF (2005), A92 petrol in Vietnam was priced at VND 8000 per litre in May 2005 while it was sold for VND 10,300 per little in Cambodia, VND 13,787 in Singapore and VND 13,634 in India. The price fluctuations, particularly with the forecast of rising world demand for oil and petrol products, will significantly affect the cost competitiveness of industries and businesses. There have been different estimates for world oil prices for 2006 and 2007. Lee (2005) gave two scenarios of increases in world oil prices to either $US61.75 or $US71.75 a barrel – a 13.9% and 32.3% compared with the prices in 2005. These increases are expected to push up the domestic oil prices by 15.5% or 36.8%, respectively. These two scenarios will be utilized to analyse the impact of energy and fuel pricing policy in Section 5.

3.4. US anti-dumping policy

The US anti-dumping policy against seafood exports from Vietnam, which has been the main controversial topic in many trade talks since the early 2000s, is important for the livelihood of people in rural areas and for a nascent and strategic seafood processing industry. The catfish dispute started in June 2002 and lasted until July 2003 is an example of a trade dispute between Vietnam and the USA. A shrimp dispute with the USA in 2004 was also considered to have strong negative impacts on the seafood processing industry as a whole since shrimp exports account for around 48–50% of total export value of the industry. Export shares to the US market are significant, accounting for 21.3% of the total shrimp export.18

We combine both tariffs imposed on shrimp and catfish to measure the impact of the recent US anti-dumping policies on the profitability of seafood processing firms. Frozen catfish on average accounts for around 90% of total frozen fillets export every year (FISTENET 2006). For simplicity and due to the lack of data, it is assumed that frozen fish fillets exported to the USA were all catfish and valued at $US56.5m, accounting for 2.57% of total export value in 2002. The weighted average anti-dumping tariff to be used for the simulation is 36.76%.19 The value of shrimp exports to the USA in 2003 was $US469m (FISTENET 2006), accounting for 21.3% of total export value in that year; the average anti-dumping tariff to be used for the simulation is 4.57%.20

18 Authors’ calculation based on figures provided in FISTENET (2006).
19 See Nguyen X. T. (unpublished presentation, 2003) for this estimated tariff rate.
20 See VASEP (2005b) for this estimated tariff rate.
4. ANALYTICAL FRAMEWORK

4.1. Empirical studies of sectoral and firm level competitiveness

A study by the United Nations presents an overall review of different methodologies and indicators for competitiveness analysis (United Nations 2001). It provides a detailed narrative of two levels of indicators, one for industry performance and the other for socioeconomic environment including relative prices, unit labour costs, capital costs, rate of investment, FDI and employment. These indicators are merely to measure industrial competitiveness with a perspective that competitiveness is related to production and the international competition ability of firms. Vo (2001) and Le (2004) also provide an overview of numerous studies on competitiveness at both theoretical and practical levels. Profitability has been used as an indicator for measuring competitiveness in Thorne (2004) Thorne (2005a) and in Heinrich and Hinrichs (1998). These studies have made a significant contribution in proving the robust linkage between a firm's profitability and its competitiveness; however, only a partial impact of price shocks is examined in these studies.

Competitiveness can be considered at provincial, regional and national levels, and also at individual and industrial levels. It can also be measured at three different competitive levels: (i) competitive performance, applied for specific firms, industries or countries with the application of profitability as an evaluation indicator; (ii) competitive potential, focusing on the importance of costs of production using partial productivity as indicators; and (iii) competitive process (Buckley et al. 1988; Boyle 2002). Thorne (2005b) argues that profitability is a proxy for competitiveness that highlighted the importance of both costs and returns. We utilize this definition to analyse the competitiveness of the seafood processing industry under the impacts of policy reforms.

Profitability is one of the most important criteria to evaluate firms' efficiency. To measure firms' profitability, it is common to measure how efficiently the firm uses its assets via the ratios of returns on capital, equity and assets, and how efficiently the firm manages its operations via the profit margin (Ross et al. 2000). There is a clear linkage between firms' responsiveness and its competitiveness and profitability. Shaffer (1995) indicates that as a result of the government's regulations, firms with superior capabilities for adapting to these policies may attain a position of competitive advantage over their rivals. Firms that are able to adjust their production and inputs to sustain the maximized profits against the policy changes are more competitive than other firms that cannot adjust accordingly. Key et al. (2000) define the term responsiveness

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21 At the firm level, apart from effective rate of protection (ERP) and the domestic resource cost ratio (DRCR), some other indicators such as an indicator of cost advantage (ICA) or indicator of price distortions (IPD) have also been used. Although these indicators are quite popular in competitiveness analysis, some of these indicators (ERP and DRCR) are more suitable for industrial level analysis and they only reflect certain aspects of the production activity, that is, they neither comprehensively represent firm's competitiveness nor can they be used to measure the overall impacts of price shocks.
as a way that the firm responds to changes in production, factor prices and technology. Firm level responsiveness refers to the adaptation in a firm's production behaviour to maximize its profitability including the substitution of factor inputs, adjustment of market orientations or improvement of technology.

In our study, firms' competitiveness is measured through profitability and responsiveness toward changes in the business environment. Under the above conceptual framework of profitability, it is shown that a firm's profitability is influenced by a number of factors, both internally and externally. Firms' characteristics, including firm size, location, ownership and market orientation, etc. are the direct and internal factors that form the production capacity, cost structure and profits. These factors either moderate or intensify the impacts of the external factors on firms' profitability. There are three main external forces that influence firms' profitability: (i) the markets, as the invisible hands, are important factors influencing firms' production decisions, hence profitability and responsiveness; (ii) the government, with its visible hand, issues policies to adjust the market movements towards governmental long-term development strategies; and (iii) other factors including the stability of the political and social environment as well as international economic factors that will also impact on firms' profitability.

In this study, we focus on the visible hand – government policy – with the aim of measuring the impacts of policy changes on firms' profitability and how firms react to these changes. Moreover, the model applied in this study does not allow for defining these impacts in the linkages with other factors and market reactions. It is therefore assumed that these impacts are independently made on firms' profits and all other external factors are also assumed to be stable in the short run.

There are two profitability indicators employed in this study – return on capital and return on assets. These indicators are used for analysis in stock markets to evaluate firms' profitability. Simulations of input and output prices due to policy changes will result in changes in revenue and costs. The reaction of firms to these changes in correspondence with profit maximizing behaviour of firms in the short run is interpreted as firms' responsiveness. The following subsections present the methodology for profitability analysis.

4.2. Methodology

4.2.1. Firm's profitability

Return on assets and return on capital are among the basic profitability ratios to evaluate the financial performance of a firm. Return on assets is a measure of profit per unit currency of assets and defined by the most common way as net income (or profit) divided by total assets (Ross et al. 2000). Return on capital is measured by profit divided by total fixed investment capital of firms. Return on capital and return on assets are calculated as follows,

22 The return on equity is not used in this analysis because of different types of firm ownership. Different firms have different approaches to its equity; for example, state-owned firms have more advantages in obtaining and possessing their own capital than non-SOEs. It is therefore not precise to use return on equity to evaluate the capability/efficiency of the firms in this analysis.
and

\[ RA = \frac{\pi}{Asset}, \] 

where \( RC \) and \( RA \) are returns on capital and returns on assets, respectively. Assets are calculated by the value of firms’ total assets while capital is calculated from the value of fixed assets. Both are valued in millions of VND.

Firms’ profit \( \pi \) is calculated in a standard accounting way,

\[ \pi = TR - TC, \] 

where \( TR \) measures total revenue of firms and \( TC \) measures total cost of firms. Expected effects of the policy changes on prices of certain inputs and outputs will lead to the change of revenue and total costs of seafood processing firms.

Total revenue of firms is the sum of the turnover from all activities of firms in the surveyed data. The total cost of firms is calculated as costs incurred during a firm’s processing or production line. Total cost includes costs for materials, energy, equipment facilities, human resources, purchased services, financial costs and other costs. Firms’ profit is equal to total revenue subtracted by total cost. Corporate income tax is not deducted from firms’ profit as profit after tax will not reflect the full production capacity of firms. Assets are firms’ total assets, including both current and fixed assets, both short-term and long-term investment while capital includes only fixed assets. The original value of fixed assets will be used for measurement due to the inconsistency of firms’ applicable depreciation rates.

Firms’ original return on capital and assets will be calculated then plugged into different policy change scenarios. The changes of firms’ return on capital and assets after price shocks helps to quantify how policy changes directly influence firms’ profitability. These scenarios are again plugged into the supply function, which is presented in the following subsection, with new input and output prices to measure firms’ capability to react to these changes based on firms’ profit maximizing behaviour.

4.2.2. **Firm’s responsiveness to policy changes**

A combination of Leontief technology and Cobb-Douglas production function is used in the model specification to derive the supply function. It is assumed that labour and capital cannot substitute for intermediate inputs. Production factors are combined at two levels to produce output. At the bottom level, intermediate inputs are combined by Leontief technology to give the composite intermediate input measured by the aggregate cost of intermediate inputs denoted as \( INTER \); and labour and capital are combined to give the composite factor input measured by value-added is denoted as \( VA \) by a Cobb-Douglas production function. At the upper level, the firm output is measured by its value and it is produced by combining these two composite inputs through Leontief technology.
At the upper level
\[ Q = \min(\theta_{VA} * VA, \theta_{INTER} * INTER). \] (4)

At the bottom level
\[ VA = AK^\alpha L^\beta. \] (5)

We can estimate \( A, \alpha, \beta \) from the Cobb-Douglas production function at the bottom level by transforming it into the logarithm form with assumption that \( \ln \) obeys Gauss-Markov conditions,\(^{23}\)
\[ \ln VA = \ln A + \alpha \ln K + \beta \ln L + \mu, \] (6)
where \( \mu_i = \ln \mu_i \) is a technical disturbance term affecting the efficiency of the production process.

Production function in the short to medium term has the following form with capital being fixed,
\[ Q = \theta_{VA} * A * K^\alpha * L^\beta. \] (7)

Optimal values of \( Q, L, \) and \( INTER \) are obtained from the following supply and factor demand functions derived from the Cobb-Douglas production function,
\[ L^{optimal} = [\beta * (P - w_3/\theta_{INTER}) * \theta_{VA} * A * K^\alpha/w_2]^{1/\beta}, \] (8)
\[ Q^{optimal} = \theta_{VA}^{1/\beta} * A^{1-\beta} * K^{\alpha/\beta} * [\beta * (P - w_3/\theta_{INTER})/w_2]^{\beta}. \] (9)

\[ INTER^{optimal} = \left( \frac{1}{\theta_{VA}^{1/\beta}/\theta_{INTER}} \right) * A^{1-\beta} * K^{\alpha/\beta} * [\beta * (P - w_3/\theta_{INTER})/w_2]^{\beta}. \] (10)

It is assumed that all firms are price takers in order to build up a supply function for a profit maximizing, price taking firm through its production function. The optimal output and inputs levels could be estimated accordingly with the exogenous output and input prices.

Measuring firm’s profit with price shocks is considered in two cases: (i) firms are passive and do not respond to a price shock; and (ii) firms actively respond to a price shock by changing input/output to maximize profit.

The actual profit, which is calculated in a standard accounting way, normally differs from profit that is inferred from assumed profit maximizing behaviour of the firm. There may be a number of reasons that could explain this discrepancy. First, the production function is in fact an average estimate of firm specific production functions. Second, as survey data provide a snapshot of the current status of firm profit, there might well be the case where some firms

\(^{23}\) Gauss-Markov conditions include a zero mean value of disturbance, homoscedasticity, no autocorrelation between disturbances and \( X \)'s that are non-stochastic or predetermined.
are still in transition toward a new equilibrium after a shock, which is unobserv-erable from survey data. Third, some firms face constraints, which are unobserv-able from survey data, making firm’s observed behaviour look like non-profit maximizing. Therefore, it is useful to break down profit into two parts in which the first part is derived from the set of output and inputs that correspond to the profit maximizing behaviour of firms and the second part is the residual.

Decomposition of the profit in the base year into profit maximizing part (the last line of equation 11) and the residual (the first two lines of equation 11) yields the following equation,

\[
\pi_{\text{actual}}^{\text{base}} = P_{\text{base}} \times (Q_{\text{actual}}^{\text{base}} - Q_{\text{optimal}}^{\text{base}}) - W_{1,\text{base}} \times (K_{\text{actual}}^{\text{base}} - K_{\text{optimal}}^{\text{base}}) \\
- W_{2,\text{base}} \times (L_{\text{actual}}^{\text{base}} - L_{\text{optimal}}^{\text{base}}) - W_{3,\text{base}} \times (\text{INTER}_{\text{actual}}^{\text{base}} - \text{INTER}_{\text{optimal}}^{\text{base}}) \\
- \text{OTHERCOSTS} + P_{\text{base}} \times Q_{\text{optimal}}^{\text{base}} \\
- W_{1,\text{base}} \times K_{\text{optimal}}^{\text{base}} - W_{2,\text{base}} \times L_{\text{optimal}}^{\text{base}} - W_{3,\text{base}} \times \text{INTER}_{\text{optimal}}^{\text{base}}
\]

(11)

where \( \pi \) (actual and base) denotes a firm’s profit without responsiveness; \( Q \) is a firm’s revenue (actual and optimal); \( K \) is a firm’s capital (i.e. representing fixed assets including long-term investment); \( L \) is a firm’s labour cost; \( \text{INTER} \) denotes intermediate costs; and \( \text{OTHERCOSTS} \) representing the aggregate component of costs that is not affected by a price shock (i.e. insurance payment, financial cost, etc.) is obtained from the data set. Actual values of \( Q, K, L \) and \( \text{INTER} \) are obtained from the data set with actual values in 2003. Optimal values of \( Q, K, L \) and \( \text{INTER} \) are estimated with profit maximization assumption based on the actual values from the data set with normalized input and output prices.

With responsiveness, the change in the residual (non-profit optimizing part) is caused by price change only, while the change in the profit maximizing part is induced by both price and quantity changes.

New profit without firm’s response to a price shock can be calculated by plugging new price indices (all prices of output, capital and labour are normalised to 1 in the base year) in the formula for profit, with output and various inputs being unchanged.

New profit with a firm’s response to a price shock can be calculated as follows,

\[
\pi_{\text{new}}^{\text{max}} = P_{\text{new}} \times (Q_{\text{actual}}^{\text{new}} - Q_{\text{optimal}}^{\text{new}}) - W_{1,\text{new}} \times (K_{\text{actual}}^{\text{new}} - K_{\text{optimal}}^{\text{new}}) \\
- W_{2,\text{new}} \times (L_{\text{actual}}^{\text{new}} - L_{\text{optimal}}^{\text{new}}) - W_{3,\text{new}} \times (\text{INTER}_{\text{actual}}^{\text{new}} - \text{INTER}_{\text{optimal}}^{\text{new}}) \\
- \text{OTHERCOSTS} + P_{\text{new}} \times Q_{\text{optimal}}^{\text{new}} - W_{1,\text{new}} \times K_{\text{optimal}}^{\text{new}} \\
- W_{2,\text{new}} \times L_{\text{optimal}}^{\text{new}} - W_{3,\text{new}} \times \text{INTER}_{\text{optimal}}^{\text{new}}
\]

(12)

where the denotations of each variable are the same as in equation (11) except for \( \pi \), representing firm’s profit with responsiveness. Actual base and optimal base values are calculated in the same way as equation (10). Optimal new values
of $Q$, $K$, $L$ and $INTER$ are also estimated from derived optimal equations, but with new values of $P$, $w_2$ and $w_3$ resulted from price shocks. Input and output prices including $P$, $w_2$ and $w_3$ are calculated according to the expected price effects in each simulation of policy changes.

The firm's responsiveness to a price shock is represented in the subtraction equation $\pi_{new}^{\text{max}} - \pi_{base}^{\text{max}}$. In this paper, this is analysed through the difference of return on capital with and without reaction as the profitability indicator.

## 5. Empirical Analysis

### 5.1. Characteristics of the surveyed data

In the 2003 survey of the seafood processing industry conducted by the Industrial Census, a sample of 618 firms having full or partial seafood processing operation was taken. Production costs of a randomly selected 175 firms were collected, accounting for 28.8% of total surveyed seafood processing firms. In this survey, firms with fewer than 10 employees were not taken into account. In a sample of 175 seafood processing firms, 101 firms are SMEs, that is, having fewer than 300 workers, accounting for 57.7% of the total sample. There are 36 SOEs, accounting for 21% of the total sample, compared with 126 (72%) and 13 (7%) of domestic non-SOEs and foreign-invested enterprises (FIEs), respectively. The overweighted numbers of SMEs and domestic non-SOEs in the sampled seafood processing firms reflect the salient feature of this industry. Most SOEs (30 out of 36 firms or 83%) are large size, compared with only 30% (or 38 large firms) among domestic non-SOEs firms. In the FDI sector, half of the FIEs are SMEs and half are large firms.

The survey also revealed that 87.43% (or 153 firms) possess fixed assets of less than VND 50bn, out of which, 60% (or 105 firms) have fixed assets valued at less than VND 10bn. Similarly, with regard to the value-added, more than 65% (or 114 firms) have added less than VND 10bn to their products after processing, out of which 89 firms (or 78%) are small size (i.e., having fixed assets of less than VND 10bn). While the fact that most seafood processing firms are small and medium size is strengthened by these findings, it also implies that there is a lack of capital invested in processing technology in this industry. This analysis also illustrates the fact that processing is mainly done by workers at relatively low pay (or low value-added) and the application of higher technology or packaging techniques is still limited.

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24 There are 597 firms that have seafood processing as their main business and only 21 firms operating seafood processing as one of their complementary activities. However, these 21 firms are not included in the sample of 178 seafood processing firms with surveyed production cost information. Of these 178 observations, three observations were dropped due to the missing information on fixed capital, reducing the sample to only 175 firms.

25 According to the government’s definition, SMEs are those firms with fewer than 300 workers or fixed assets valued of less than VND 10 billion. In this paper, the former criterion is taken into account in classifying the size of enterprises.
5.2. Cost structure

Material inputs account for about 76% of the total cost for inputs in the seafood processing firms while it accounts for nearly 86% of their total intermediate costs. As material inputs are tradable, this leads particularly to the larger proportion of tradable inputs (87.6%), including fuel and energy, over non-tradable costs, accounting for only 6.8% (excluding labour cost) of total intermediate costs. The dominant tradable material inputs imply a strong reaction of firms toward trade liberalization policy.

Electricity is an important non-tradable input, accounting for approximately 2% to more than 5% depending on categories of firms. Firms in the central region spend the most money on electricity with 5.6% of total intermediate inputs.26 While large firms consume more material inputs (nearly 90% of total intermediate costs) and less electricity and fuel (1.7% and 0.9%, respectively), SMEs consume less material inputs (82.4%) and twice the electricity and fuel inputs (3.4% and 2.9%, respectively).27 There is a notable gap in the costs of electricity and oil and petrol between outward- and inward-oriented firms with only 2% and 1.1%, respectively, of the former compared with 3.2% and 2.8% of the latter. It could also be noted that large firms and FIEs are most cost-effective in terms of energy and oil consumption (0.9% and 0.7%, respectively), followed by outward-oriented firms (1.1%).

These facts could be justified by better processing technology in large firms, outward-oriented and FIEs over the others. The discrepancy of electricity, oil and petrol consumptions and the different cost structures among different firms imply different impacts on profitability and different reactions of these firms toward price shocks.

5.3. Profitability

Table 1 presents the profitability structure categorized by types of firms. In terms of profitability, the leading firms belong to the large-scale category with an outstanding profit of VND 11bn on average in 2003 and the rate of 70% return on capital. Despite the second ranking position with an average profit of VND 6.7bn of the SOEs, the rate of return on capital in this sector is only 32%, much lower than that of the non-state sector with a return rate on capital of 55%. A regional comparison shows that southern firms are also much more profitable than their counterparts in the north and central regions with the rate of a 56% return rate on capital compared with, respectively, 5% and 20% of firms in the other two regions.

About 29.7% of the sample of seafood processing firms is operating at a loss (52 of 175 firms had negative profitability). Among those unprofitable

26 This could result from the geographic conditions that electricity supply is more difficult and more expensive in the central region.

27 The differences of material and electricity inputs between large and small firms are significant at the 5% level while the difference in energy consumption between these two types of firms is significant at the 10% level.
<table>
<thead>
<tr>
<th>Sector</th>
<th>SOEs</th>
<th>Non-SOEs</th>
<th>FIEs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central SOEs</td>
<td>Local SOEs</td>
<td>Joint stock company with &gt; 50% of fixed assets owned by state</td>
</tr>
<tr>
<td>Obs.</td>
<td>4</td>
<td>26</td>
<td>6</td>
</tr>
<tr>
<td>RC</td>
<td>0.54</td>
<td>0.33</td>
<td>0.12</td>
</tr>
<tr>
<td>RA</td>
<td>0.28</td>
<td>0.14</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table 1. Profitability structure by types of firms
firms, two-thirds are small and private. The unprofitable SOEs take the highest proportion, accounting for 41.7% of the total firms in this category (15 among 36 firms) compared with 27% and 23% of domestic non-SOEs and FIEs, respectively. Additionally, of 19 unprofitable large firms, 12 are state-owned. This finding proves the fact that while many SOEs are large size, receive more support from the government and have existed under more favourable policies, the majority are operating less efficiently than private and foreign firms. Although there are only three unprofitable FIEs, their losses are great. This could be explained by the fact that these FIEs are newly established and still at the beginning stage of operation. However, some other studies have also observed that FIEs often inflated their production costs, which may lead to higher costs and lower return on capital (IE 2001).

5.4. Simulation scenarios

The primary objective of the simulations is to quantify the impact of the government’s policy changes on profitability at the firm level. Further, based on this analysis, the level of market price distortions due to these policy changes and how they affect firms’ competitiveness will be evaluated. The expected effects of the policy changes on the prices of certain inputs and outputs will lead to a change in revenue and the total costs of seafood processing firms. Revenue and the total cost of firms will then be recalculated and plugged back into the profitability indicators. Groundwork for constructing price changes in the simulation exercise has been discussed in Section 3. Based on such discussions, the following six sets of one or two scenarios will be analysed as follows.

As analysed in Section 4, the two indicators, rate of return on capital (\(RC\)) and rate of return on assets (\(RA\)), are chosen to measure firms’ profitability and the level of a firms’ reaction to price shocks. In the first step, the impact of price shocks on firms’ profitability without reaction will be measured by straightforward recalculations of firms’ profitability through the change of return on capital and the return on assets. These are assumed to be short-term changes corresponding with firms’ behaviour in the presence of market imperfections that prevent firms from adjusting their production behaviour for profit maximization. In the following step, firms’ responsiveness to these price shocks will be taken into account by applying profit equations (10) and (11) based on a derivative supply function and factor demand functions.

A Cobb-Douglas production function has been chosen for this study for simplicity without loss of generality. First, the estimated coefficients of firms’ labour and capital are tested through the Cobb-Douglas production functions at both production levels – value-added and output – aiming to test the reliability of the selected specification.

28 The difference in profit between small and large firms is statistically significant at the 5% level.

29 The mode specifications are: OLS estimations by a combination with Leontief technology or only by the Cobb-Douglas technology.
Below are the two estimated Cobb-Douglas production functions, first at value-added level and second at the output level,

\[ \log VA = 0.634 + 0.203 * \log K + 0.760 * \log L \]  \hspace{1cm} (13)

\[ \text{t-stat: (2.00) (2.91) (12.17)} \]

\[ \text{Adjusted-} R^2 = 0.84; \text{ Number of observations = 156} \]

and

\[ \log Q = 0.688 + 0.05 * \log K + 0.216 * \log L + 0.748 * \log INTER \]  \hspace{1cm} (14)

\[ \text{t-stat: (4.85) (1.64) (5.62) (25.76)} \]

\[ \text{Adjusted-} R^2 = 0.98; \text{ Number of observations = 174} \]

where \( VA \) denotes value-added, \( Q \) denotes total revenue, \( L \) denotes labour and \( K \) denotes capital.

Diagnostic tests for heteroscedasticity and multicollinearity give acceptable results for both production functions. However, the null hypothesis of no omitted variables is rejected for equation (14).\(^{30}\) The result of this diagnostic

\(^{30}\) A possible justification for this inappropriateness is that Cobb-Douglas technology is often better applied with physical values rather than monetary values. While the use of the latter values often causes multicollinearity, the use of the former is impossible in cost calculations (i.e. one cannot add different components with different types of physical units).
test confirms the assumption that production factors are better combined at two levels with two composite inputs (one is composite intermediate input and the other is composite labour and capital input) to make outputs through Leontief technology in this model. As a result, the value-added production function has been selected in this analysis.

A statistical test of the value-added production function confirms the assumption that, in the long run without any constraints of mix production factors, firms’ return to scale is constant and in the short run, if capital is fixed, labour input is diminishing. A statistical test of the OLS estimation shows that both coefficients are statistically significant at 1% level. The estimates of the labour coefficient being 76% and capital coefficient being only 20.3% strengthen the fact that the seafood processing industry is labour intensive.

The estimated parameters of the value-added production function using equation (13) are then plugged into the derived supply function and factor demand functions in equations (8), (9) and (10) to obtain the optimal values of output and inputs. The first terms of equations (11) and (12), including the first two lines, known as the residual term, are calculated by using values from the data set with new prices. The second terms, the last line of equation (12), known as the profit maximizing part, are calculated by using the optimal values obtained from the derived supply and factor demand functions. In equation (11), without a firm’s reaction, optimal values are fitted with base prices while in equation (12) new simulated input and output prices are plugged in. After that the return on the capital indicator is recalculated based on a firm’s profit with and without reaction and a comparison of the rates of return on capital between the two cases with and without reaction, or the change of return on capital after a firm’s reaction, indicates a firm’s competitiveness in terms of profitability.

Additionally, calibrations of the parameters of labour and capital are also experimented on by two assumptions, through common and specific production functions. For the common production function, the calibrated coefficient of capital is 22.87% and that of labour is 62.49%. These calibrated coefficients (both common and specific) will also be plugged into the derived supply and factor demand functions to examine the sensitivity of a firm’s reactions. Thus, we obtain three alternative values of the parameters in measuring the changes of firms’ return to capital with reaction.

5.5. Changes of firms’ profitability: policy changes without firms’ reactions

Table 2 presents the immediate impact on firms’ return on capital and return on assets after policy changes. Of all scenarios, tariff elimination has the strongest positive impact on the profitability of seafood processing firm while raising electricity charge reduce the firms’ profitability the most. The detailed analyses of each scenario are reported as follows.

5.5.1. Scenario 1: Lowering the tariff to 5% and tariff elimination
This simulation reports that a firms’ average returns on capital increases by 14% and 19% due to the tariff changes. The higher increase occurs on the tariff
Table 2. Return on capital and assets under the impacts of policy changes without firms' reactions

<table>
<thead>
<tr>
<th>By sector</th>
<th>By export orientation</th>
<th>By region</th>
<th>By size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SOEs</td>
<td>Non-SOEs</td>
<td>FIEs</td>
</tr>
<tr>
<td>Number of observation.</td>
<td>36</td>
<td>125</td>
<td>13</td>
</tr>
<tr>
<td>RC before price shocks</td>
<td>0.32</td>
<td>0.55</td>
<td>-0.16</td>
</tr>
<tr>
<td>RA before price shocks</td>
<td>0.14</td>
<td>0.12</td>
<td>-0.26</td>
</tr>
</tbody>
</table>

After policy changes:

1.1 Lowering tariff to 5%
| RC | 0.13 | 0.75 | 0.29 | 1.21 | 0.09 | 0.64 | 0.30 | 0.53 | 0.52 | 0.68 | 0.59 |
| RA | 0.06 | 0.23 | -0.05| 0.37  | 0.00 | 0.19 | 0.08 | 0.15 | 0.17 | 0.17 | 0.17 |

1.2 Tariff elimination
| RC | 0.11 | 0.82 | 0.39 | 1.42 | 0.01 | 0.68 | 0.36 | 0.61 | 0.61 | 0.69 | 0.64 |
| RA | 0.05 | 0.25 | 0.00 | 0.45  | -0.02| 0.21 | 0.10 | 0.18 | 0.20 | 0.19 | 0.19 |

2.1 Exchange rate depreciates by 5.24%
| RC | 0.38 | 0.65 | -0.13| 0.35  | 0.68 | 0.65 | 0.08 | 0.27 | 0.33 | 0.80 | 0.53 |
| RA | 0.16 | 0.14 | -0.26| 0.08  | 0.14 | 0.14 | 0.03 | 0.07 | 0.08 | 0.16 | 0.11 |

2.2 Exchange rate depreciates by 1.62%
| RC | 0.34 | 0.58 | -0.15| 0.30  | 0.61 | 0.59 | 0.06 | 0.22 | 0.28 | 0.73 | 0.47 |
| RA | 0.15 | 0.13 | -0.27| 0.07  | 0.13 | 0.13 | 0.02 | 0.05 | 0.07 | 0.14 | 0.11 |

3.1 Raising electricity charge by 42.8%
| RC | 0.29 | 0.51 | -0.19| 0.24  | 0.56 | 0.53 | 0.02 | 0.16 | 0.23 | 0.66 | 0.41 |
| RA | 0.12 | 0.11 | -0.28| 0.05  | 0.11 | 0.10 | 0.00 | 0.03 | 0.05 | 0.12 | 0.08 |

3.2 Raising electricity charge by 14.3%
| RC | 0.31 | 0.54 | -0.17| 0.26  | 0.58 | 0.55 | 0.04 | 0.19 | 0.25 | 0.69 | 0.44 |
| RA | 0.13 | 0.11 | -0.27| 0.06  | 0.12 | 0.11 | 0.01 | 0.04 | 0.06 | 0.13 | 0.09 |

4.1 Petrol price increases by 36.8%
| RC | 0.29 | 0.52 | -0.17| 0.26  | 0.55 | 0.54 | 0.03 | 0.16 | 0.23 | 0.68 | 0.42 |
| RA | 0.12 | 0.11 | -0.27| 0.05  | 0.11 | 0.11 | 0.01 | 0.03 | 0.05 | 0.13 | 0.08 |

4.2 Petrol price increases by 15.5%
| RC | 0.31 | 0.54 | -0.17| 0.27  | 0.57 | 0.55 | 0.04 | 0.18 | 0.25 | 0.69 | 0.44 |
| RA | 0.13 | 0.12 | -0.27| 0.06  | 0.12 | 0.11 | 0.01 | 0.04 | 0.06 | 0.13 | 0.09 |

5.1 Combination of 1.2, 2.1, 3.1, 4.1
| RC | 0.10 | 0.87 | 0.41 | 1.49  | 0.02 | 0.73 | 0.37 | 0.60 | 0.64 | 0.73 | 0.68 |
| RA | 0.04 | 0.26 | -0.00| 0.47  | -0.02| 0.21 | 0.10 | 0.17 | 0.20 | 0.19 | 0.20 |

5.2 Combination of 1.2, 2.2, 3.1, 4.1
| RC | 0.07 | 0.79 | 0.38 | 1.40  | -0.03| 0.66 | 0.33 | 0.54 | 0.58 | 0.66 | 0.61 |
| RA | 0.03 | 0.24 | -0.01| 0.44  | -0.03| 0.20 | 0.08 | 0.15 | 0.18 | 0.17 | 0.18 |

6. US anti-dumping tariff
| RC | 0.31 | 0.46 | -0.25| 0.12  | 0.59 | 0.48 | 0.01 | 0.12 | 0.19 | 0.62 | 0.37 |
| RA | 0.13 | 0.09 | -0.31| 0.00  | 0.12 | 0.09 | 0.01 | 0.02 | 0.04 | 0.11 | 0.17 |

Note: RC denotes return on capital and RA denotes return on assets.
elimination case. This could be derived from the fact that for the seafood processing industry, tradable material inputs dominate in intermediate inputs and most firms purchased from domestic sources. This benefited value that overwhelms the decreased value of domestically sold output leads to a gain of profitability in the industry and enhances the firm’s competitiveness after the price shocks.

However, the impact varies among different categories of firms, depending on the weight of output export over import of material inputs. For the case of tariff elimination, while the rate of return on capital of the SOEs decreases greatly by 21%, that of the non-SOEs and FIEs is notably increased by 27% and 55%, respectively. This finding could be justified by the fact that most SOEs’ products are sold domestically while firms in other sectors export the majority.

While the seafood processing industry makes use of most domestic seafood sources, it is, however, strongly protected by the government. Therefore, seafood exporters and those firms that purchase material inputs domestically will benefit from lower input prices after trade liberalization and seafood importers could be hurt badly.31 This fact could be reflected in the contrary impacts between small and large firms. Looking at the regional classifications, there is an average gain from trade liberalization, with northern and central firms benefiting more than southern ones.

5.5.2. Scenario 2: Exchange rate depreciates by 5.24% and 1.64%

With the depreciation of the VND by 5.24%, there is a positive impact from 3% to 10% on firms of all categories. It is observed that while tradable inputs take a very large part of the total intermediate inputs (mainly material inputs) and are vital for output value, an increase in the market value of output not only compensates but also dominates the input cost increase.

For the case of higher depreciation, FIEs and northern firms gain the least with an increase of 3%. Large firms and non-SOEs gain the most with an increase of 10% of return on capital, followed by southern and inward-oriented firms. Differences in market orientation do not cause significant changes in the return on capital resulting from exchange rate depreciation. A similar positive impact could be seen throughout the categories for the depreciation of the VND by 1.64%, obviously with smaller magnitude. The difference in the magnitude of the impacts is also similar among categories.

5.5.3. Scenario 3: Raising electricity charge by 42.8% and 14.3%

With the rise of 42.8% in electricity charges, the total cost of firms increases by 0.82% on average while the total intermediate cost increase from 1.2% on average up to 19% at most. Central firms suffer the highest increase by 2.3% on average in intermediate cost due to the higher electricity cost share of these

31 However, the extreme numbers of changes in profitability in this scenario should be interpreted carefully because information on firms’ export share in the survey data was not collected. Firms only declared whether they export/import but did not declare how much of their outputs were exported. It is therefore assumed that if firms export, then they export total output and vice versa; if not, they then only sell goods domestically.
firms. However, as the absolute value of the intermediate cost of central firms is not large, it is still observed that firms' profitability uniformly reduces by 3% or 4% regardless of categories. Similarly, firm's return on capital uniformly reduces by 1% or 2% as a result of the increases in electricity charges by 14.3% regardless of sector, location, size and market orientation. Hence, the cost competitiveness of all firms is equally hurt as a consequence of the increase in electricity charges.

5.5.4. Scenario 4: Raising petrol and oil price by 36.8% and 15.5%
Similar to scenario 3, a higher increase in oil and petrol prices has a stronger effect on the industry's profitability. With the increase of 36.8% of petrol and oil price, the average rate of return on capital decreases by 3%. The FIEs suffer notably the least by this price shock with the return on capital decreasing by only 1%. This is because they consume the least amount of fuel and oil compared with firms in other categories. Similarly, for the classification of firm size, for SMEs, fuel and energy inputs take a larger part, with 2.9%, compared with only an average of 0.9% for large firms, that is why the magnitude of the impact on SMEs' profit is twice as much as that on large firms (reduction of return on capital by 4% and 2%, respectively) once oil prices rise. This is also derived from the fact that large-scale production is more cost effective than small-scale, or larger firms have better processing technology so fuel and energy could be saved.

Similar justification of the more up-to-date technology could be applied for the difference of changes in return on capital between outward- and inward-oriented firms with the rate of return on capital of the former decreasing by 2%, compared with that of the latter being lowered by 4%. The rise of the oil and petrol price by 15.5% does not have a significant effect on firms' profitability, with the reduction of return on capital by only 1% or 2%. This is understandable as energy and fuel consumption takes only 2% of the total intermediate cost, therefore this rise only pushes up firms' total intermediate costs by an average of 0.3%.

5.5.5. Scenario 5: Combinations of all policy changes
To measure the relative magnitude of each policy change and to look at the interactive effects of those changes on firm's competitiveness, the simulation exercise is also done through a combination of all policy changes. In the set of combined scenarios, the larger magnitude of price changes will be applied while the exchange rate devaluations are separated into two different scenarios. Tariff elimination is also taken into account for these two combinations.

An overall increase in the profitability by 23% and 16%, respectively, for the two cases of combined scenarios shows that as a whole, policy changes, if made simultaneously, will have positive impacts on firms' production, mainly driving by the strong and positive impact of trade liberalization. As discussed above, tariff and exchange rate depreciation are the two most important policies that have the strongest impacts on firms' profitability and as both of these policy changes generally have positive effects on firms' profits, the losses resultin from price shocks of other inputs could be covered.
However, different categories of firms received different effects of the combined changes of policy. It is observed that those firms that benefit from trade liberalization policy will gain in the combined changes and vice versa, those firms that suffer from this policy will face the risk of profit loss in the combinations. Hence, firms in the state-owned sector and inward-oriented firms lose a great deal from combined policy changes in their return on capital – by 22% and 57%, respectively. For large firms, the benefit from the exchange rate depreciation cannot compensate for the losses from other price shocks so in the second scenario of combined policy changes, large firms’ rates of return on capital reduce slightly by 4% on average. Firms in all other sectors and categories benefit greatly, with the most impressive increase by 125% of outward-oriented firms, followed by FIEs at 57%.

Referring to the above analysis, those firms that sell most products domestically or do not export suffer from trade liberalization, while outward-oriented firms benefit from trade liberalization. Although the VND is still overvalued, the gradual devaluations made by the government in recent years have made its currency closer to the real value. Additionally, the seafood processing industry is still highly protected by the government, so trade liberalization becomes the most striking change to the sector’s production. As a result, despite the fact that all firms could increase their profitability from the exchange rate depreciation policy, trade liberalization policy is so much more important; it dominates other policy changes and the findings also strengthen the argument that market orientation is an important factor for production stabilization in the context of open trade and economic integration.

5.5.6. Scenario 6: US anti-dumping tariff for catfish and shrimp
Overall, firms suffer largely with an average reduction of the rate of return on capital by 8%. Those firms that export more will suffer more, particularly those exports to the USA. However, it is not possible to clarify the proportion of output to the USA of specific firms or a proportion of exported output as it was not surveyed. Extreme results therefore are observed in this scenario (i.e. firms that do not export are not hurt at all). As the number of exporting firms in the state-owned sector is small, they are hardly affected by US anti-dumping policy. Impacts of the tariff on non-SOEs and FIEs and firms of all sizes are similar with a reduction of 9% and 8%, respectively.

5.6. Firms’ reactions against price shocks
Table 3 presents details of firms’ reactions against price shocks. Only the larger scale of each scenario set in the previous section will be interpreted in the following analysis. For the trade liberalization scenario, while this policy change has various impacts on the profitability of firms in different categories, all firms strongly react to the price shock due to trade liberalization with the change of return on capital ranging from 30% up to nearly 64%. Outward-oriented firms have the second strongest reaction followed by large firms with a change of return on capital of 61%. SOEs also react strongly with the return
Table 3. Return on capital and assets under the impacts of policy changes with firms’ reactions

<table>
<thead>
<tr>
<th>By sector</th>
<th>By export orientation</th>
<th>By region</th>
<th>By size</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOEs</td>
<td>Non-SOEs</td>
<td>FIEs</td>
<td>Outward</td>
</tr>
<tr>
<td>1.1 Lowering tariff to 5%</td>
<td>0.493</td>
<td>0.356</td>
<td>0.182</td>
</tr>
<tr>
<td>1.2 Tariff elimination</td>
<td>0.560</td>
<td>0.507</td>
<td>0.302</td>
</tr>
<tr>
<td>2.1 Exchange rate depreciates by 5.24%</td>
<td>0.187</td>
<td>0.245</td>
<td>0.745</td>
</tr>
<tr>
<td>2.2 Exchange rate depreciates by 1.62%</td>
<td>0.023</td>
<td>0.014</td>
<td>0.043</td>
</tr>
<tr>
<td>3.1 Raising electricity charge by 42.8%</td>
<td>0.414</td>
<td>0.040</td>
<td>0.095</td>
</tr>
<tr>
<td>3.2 Raising electricity charge by 14.3%</td>
<td>0.035</td>
<td>0.006</td>
<td>0.016</td>
</tr>
<tr>
<td>4.1 Petrol price increases by 36.8%</td>
<td>0.023</td>
<td>0.017</td>
<td>0.000</td>
</tr>
<tr>
<td>4.2 Petrol price increases by 15.5%</td>
<td>0.017</td>
<td>0.006</td>
<td>0.000</td>
</tr>
<tr>
<td>5.1 Combination of 1.2, 2.1, 3.1, 4.1</td>
<td>0.150</td>
<td>0.486</td>
<td>0.398</td>
</tr>
<tr>
<td>5.2 Combination of 1.2, 2.2, 3.1, 4.1</td>
<td>0.154</td>
<td>0.419</td>
<td>0.325</td>
</tr>
<tr>
<td>6. US anti-dumping tariff</td>
<td>0.120</td>
<td>0.130</td>
<td>0.044</td>
</tr>
</tbody>
</table>
on capital increase by 56%. FIEs increase their return on capital by 30.2% while firms of all other criteria experience an increase in the return on capital by approximately 40%. It is noted that while trade liberalization brings most benefits to FIEs and outward-oriented firms, and causes losses for SOEs and large firms, firms of all these four categories react strongly to this policy change. This shows high potential in production capability of these firms in adjusting and adapting to business environment changes; this could be justified by the advantages of economies of scale and the export orientation that help firms become more dynamic and competitive in the transitional environment.

Exchange rate depreciation generates a strong overall reaction in the industry. FIEs have the strongest responsiveness, with a change of return on capital of 74.5% on average, followed by outward-oriented firms with a change of 48.7%. It is noted that all FIEs are seafood exporters. On the contrary, northern, central and inward-oriented firms have the smallest reactions with average changes of only 4.3%, 4.8% and 9.5%, respectively. The contrasting responsiveness of these firms shows that exchange rate depreciation brings more benefits to exporting firms, thus generating more responsiveness. Additionally, this finding could again strengthen the fact that exporters are more exposed to international competition, therefore more dynamic and flexible in their production adjustment.

For the expected rise in the electricity charge of 42.8%, SOEs have the strongest reaction with the change of return on capital of 41%, compared with 12% on average. FIEs do not respond to the increase of petrol and oil price increase (or the responsiveness is too small and negligible). Other firms’ reactions are indicated by a change between 1% and 3%.

For the simultaneous combinations of all policy changes, all firms strongly react to price shocks. For the combined scenario with exchange rate depreciations of 5.24%, outward-oriented firms have the highest responsiveness level with the return on capital increases by nearly 73%, followed by large firms and non-SOEs with changes of 51% and 49%, respectively. Reactions of SOEs are the least strong with an average change of only 15%. These findings confirm that while large firms benefit from economies of scale in terms of production costs, non-SOEs (which are mostly small size) are much more flexible in managing production and adjusting inputs. In contrast, outward-oriented firms are also more dynamic than inward-oriented firms in production and inputs adjustment for profit maximization. Additionally, although many SOEs are of large size, the finding also indicates that the state-owned sector is not as flexible as the private sector and suffers more from a changing business environment.

For the scenario of US anti-dumping policy, the whole industry is quite responsive, with an average change of 12% in return on capital. The effect of this tariff policy has been quantified in the above simulations without firms’ reaction. It shows that the anti-dumping tariff not only hurt seafood exporters but also the whole industry. Northern and outward-oriented firms which suffer the most from this tariff also have the strongest responsiveness, with changes of 37% and 28%, respectively. Inward-oriented firms are not hurt and thus unresponsive to this incident.
6. CONCLUSION

This paper examines the level of firms’ competitiveness in the seafood processing industry in Vietnam. Profitability indicators are employed using a value-added Cobb-Douglas production function combined with Leontief technology to measure the impacts of policy changes and firms’ reactions to policy induced price shocks. We show that outward-oriented firms gain higher levels of profits than inward-oriented firms but are still less profitable due to the need for higher investment capital in technology. The former are also more dynamic than the latter and react more strongly to policy changes. State-owned sector firms are less profitable and less responsive to the changing business environment than firms in the private and foreign sectors. In terms of energy consumption, outward-oriented and large firms have the highest cost effectiveness.

Among policy changes, trade liberalization has the strongest impact on firms’ profitability and also receives the most robust reactions from both profitable and unprofitable firms. While seafood products are highly protected by the current high level of tariff, trade liberalization policy will mostly bring benefits to the seafood processing industry. Nevertheless, not all firms benefit from this policy. Private sector and outward-oriented firms particularly enjoy great gains while state-owned sector and inward-oriented firms are heavily hurt. However, firms in both sectors have robust reactions towards these policy changes. The application of trade liberalization policy in combination with exchange rate depreciation will bring benefits that could compensate for the losses from input price increases resulting from pricing policy changes. Therefore, if all policy changes are made simultaneously, firms will incur fewer negative consequences.

In the scenario of combined policy changes, among firms of different categories, outward-oriented and large firms have the most robust reactions against price shocks. State-owned firms are least responsive to business environment changes. US anti-dumping tariffs hurt firms’ profitability heavily – not only seafood exporting firms but also non-exporters. However, firms have very robust reactions against this event, not only by selling products to the domestic market but also seeking new potential exporting markets, including the European markets and markets in Africa.

Based on the findings from the qualitative and quantitative study in this paper, there are several policy implications to be drawn as follows. There still exist many price distortions that affect firms’ profitability and hence competitiveness. Removal of these distortions will hurt several firms and bring benefits to many others depending on their characteristics. If considerations are made with the integration all policy changes, favourable price shocks could compensate for unfavourable price shocks, thus firms will be less affected. While tariff elimination hurts SOEs and large firms, this policy still brings benefits to most other firms. It is necessary to have supplementary policies to support firms in these two sectors to react properly (i.e. accelerations to privatization process or stable policies).

The fact demonstrates that outward-oriented firms are more dynamic, able to adjust to price changes, and thus more competitive than inward-oriented
ones. The policies that support an import substituting strategy at the expense of the exporting sector are no longer relevant. Trade reforms to remove these import biases are necessary.

Further analysis demonstrates that technological progress is an important factor for firms to improve production; technology should be integrated with policy changes. Thus, improving fair access to credit and diverse financial sources to obtain loans for technological improvements are necessary for firms to compete. In addition, material inputs are rather problematic for seafood processing firms due to the seasonal nature of the seafood supply. Thus, long-term development of the aquaculture and fishery sector should be considered with the assurance of stable supply sources.

Last but not least, the study shows that small and medium enterprises have rapidly expanded and proved the importance of their role in the development of this industry. There should be more encouraging policies such as credit accessibility improvement and abolishment of unfair favourable pricing and administrative policies to sustain and develop this sector.

REFERENCES


