VIETNAM INSTITUTE FOR ECONOMIC AND POLICY RESEARCH
(University of Economics and Business - Vietnam National University)

The Impacts of TPP and AEC on the Vietnamese Economy:

Macroeconomic Aspects and the Livestock Sector

Hanoi, August 2015



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Despite our efforts, we understand that there may be limitations and even errors in the Report. We sincerely hope to receive comments and contributions from the readers.

Ha Noi, August 1st, 2015

On behalf of the Authors

Dr. Nguyen Duc Thanh

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AANZFTA	ASEAN-Australia-New Zealand Free Trade Agreement
ACFTA	ASEAN–China Free Trade Area
AEC	ASEAN Economic Community
AFTA	ASEAN Free Trade Area
AIFTA	ASEAN-India Free Trade Agreement
AJCEP	ASEAN-Japan Comprehensive Economic Partnership
AKFTA	ASEAN-Korea Free Trade Agreement
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ATPSM	Agricultural Trade Policy Simulation Model
BTA	The US-Viet Nam Bilateral Trade Agreement
CEPT	Common Effective Preferential Tariff
CGE	Computable General Equilibrium
EU	European Union
FAPRI	Food and Agricultural Policy Research Institute
FDI	Foreign Direct Investment
FTAAP	Free Trade Area of the Asia-Pacific
FTAs	Free Trade Agreements
GDP	Gross Domestic Product
GE	General Equilibrium
GEL	General Exclusion List
GSIM	Global Simulation Analysis of Industry-level Trade Policy
GSO	General Statistics Office
GTAP	Global Trade Analysis Project
HAGL	Hoang Anh Gia Lai
HF	Holstein Friesian
HS	Harmonized System
ITC	International Trade Centre
KRU	Kazakhstan, Russia and Ukraine
M&A	Mergers and Acquisitions
MARD	Ministry of Agriculture and Rural Development
MFN	Most Favored Nation
NTBs	Non-tariff Barriers
OIE	World Organization for Animal Health
PE	Partial Equilibrium

PRRS	Porcine Reproductive and Respiratory Syndrome
RCA	Revealed Comparative Advantage
RCEP	Regional Comprehensive Economic Partnership
RCA	Revealed Comparative Advantage
SCAP	Southern Center for Agricultural Policy and Strategy
SITC	Standard International Trade Classification
SMP	Skim Milk Powder
SOEs	State-owned Enterprises
TPP	Trans-Pacific Partnership
TPSEP	Trans-Pacific Strategic Economic Partnership
TRIST	Tariff Reform Impact Simulation Tool
UHT	Ultra-High-Temperature
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
US	United States
USD	United States dollar
VCFTA	Vietnam-Chile Free Trade Agreement
VCUFTA	Viet Nam-Customs Union of Russia, Belarus, and Kazakhstan Free Trade Agreement
VHLSS	Vietnam Household Living Standards Survey
VJEPA	Vietnam - Japan Economic Partnership Agreement
VKFTA	Vietnam – Korea Free Trade Agreement
VND	Viet Nam dong
WITS	World Integrated Trade Solution
WMP	Whole Milk Powder
WTO	World Trade Organization

INTRODUCTION

Viet Nam's deeper integration into the global economy, especially via such a comprehensive free trade agreement as the Trans-Pacific Partnership (TPP) or the establishment of the ASEAN Economic Community (AEC), brings various opportunities and challenges. Accompanying these are the gains and losses for the participants of the integration process. At the same time, the welfare of those who are not direct participants is also affected due to this process via changes in various aspects such as economic growth, trade, prices, labor... Previous studies on the impacts of TPP on signatory countries gave a promising economic prospect for Viet Nam, which is going to be the largest beneficiary compared to the other 11 TPP countries. Similar studies on the impacts of AEC shows much smaller changes on Viet Nam's economy.

Viet Nam's international integration over the past couple of decades has helped the country gain much in terms of economic growth, investment, export and income. However, the higher degree of openness also means higher exposure to external risks and possible worsening of internal risks. Great expectations came with the accession into the WTO, for example. Increases in export and foreign investment were remarkable. Yet, great influx of capital coupled with the inexperienced monetary policy (under fixed exchange rate management and greater openness) contributed to the asset price bubbles and the returning of double digit inflation in 2008. The heavily dependence of Viet Nam on imports and foreign investment, the long lasting consequences of the world economic crisis and sustaining internal weaknesses during the post-WTO period give the warning signs for Viet Nam not to be complacent with the promising TPP and, to a lesser extent, AEC. In order to make the best of the opportunities and overcome the challenges from integration, Viet Nam needs to continue to make further fundamental changes in economic structure, institutions and governing policies.

In addition, the impacts of this regional integration are expected to vary across industries. Comparatively advantageous industries are expected to benefit the most while disadvantageous industries may suffer albeit with different degrees. Livestock is the second largest sector of Viet Nam's agriculture, following crop cultivation. However, it is considered as unsustainable, uncompetitive and vulnerable to FTAs. Viet Nam's livestock sector's difficult conditions are reflected in the followings: (i) The size of production is small, unreliable and based on households (instead of large commercial farms), using leftovers as feeds and lacking care of animal diseases; (ii) Heavy dependence on foreign breeds and feeds; (iii) Disease-stricken problem is common though still under control; (iv) Slaughter hygiene and food safety remain limited, causing food poisoning; and (v) Environmental pollution due to livestock industry, harming producers and neighboring households as well.

Regardless of the fact that the opportunities are mainly offered to a limited number of big commercial farms in Viet Nam thanks to reduced cost of inputs (breeds and feeds), having

the above characteristics, the livestock sector of Viet Nam would face fierce competition from foreign producers when the tariffs and NTBs are reduced and removed thanks to FTAs. The most potential sufferers from TPP and AEC in Viet Nam is considered to be producers of dairies (due to the shortage of Vietnamese products and the large proportion of imported ones in domestic market), beef (due to the high quality and reasonable price of imported beef), poultry (due to increasing price of Vietnamese products together with rising concern on food safety in Viet Nam in time of bird flu and other diseases) and pork and again poultry (due to lower prices of imports, though the competition is less serious thanks to the acceptable price of Vietnamese products, the small percentage of imported products in domestic market and the consumption habit of Vietnamese people).

Recent literatures, despite having already covered either the impacts of TPP and/or AEC on member's economic performance in general or the consequences of trade liberalization on Viet Nam's livestock sector and the welfare of livestock farming households, lack certain in-depth analysis. For example, Linh, Burton and Vanzetti (2008) construct numerous trade liberalization scenarios including VN only, AFTA, AFTA+3, VN-US, VN-EU25 but no scenarios include TPP. Another study by Todsadee Kameyama and Lutes (2012) already studied TPP's impacts on the livestock sector in particular, their findings lack of in-depth analysis on the sub-sectors as well as the market structure in member countries. In other words, the literatures still leave room for a comprehensive analysis in terms of the impacts of TPP and AEC on Viet Nam's economy and specifically on Viet Nam's livestock sector and its sub-sectors, which combines both desk-based and field-based studies. In the context of active lobbying of both pro- and anti-TPP sides, in line with the secrecy of TPP contents to media and the public, there exists a need for a thorough study to improve public awareness and policy makers' understanding about the soon-coming TPP and AEC. As a result, we conduct this study in order to investigate the potential impacts of TPP and AEC on Viet Nam's economy and its livestock sector to improve the knowledge of decision-makers, stakeholders (including investors) and the public regarding this promising and comprehensive integration.

This study attempts to make a quantitative evaluation of the potential economic impacts of liberalizing trade in goods and services under the TPP and AEC on Viet Nam. Based on the recently published Global Trade Analysis Project (GTAP) Data Base version 9 by Narayanan, Aguiar and McDougall (2015) and the GTAP model (Hertel 1997; McDougall, 2003), we conduct a set of numerical experiments to simulate the economic effects arising from the establishing TPP and AEC on both the macroeconomy and the livestock sector. Also, with the ambition to measure the diverse results across livestock sub-sectors (which GE models tend not sufficient to cover details), we use a PE model at the same time. Based on the data from UN Comtrade, we also run similar simulation exercises using the Global Simulation Analysis of Industry-level Trade Policy (GSIM) for our PE analysis of the livestock sector. We assume that bilateral tariffs on trade in goods among member countries will be completely removed

and the non-tariff barriers will be reduced for trade facilitation. These liberalizations of trade in goods and services would generate economic gains to the participating countries. It should be noted that TPP and AEC are expected to liberalize not only trade in goods and services but also investment and movement of labor, but our analysis is confined to the former due to the data limitation.

Our main findings are of two folds. *On the macroeconomic side*, the analysis shows the clear gains in GDP after TPP and AEC, with Viet Nam being the biggest gainer in terms of GDP percentage under TPP. Viet Nam will also see large gains in investment, consumption and imports in general and in output and exports of apparels, textile, leather and footwear, especially to TPP member countries. Total export decline slightly under fixed primary factor assumption due mainly to higher competition in both input and output markets. TPP, and to a much lesser extent, AEC, causes Viet Nam to lose some of its exports to its competitors such as the US (processed food) or China (electronic equipment)… At the same time, we observe the movement of production resources from declining industries (such as wood products, coal, chemical, rubber, motor vehicles, machineries and parts and electronic equipment) to expanding industries such as textile, apparels and leather products. *On the livestock sector side*, we observe the narrowing down of the whole sector after TPP and, to a smaller degree, AEC. Given the low productivity and competitiveness of the sector, poultry (and to a lesser extent swine meat) producers will suffer the most in terms of output and welfare though the current consumption habit of Vietnamese people most of whom prefer fresh/warm meat than frozen one may slow down the impacts. On the other hand, milk and beef producers have better chance of survival. The sector needs quick restructuring efforts to improve efficiency in facing foreign competitors.

The structure of the report is as followed. Section 2 provides a general overview of TPP and AEC, recent negotiations and trends in trade and investment between Viet Nam and member countries. The next section discusses in details the impacts of TPP and AEC on the Viet Nam's economy and its economic sectors in relation to the country's main trading partners. This section provides the literature review, the discussions on the methodology, the model, the database as well as the main assumptions used in the study and discussed in details the impacts of TPP and AEC on GDP, investment, trade, output, welfare and labor demand using simulation results from the GE model. Section 4 looks at the livestock sector in more details. It first describes the trends and recent performance of Viet Nam's livestock sector, focusing on production, consumption, market structure and value chains in the sub-sectors as the combined results of a thorough desk study and various field trips across Viet Nam. Then section 4 provides the methodology, the database as well as the main assumptions for the GSIM model. Further analysis of the impacts of TPP and AEC on Vietnamese livestock sector and sub-sectors is then provided using simulation results obtained from the GSIM model. The last section summarizes the research findings and provides policy discussions.

BACKGROUND OF VIET NAM'S INTERGRATION

Overview of Viet Nam's FTAs and trade liberalization

Over the last 30 years since Doi Moi, the policy of opening the country and integrating into the international economy has become a primary strategy of Viet Nam, in line with structural reforms, aiming at economic growth and sustainable development. Starting with the participation into ASEAN and its free trade agreement in 1995, Viet Nam has been actively engaging further in bilateral and regional free trade agreements (FTAs) with major economies, namely the US, China, Japan, EU, Chile, etc., as well as multilateral trade networks like WTO, ASEAN-India, ASEAN-ROK, ASEAN-Australia-New Zealand. Table 1 lists all the FTAs that Viet Nam has signed up to date.

Table 1. FTAs Viet Nam has signed up to date

FTA	Partner	Coverage (% tariff lines)	In effect	Completion
WTO		100	2007	2019
AFTA	Intra ASEAN	97	1999	2015/2018
ACFTA	ASEAN–China	90	2005	2015/2018
AKFTA	ASEAN–Korea	86	2007	2016/2018
AANZFTA	ASEAN–Australia–New Zealand	90	2009	2018/2020
AIFTA	ASEAN–India	78	2010	2020
AJCEP	ASEAN–Japan	87	2008	2025
VJEPA	Viet Nam–Japan	92	2009	2026
VCFTA	Viet Nam–Chile	89	2014	2030
VKFTA	Viet Nam–Korea	88	2016	2031
VCUFTA	Viet Nam – Custom Union (Russia – Belarus – Kazakhstan)	90	2016	2027

In economic terms, benefits brought by FTAs to signatories are usually reflected in trade and FDIs. Since 2007, total volume of trade of Viet Nam increased by 2.68 times, from 111.3 billion USD in 2007 to 298.2 billion USD in 2014 (Appendix 2). In details, imports rose by 2.36 times and exports gained almost threefold value, reaching 148.0 billion USD and 150.2 billion USD in 2014, respectively.

After the entry of Viet Nam to WTO in 2007, there was an influx of FDI flowing to Viet Nam. Compared to the previous period, the total FDI registered in Viet Nam surged, with an amount of over 70 billion USD in the year of 2008 solely (GSO, 2015). However, due to impacts of the global financial crisis, the effective FDIs in the same year 2008 was only 9.6 billion USD. On average, the total effective FDIs reached 10.7 billion USD per annual in the period of 2007 – 2014.

Trans-Pacific Partnership (TPP)

Remarkably, in 2008 Viet Nam began joining the Trans-Pacific Partnership (TPP) talks - which is considered as the most comprehensive and widely influential FTA up to the time being. Despite being named a trade pact, TPP is not only (or even mainly) about trade in goods but it ambitiously targets at rewriting the global rules on trade by liberalizing trade in services and financial services, enhancing the flows of investment and labor; and most importantly creating the institutional conditions serving that aim: legal framework related to intellectual property right, state-owned enterprises (SOEs), competition, dispute settlement, etc.

Historical root

In fact, the TPP originated from the Trans-Pacific Strategic Economic Partnership (also known as Pacific-4) signed by 4 countries Brunei, Chile, New Zealand and Singapore on 3 June 2005 and enforced in 2006. TPSEP did not attract much public attention until early 2008 when the US agreed to join negotiations with Pacific-4 concerning the liberalization in trade of financial services and investment. In late September 2008, the US officially announced the start of TPP talks, followed by the almost immediate participation of Australia, Peru and Viet Nam in November of the same year with a promise of opening the first round in March 2009. However, due to the complicated political situation in the US after the inauguration of Barack Obama in January 2009, the first round was delayed to 15-19 March 2010 in Melbourne, Australia. After 3 rounds with 9 members, there are currently 12 countries participating in TPP negotiations with Malaysia joining in October 2010, Canada and Mexico in June 2012 and Japan in July 2013. Up to May 2015, 19 official rounds of TPP talks have been conducted (Table 2), not to mention numerous mid-term and ministerial meetings, bilateral talks and visits among member countries. After the 19th round of formal meetings, negotiations stopped taking the form of official rounds, but other meetings, such as Chief Negotiators Meetings and Ministers Meetings, continue.

Table 2. 19 Official Rounds of TPP Negotiations up to May 2015

Round	Date	Venue	Member countries
1	15-19/3/2010	Melbourne, Australia	Pacific-4 (P-4), US, Australia, Peru, Viet Nam
2	14-18/6/2010	San Francisco, US	

3	5-8/10/2010	Brunei	
4	6-10/12/2010	Auckland, New Zealand	
5	14-18/2/2011	Santiago, Chile	
6	24/3 – 1/4/2011	Singapore	
7	15-24/6/2011	Ho Chi Minh City, Viet Nam	
8	6-15/9/2011	Chicago, US	P-9 (P-4, US, Australia, Peru, Viet Nam, Malaysia)
9	22-29/10/ 2011	Lima, Peru	
10	5-9/9/2011	Kuala Lumpur, Malaysia	
11	2-9/3/2012	Melbourne, Australia	
12	8-18/5/2012	Dallas, US	
13	2-10/7/2012	San Diego, US	
14	6-15/9/2012	Virginia, US	
15	3-12/12/2012	Auckland, New Zealand	
16	4-13/3/2013	Singapore	P-11 (P-9, Canada, Mexico)
17	15-24/5/2013	Lima, Peru	
18	14-24/7/2013	Kota Kinabalu, Malaysia	
19	23-30/8/2013	Bandar Seri Begawan, Brunei	12 current members (P-11, Japan)

Main issues: potential contents and controversies

Currently, there are 12 countries along the Pacific coast joining the TPP negotiations, creating the largest free trade area, accounting for nearly 40% of total GDP of the world economy and 25% of global trade. According to official announcement released by the Ministry of Industry and Trade of Viet Nam as well as posted on Ministry of Industry and Trade of the US, at the 19th APEC Economic Leaders' Meeting in Honolulu on 12 November 2011, P-9 agreed on the outlines of the TPP agreement, in which five features making TPP "a landmark, 21st-century trade agreement, setting a new standard for global trade and incorporating next-generation issues that will boost the competitiveness of TPP countries in the global economy."

First, comprehensive market access: mainly via the removal of tariffs and non-tariff barriers in trade of goods, services and investment

Second, fully regional agreement: to facilitate the development of production and supply chains among TPP members, promote jobs, living standards, welfare and sustainable growth in our countries

Third, cross-cutting trade issues: to deal with four new issues: ensure regulatory coherence, promote competitiveness and business facilitation, encourage small- and medium-sized enterprises and contribute to advance TPP countries' economic development priorities.

Fourth, new trade challenges: trade and investment in innovative products and competitive business environment across the TPP region.

Fifth, living agreement: to enable the updating in the future and the expansion to new members.

On the basis of the above five features, TPP's legal text has been drafted, covering almost all contents of the negotiations. Up to May 2015, even though the details of TPP have not been publicized, according to the press release of Ministry of Industry and Trade of Malaysia right before the 18th round of TPP talks and other sources from the US (namely Public Citizen, Huffington Post, etc.), it contains 29 Chapters, of which the negotiation of 14 chapters have relatively been finished, addressing both traditional trade issues (such as trade of goods, customs, technical barriers) and new ones (e.g. institutions, financial services, agriculture, labor, etc.). The leaked contents as well as their controversies are summarized in Appendix 1.

Negotiation up to date

Despite being expected to conclude early as most of issues are currently in agreement and in the finalizing procedure, TPP still faces lengthy and fierce debates on a number of chapters related to sensitive and controversial topics such as Intellectual Property Rights, Rules of Origin, Dispute Settlement, State-Owned Enterprises in Competition Policy, Agriculture and Textiles, etc. The main reason for the disagreement is the difference in development stage of in-bloc economies. Consequently, the goals of TPP talk conclusion in 2012, 2013 and 2014 were all missed.

Issues for Viet Nam

Entering TPP, Viet Nam is facing not only opportunities but also a variety of challenges in both trade of goods and demand for institutional reforms. According to Nguyen Thi Thanh (2013), six major challenges for Viet Nam of TPP talk table are: Rule of Origin in Textiles and Apparel sector, competition in both domestic and foreign agricultural markers, Intellectual Property Rights, reforms in State-Owned Enterprise, reforms in legal system and the requirement on labor standards.

ASEAN Economic Community (AEC)

The objective of the AEC is to promote economic development in an equitable manner, to establish economic zone with higher competitiveness, facilitating for the full integration of ASEAN into the global economy. In other words, with interchangeable characteristics of the

product rather than complement each other as in TPP, the main ambition of the ASEAN countries when forming AEC is not only limited to ASEAN, but also to attract foreign investment flow into an unified and free area of merchandise, capital and labor.

Historical root

The Association of Southeast Asian Nations (ASEAN) was established in 1967, currently composed of 10 member countries: Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei, Myanmar, Cambodia, Laos and Viet Nam. With the goal of developing ASEAN into a zone of stability, prosperity, competitiveness and growth equity, reducing poverty and economic and social inequality, at the Bali conference in 10/2003, the ASEAN leaders made a declaration on the establishment of the ASEAN Economic Community (AEC) in 2020 (Bali Concord II). After that, the objective of the completion was pushed to 2015, along with the wider and broader economic integration, adopted in Cebu Declaration, signed at the 12th ASEAN Summit in 01 / 2007.

Four pillars of AEC

Figure 1. Four pillars of AEC

Source: ASEAN's presentation at the OECD Southeast Asia Regional Forum, 24-26 March 2014, Bali, Indonesia.

At the 14th ASEAN Summit in Thailand, the ASEAN leaders signed the Cha-am/Hua Hin Declaration about the ASEAN Community Roadmap and also signed through AEC

Blueprint, specifying measures to build four pillars of integration: (1) unified market and production base; (2) competitive economic region, (3) equitable economic development and (4) integration with the global economy; followed the schedule consists of 4 stages: 2008-2009, 2010-2011, 2012-2013 and 2014-2015. By using AEC Scorecard - mechanism for periodic assessment of implementation process of member countries, Pillai (2013) concluded that the level of implementation of the measures was estimated at 79.7% in total three first stages. Nguyen Hong Son, Nguyen Anh Thu, Nguyen Tien Dung and Ha Van Hoi (2014) suggested that with this level of implementation, ASEAN still have so many works to do to complete the AEC by 2015 according to the proposed schedule.

Even though the ASEAN integration is ambitiously comprehensive, in this study, we can only use Pillar 1 as input for the simulation. In detail, the free flow of goods and free flow of services are particularly considered to construct the scenarios.

Implementation up to date

Since joining ASEAN in 1995, Viet Nam has actively committed to CEPT/AFTA terms and conditions – gradually removing tariffs and jointly signed multilateral FTAs between ASEAN and other countries (Japan, Australia – New Zealand, Korea, etc.)

AEC has various opportunities for Viet Nam including (1) regional stability support for Viet Nam's socio-economic development; (2) AEC helps promote Viet Nam's further integration into the global economy; and (3) AEC improves the bargaining power of Viet Nam with other major trade and investment partners.

Viet Nam has committed to gradually remove tariffs on 10,455 tariff lines to 0% for almost all products in 2015 and to 7% in 2018 for the rest of the products. In 2013, there were still 202 tariff lines in General Exclusion List (GEL). However, GEL until now is mainly on Tabaco and cigarettes, not on livestock.

Economic relations between Viet Nam and TPP/AEC countries

In international economics, the economic relations between a country and another or a group of countries reflects mainly through the bilateral trade as well as the flows of foreign direct investment (FDI) among them. For Viet Nam, ASEAN neighbors and a number of TPP countries are already major partners of Viet Nam in terms of trade. Regarding FDI, Viet Nam has received a great amount of capital from the big countries in these two blocs.

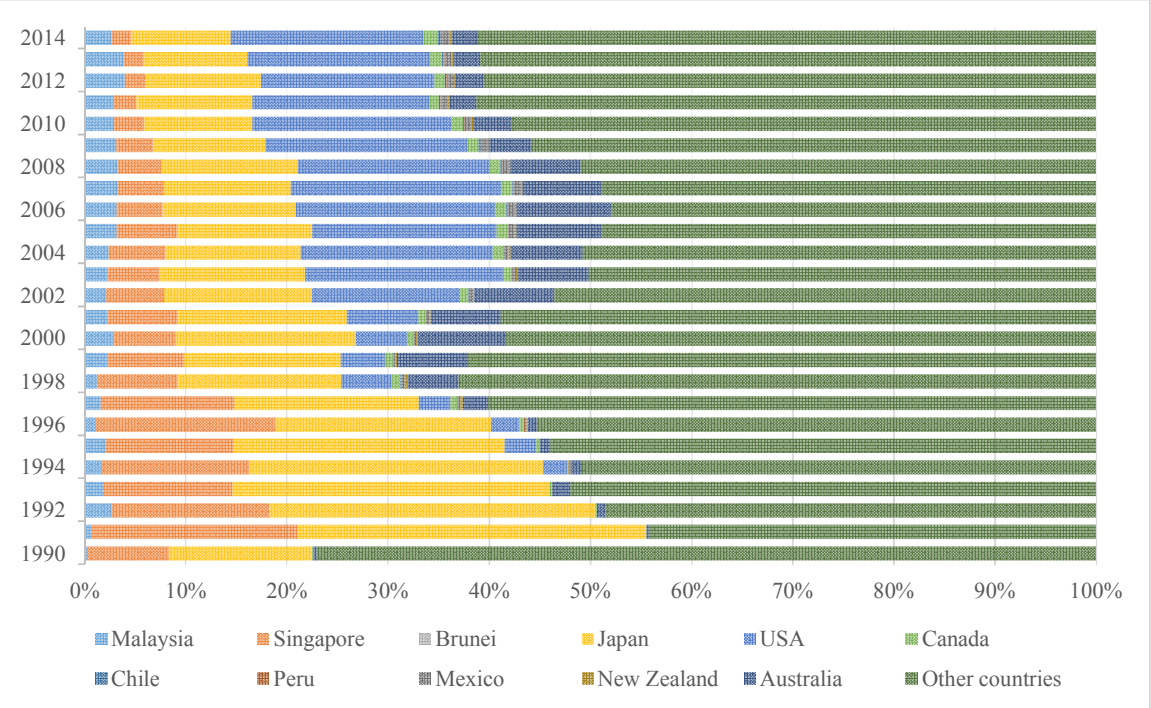
Trade relations

Both TPP and AEC blocs consist of important trade partners of Viet Nam. In details, they account for 51% of total exports from Viet Nam and 38% total imports to Viet Nam in 2014.

Viet Nam's trade with TPP countries

Since 1990, although exports of Viet Nam to the TPP countries continuously increased, its share in total export was not stable. This share peaked at 50% of Viet Nam's exports in the early 1990s and in the 2003-2007 period.

Figure 2. Viet Nam's Exports by Partner, 1990-2014



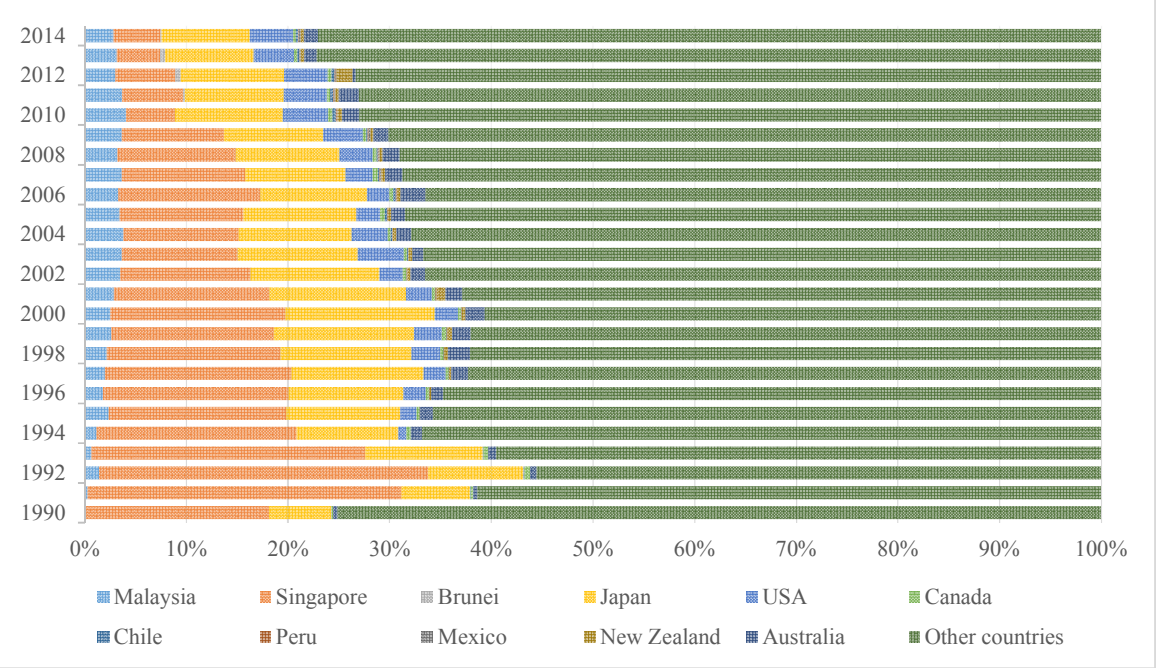
Source: Authors' calculation from CEIC Database and GSO (2015)

In the 1990s decade, Japan and Singapore were the two important trade partners of Viet Nam as exports to these markets were up to 50% of total Viet Nam's export. Since 2002, after The US-Viet Nam Bilateral Trade Agreement (BTA), exports to the US rose rapidly and the US quickly became the largest export market of Viet Nam. Also, during this period, exports to Australia also increased and accounted for approximately 10% of total exports of Viet Nam. After the world economic crisis, the proportion of Viet Nam's export to the TPP countries reduced and stabilized at 38-39%.

In TPP group, Viet Nam mainly imports from four major partners include Malaysia, Singapore, Japan and the US. The share of imports from TPP countries tended to decrease over the years, from 39.9% in 2000 to 30% in 2009, and was only at 23% in 2014. The main cause was due to the increasing imports from China, accounting for a large share of Viet Nam's import structure. In 2014, Viet Nam's imports from 11 TPP countries reached 34.0 billion USD while imports from China amounted to 43.9 billion USD and accounted for 29.6% of total imports.

Similar to trade with world, Viet Nam's trade with the TPP countries focuses on some main sectors such as electrical machinery and equipment, sound recorder (HS 85); mineral fuels, mineral oils and products of their distillation, (HS 27); apparel and clothing accessories (HS 61, 62) (Appendix 2a, 2b).

Figure 3. Viet Nam's Imports by Partner, 1990-2014



Source: Authors' calculation from CEIC Database and GSO (2015)

Viet Nam's exports to TPP countries still focus on labor-intensive goods such as clothing and apparel; footwear, gaiters and the like (HS 64); machinery products, electronic equipment (HS 85); furniture (HS 94); etc. In 2013, according to the Classification by HS code 2-digit, ten major commodity groups exported by Viet Nam to TPP countries reached 39 billion USD, accounted for 75.52% of export turnover to these countries. In particular, Japan and the US are the two main export markets and account for 3/4 of total exports from Viet Nam to TPP countries. With other markets, Viet Nam mainly exports a number of goods such as mineral fuels, mineral oils and products of their distillation (HS 27) to Malaysia (18.15%) and Australia (28.30%). Malaysia is also a major market for machinery products, electronic equipment (HS 85) from Viet Nam with 1.84 billion USD accounting for 23.28% of total export of this commodity. According to Nguyen Hong Son *et al*. (2014), these items are products which Viet Nam has comparative advantage with the Revealed Comparative Advantage (RCA) index greater than 1. Especially, when calculating the RCA index based on trade data classified by SITC, the authors showed that Viet Nam has advantages in labor-intensive goods such as furniture, handbags, footwear and apparel (HS 42, 61, 62, 64 and 94). Viet Nam also has some

advantages in fish and crustaceans, mollusks (HS 03), with RCA of this commodity in 2012 is 7.77 (Nguyen Hong Son *et. al*, 2014).

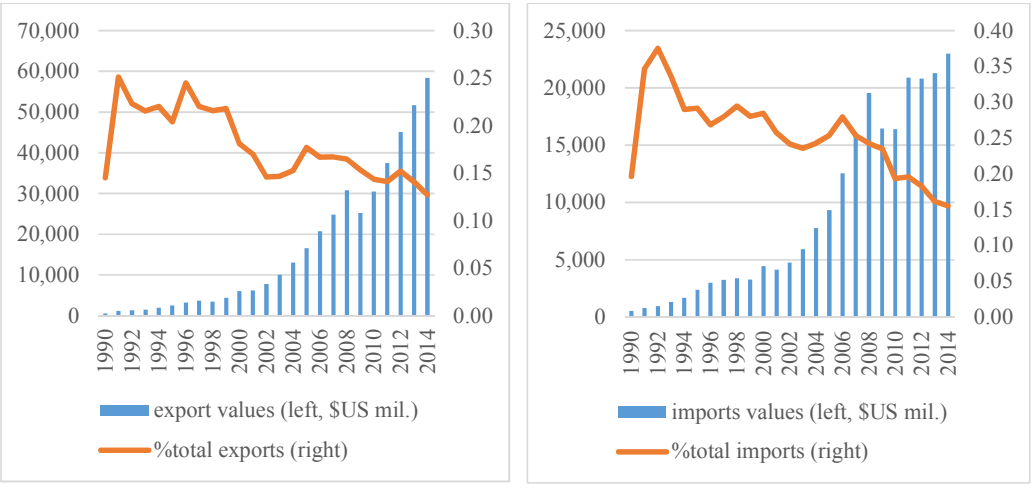
Not only export, Viet Nam also imports large amount of electrical machinery and equipment, sound recorder (HS 85) and mineral fuels, mineral oils and products of their distillation (HS 27). Import turnover of these two commodity groups reached 9.75 billion USD compared to 13.65 billion USD and accounted for 35.15% of Viet Nam's import turnover from TPP countries. These commodities mainly came from Singapore, Malaysia, Japan, Brunei and Canada. Viet Nam also imported some other items from TPP countries such as plastic and articles thereof (HS 39); Iron and steel and articles thereof (HS 72, 73); nuclear reactors, boilers, machinery and mechanical appliances, parts thereof (HS 84) from Japan; cotton (HS 52); residues and waste from the food industries, prepared animal fodder (HS 23) from Canada; and cereals (HS 10) from Australia.

Viet Nam's trade with AEC countries

Data on exports and imports of Viet Nam with regional countries have shown the decrease in its share of total trade. In terms of values, Viet Nam's exports to AEC countries have continuously increased, however, the proportion of total exports declined over time. In 2014, Viet Nam's exports to the AEC reached 19.09 billion USD and accounted for 12.7% total export turnover.

Similarly, imports from the AEC countries declined from over 30% in 1990 to 15.5% in 2014, corresponding to 23 billion USD. In which, the major partners are still Thailand, Malaysia, Singapore and Indonesia. This shows that Viet Nam's trade flows are gradually shifting to new partners such as the US, South Korea, China and the EU instead of the traditional regional partners.

Figure 4. Viet Nam's Trade with AEC Countries



Source: Authors' calculation from CEIC Database and GSO (2015)

Unlike with the TPP markets, Viet Nam's trade with AEC countries does not focus on goods that have comparative advantage such as footwear, apparel and clothing, but plastics, rubber, glass and glassware (HS 39, 40, 70); wood and paper (HS 44, 48); electrical machinery and equipment, sound recorder (HS 85); mineral fuels, mineral oils and product of their distillation, (HS 27). Similar to trade with TPP countries, both exports and imports of the two main commodity groups (HS 85, 27) account for the largest share of trade between Viet Nam and the AEC countries, in which, Viet Nam mainly imports from Singapore and exports to Malaysia (HS 85, 17) and Cambodia (HS27) (Appendices 2c and 2d).

According to statistical data, in 2013, exports of rubber, plastic to the ASEAN countries reached 5.7 billion USD, which mainly focused on Cambodia and Indonesia (HS39) and Malaysia (HS 40). Cereals (HS10) is also a major export item of Viet Nam to Malaysia, Philippine and Singapore. Nguyen Hong Son *et. al* (2014) indicated that the comparative advantages of Viet Nam were similar to the rest of ASEAN, including items such as wood, rubber, cereals, which have RCA larger than 1.

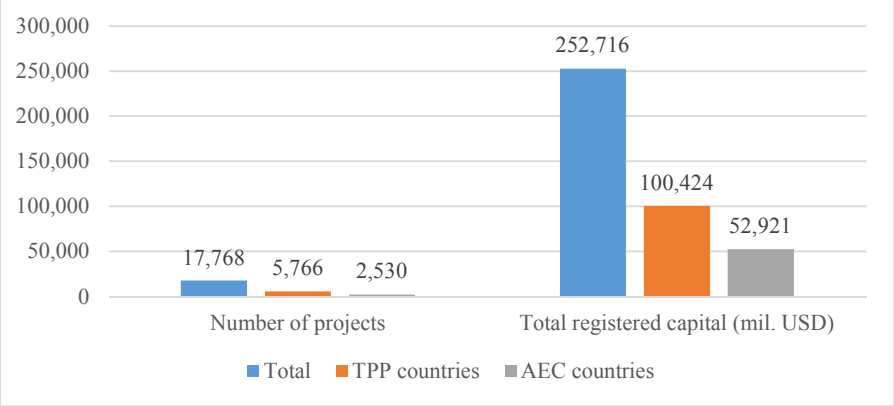
In terms of imports, excluding wood (HS 44) mainly imported from Laos; animal or vegetable fats and oils (HS 15) from Malaysia; paper and paperboard (HS 48) from Indonesia, the rest of the products are mostly imported from Thailand such as rubber, plastics and their products (accounting for approximately 50% of the import value of these two commodities); nuclear reactors, boilers, machinery and mechanical appliances; parts thereof (HS 84); vehicles (HS 87) and organic chemicals (HS 29).

Foreign direct investment

Foreign direct investment in Viet Nam

Based on both of registered capital and the number of projects, TPP countries are always one of the largest investors to Viet Nam.

Figure 5. Foreign Direct Investment in Viet Nam



Note: Accumulation of projects having effect as of 20th December, 2014
Source: GSO (2015)

With accumulation of the valid projects, the level of foreign direct investment from TPP countries tends to double both in value and the number of projects when compared with those from ASEAN countries. This is understandable when most of the participant countries of TPP are advanced countries such as Japan, Singapore, US, and also the largest trading partners of Viet Nam. By the end of 2014, two out of four countries, which were the biggest foreign direct investors to Viet Nam, are TPP's members. At the same time, 8 of the 11 TPP countries have about 5.8 thousand valid investment projects in Viet Nam, accounting for 32.5% of total number of projects, in which, Japan and Singapore are the two biggest investors with 2,531 and 1,367 projects respectively.

Table 3. Viet Nam's FDI from TPP Countries

	Number of projects	Total registered capital (million USD)
Japan	2,531	37,334.5
Singapore	1,367	32,936.9
United States	725	10,990.2
Malaysia	489	10,804.7
Canada	143	4,995.2
Australia	326	1,656.0
Brunei	160	1,624.4
New Zealand	25	82.1
Rest of World	12,002	152,292.0

Note: Accumulation of projects having effect as of 20 December, 2014
Source: GSO (2015)

In terms of register capital, the total accumulation capital of projects having effect as of 20th December, 2014 from TPP partners achieved 100.4 billion USD, accounting for 39.7% of register FDI to Viet Nam, in which, Japanese investors contributed about 37.3 billion USD, Singaporean investors 32.9 billion USD, the US and Malaysia have the same amount of about 10.9 billion USD.

Table 4. Viet Nam's FDI from AEC Countries

	Number of projects	Total registered capital (million USD)
Singapore	1,367	32,936.9
Malaysia	489	10,804.7
Thailand	379	6,749.2
Brunei	160	1,624.4
Indonesia	42	386.4
Philippines	72	298.1
Laos	8	66.8
Cambodia	13	54.6
Rest of World	15,238	199,794.9

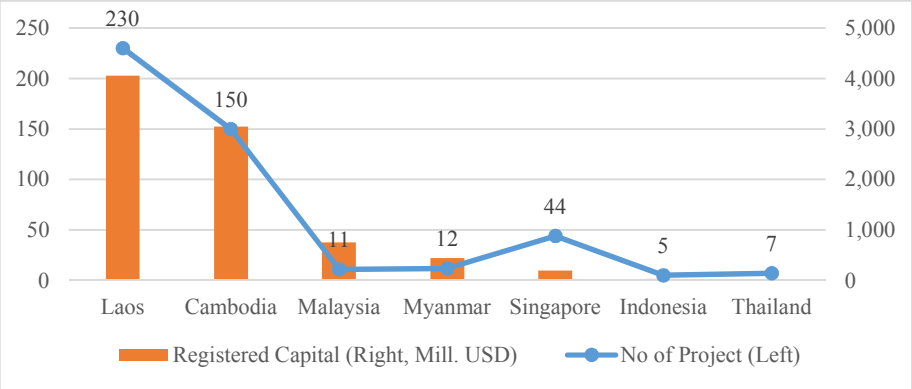
**Note:* Accumulation of projects having effect as of 20 December, 2014
Source: GSO (2015)

The majority of investment between ASEAN and Viet Nam comes from two TPP's participants (Singapore and Malaysia). Among the rest of AEC countries, Thailand has the biggest foreign direct investment capital to Viet Nam, with 379 valid projects and 6.75 billion USD accumulated capital at the end of 2014.

Viet Nam's Outward Foreign Direct Investment

Along with exports to two neighbor countries, in recent years, Viet Nam has begun to invest to Laos and Cambodia. In 2013, Viet Nam exported 3.4 billion USD to the two countries, about 18.1% the total exports of Viet Nam to ASEAN. Meanwhile, Viet Nam has 380 projects licensed with the total capital of 7.1 billion USD in Laos and Cambodia (accumulation of projects having effect as of 31 December, 2013).

Figure 6. Viet Nam's Direct Investment Oversea projects licensed



Note: Accumulation of projects having effect as of 31 December, 2013
Source: Statistical Yearbook of Viet Nam (2013)

Therefore, while some of countries in AEC are the markets which Viet Nam aims to conduct direct investment projects, TPP's countries are major investment partners of Viet Nam.

IMPACTS OF TPP AND AEC ON VIET NAM'S ECONOMY

Methodology: Computable General Equilibrium Model

This section, after providing a literature review on the models used for evaluating the impact of trade liberalization on various economies, discusses in details the model we use in this study. In particular, the model, the assumptions, the databases and the scenarios are described.

Literature Review

Studies on the impacts of trade liberalization are numerous ranging from huge models that cover a wide range of economies using extensive databases to those that go deeper into specific industries to analyze the (potential) impacts of a specific or a number of liberalization movement(s). In this study, with the aim to assess the macroeconomy and the livestock sector of Viet Nam, we review related quantitative researches that use either a general equilibrium approach or a partial equilibrium approach or both.

Since the beginning of the TPP negotiation, there has been a great deal of literature on ex-ante assessment of TPP's impacts on the member economies. Most cited studies are the ones using static computable general equilibrium (CGE) model of Todsadee, Kameyama and Lutes (2012), Petri, Plummer and Zhai (2012) and Kawasaki (2014) or dynamic CGE by Itakura and Lee (2012) and Cheong (2013) to simulate the effects of trade liberalization of TPP and prospective FTA in Asia/Asia-Pacific region.

Petri, Plummer and Zhai (2012) used CGE model and employed the GTAP 8 database, with a number of changes in parameters compared to the standard GTAP model. They constructed 9 scenarios depending on the coverage of integration into TPP and Asian FTA. Simulation results show that the US and China would be the center of TPP and Asian bloc, and participation of large economies such as Japan and Korea will increase the economic gains for the whole blocs. FTAAP originated from TPP will be more service-oriented liberalized and focus more on social issues compared to the FTAAP starting from Asia-FTA.

Itakura and Lee (2012) implemented simulations with the recursively dynamic GTAP which extends the standard GTAP model by incorporating the international capital mobility and accumulation of capital stock, based on GTAP database version 7.1. Besides the baseline scenario, the authors constructed 4 scenarios for simulation: TPP-track, Asia-track, and delayed-Asia-track and Global trade liberalization. Different from Petri *et al.* (2012), Itakura and Lee (2012) had a longer time period for implementation (2013-2030) and another direction of FTA expansion (the Asia-track starting from ASEAN instead of East Asia integration). Their results shows that Asia-track will gave larger welfare gains than the TPP-track, however due to uncertainty about the creation of pan-Asia FTA, TPP is now a more desirable option for Asia-Pacific countries.

Todsadee, Kameyama and Lutes (2012) used static GTAP model and GTAP 7 database with base year 2004 to simulate TPP's impacts on TPP economies and a number of livestock sub-sectors. At macro level, they share relatively similar results with above studies. At sectoral level, the meat production expands more in both absolute and relative term in Australia (20.19 million USD or 6.59%), Chile (15.61 million USD, –9.90%), New Zealand (12.61 million USD, –3.81%), Canada (10.68 million USD, –4.09%) and the US (7.08 million USD, –3.85%). In contrast, Viet Nam, Japan and Malaysia will experience a decline in livestock output. The range of contraction is from 24.81% to 53.06% for Japan, 0.25% – 3.6% for Malaysia and 0.01% – 1.78% for Viet Nam depending on sub-sectors.

Also applying the recursively dynamic GTAP model and GTAP 8 database, Cheong (2013) assessed the impacts of TPP in period 2013-2027 through three scenarios: TPP9, TPP12 and TPP12+PRC. Results reveals that the economic gains for member countries will increase if the coverage of integration expand, except for Peru, Malaysia and Viet Nam, though the difference is not really significant in term of percent change of GDP.

Kawasaki (2014) also used GTAP 8 database for his static GTAP model to assess the impacts of TPP, RCEP[1] and FTAAP[2] on Asia-Pacific economies (APEC). The author constructed 6 scenarios: 2 for each of the FTAs mentioned above (one scenario of tariff removal and the other of tariff removal plus NTBs reduction). Results reveal that the income gain for APEC from TPP is 1.2% of regional GDP, from RCEP 1.0% and from FTAAP 4.3%. Moreover, the tariff removal together with NTB reduction will bring larger income gains than tariff removal only, implying that domestic reforms are necessary for signatory countries to take advantage from integration. Besides, when disaggregating the driving factors of income increase in all 6 scenarios, the dynamic effects of technology improvement and capital increase are the main ones, much greater than the static impacts of terms of trade and resource reallocation.

Burfisher *et al*. (2014) uses a static GTAP model and GTAP database version 8 in order to analyze the impacts of TPP on agriculture. The authors constructs two scenarios to simulate the development between 2014 and 2025 (the expected completion year of TPP implementation): (1) a baseline scenarios adopting the available prediction on GDP growth, capital and labor increase, demographic and dietary changes, together with the implementation of other prospective FTAs; and (2) TPP scenario: all the above changes, plus the removal of tariffs and quotas for all industries among TPP countries. The results show that compared to the baseline scenario, TPP helps increase the intra-TPP agricultural trade by 6% and the US

[1] Regional Comprehensive Economic Partnership: multilateral FTA consists of many Asian-Pacific countries (10 ASEAN countries, Japan, Australia and New Zealand), proposed by China in 2011, the main difference from TPP is the participation of China, India and South Korea and exception of the US.
[2] Free Trade Area of the Asia-Pacific: this idea received mutual agreement at the APEC Meeting in 2006. In 2010, the "Pathways to FTAAP" was released with the target of concluding implementation in 2016. FTAAP can be considered as the united bloc of TPP and RCEP.

accounts for largest part (33%) of agricultural export increase while Japan makes up the biggest share (70%) of agricultural import increase. Trade in rice, sugar and other meat observes the highest percentage changes; on the other hand, bovine meat, other foods and poultry meat will have the largest figures in absolute term. Trade expansion in meat account for 43% expansion in intra-TPP agricultural trade in 2025, with Australia, the US, Canada and New Zealand being the main suppliers. Japan will be the biggest meat importer. Output in almost all agricultural sectors of Viet Nam and Singapore will decline, while gains achieved most in Australia (meat), New Zealand (dairy) and Singapore (other agriculture).

All studies reviewed above share a similar conclusion that almost all signatory countries would gain in terms of real GDP and economic welfare. Viet Nam will benefit the most with regard to the GDP increase in percentage. The main points are as follows:

First, the deeper integration will bring more economic gains: the increase in real GDP, welfare and income rise gradually when scenario changing from tariff removal only to tariff removal plus NTB reduction. For instance, the income gain for Viet Nam will double from 9.9% in tariff-removal scenario to 18% in tariff-removal + NTB-reduction scenario (Kawasaki, 2014).

Second, the total welfare and total real GDP of the whole bloc will increase when the number of TPP members increase. However, the economic benefits are likely to be shared with the new-comers, such as Viet Nam. In case China enters TPP, almost all in-bloc economies will observe a significant economic gain, and vice versa for out-siders (Cheong, 2013).

Third, comparing the 2 free trade blocs (TPP and RCEP), Viet Nam will gain more if participating in TPP than in RCEP. In the ideal case, when TPP and RCEP can be united into FTAAP, the economic gain for Viet Nam will be higher than participating in either of them (Kawasaki, 2014; Itakura & Lee, 2012).

However, those studies employed GTAP 8 database with base year 2007 or older, together with quite ambitious scenarios of reducing 25%-50% NTBs for countries on signing TPP and/or did not discussed Viet Nam in details. This study aims to improve these weak points by using the GTAP 9 database with base year 2011 and more realistic scenarios with more reasonable extent of NTB reduction.

The Model

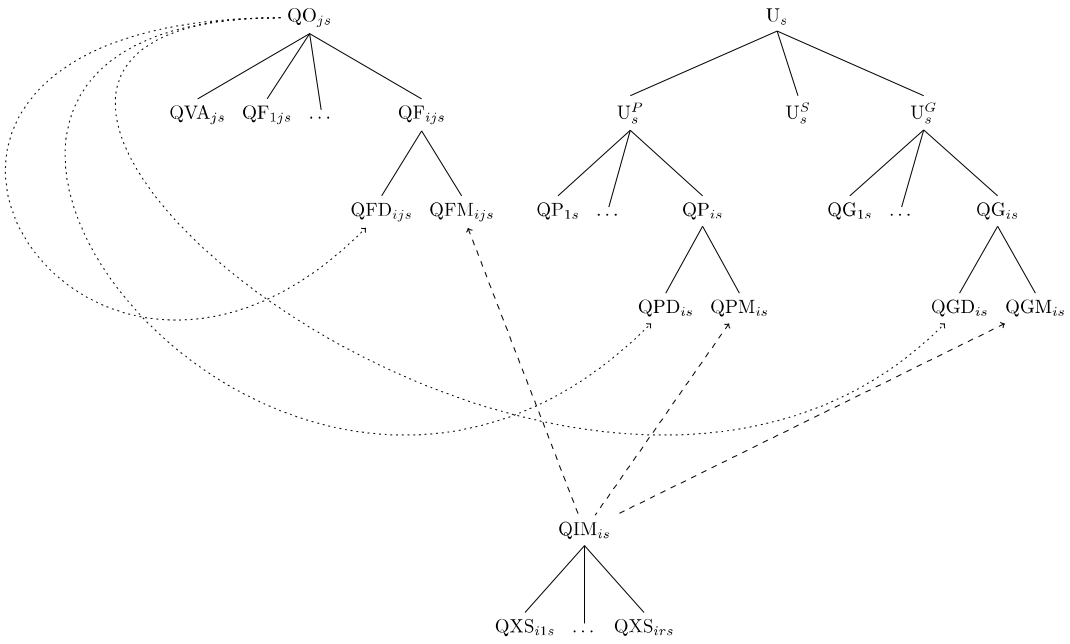
To analyze the impacts of TPP and AEC on the whole economy and its economic sectors, we use a standard GTAP model with database version 9. The results of the simulation exercises using GTAP 9 are used to discuss the impacts on the macroeconomy and the livestock sector.

Standard GTAP Model

Quantitative analysis of trade liberalization requires data on international trade matrix by country and by commodities, evaluated at different prices such as f.o.b., c.i.f., and tax-

inclusive market prices. Trade data does not suffice for our analysis as we need to include the consideration of impacts on production, consumption, investment, and economic welfare for all participating countries as well as non-participating countries, in order to cover the entire global economy. Thus, we are conducting a globally economy-wide analysis to assess the economic effects of TPP and AEC implementation. For this purpose, we use the computable general equilibrium (CGE) model of global trade and the database developed by the Center for Global Trade Analysis, Purdue University, known as GTAP model and GTAP Data Base. The details of multi-region, multi-sector GTAP model (Hertel 1997; McDougall 2003) and the GTAP Data Base version 9 (Narayanan, Aguiar, and McDougall 2015) covering 140 regions (countries) and 57 industrial sectors with 2011 benchmark year can be readily accessed at the GTAP website (www.gtap.org). The standard GTAP model is a comparative static general equilibrium model of global trade. It assumes perfect competition, constant returns to scale of production technology, and differentiation of trades based on the place of origin (Armington, 1969). Figure 7 outlines the structure of standard GTAP model in a form of tree diagram.

Figure 7. Structure of the GTAP Model



Source: Authors'

On the right-hand part, economic welfare of the representative regional household in region s, U_s is determined by private consumption, U_s^P, of goods and services (QP_{is}), savings, U_s^S, and public expenditures, U_s^G, on QG_{is}. Goods and services are composed of domestic products (QPD_{is}, QGD_{is}) and imports (QPM_{is}, QGM_{is}). Here, the substitution between domestic and imported goods is based on product differentiation by the place of origin.

Further, the imports are also differentiated by the sources where the goods are produced (QXS_{irs}). The left-hand part of the tree diagram describes the production of good j, QO_{js}. Under the constant return to scale production technology, value added items (QVA_{js}) such as labor and capital are assembled with intermediate inputs (QF_{ijs}) that is again subject to the product differentiation by the place of origin.

GTAP Database Version 9

Because of the direct use of the 140-region and 57-sector GTAP database for our simulation is costly in computation, we aggregate the GTAP database to 23 regions and 22 sectors (Appendices 4a, 4b). It should be noted here that the simulation results could be affected by the degree of aggregation. Using this sector aggregation, we define livestock sub-sectors as animal products (OAP), meat products of cattle, sheep, goats, horse (CMT), other meat products (OMT), raw milk (RawMilk), and dairy products (Dairy). We will refer these sub-sectors as livestock sub-sectors throughout this report.

Tariff barriers

The aggregated GTAP database is used to compute average applied import tariff rates. For Viet Nam, Table 5 shows imports from the TPP and AEC partners and associated average applied import tariff rates by sector. Total imports of Viet Nam in 2011 amounts to about 121 billion USD, of which the imports from the TPP partners accounts for one fourth, about 30 billion USD, whereas the AEC partners 17 percent or 21 billion USD. Most of the imports are concentrated in two manufacturing sectors; chemical and metal products (MProc) and other manufactured products (OthMnfc). For instance, the table indicates that the Viet Nam's MProc imports from the TPP counterparts is about 12 billion USD and subject to the applied tariff rate by 4.4 percent, whereas OthMnfc imports is 7 billion USD under 6.5 percent tariff rates.

Viet Nam's imports of livestock products are small as compared to the manufactured products. The largest imports of livestock products are dairy products (Dairy) that amount to 448 million USD subject to 4.6 percent import tariffs. Other meat products (OMT) from TPP partners are the second largest (141 million USD), imposed relatively high import tariff rates (17.5 percent). Imports of livestock products from AEC partners are negligible.

Table 5. Viet Nam's Imports and Exports and Applied Tariff Rates

	Total imports, USD, mil.	Imports from TPP partners		Imports from AEC partners		Total Exports, USD, mil	Exports to TPP partners		Exports to AEC partners	
		USD, mil.	Tariffs (%)	USD, mil	Tariffs (%)		USD, mil.	Tariffs (%)	USD, mil	Tariffs (%)
Rice	47	0	24.4	5	5.4	3,474	426	33.5	1,968	21.9
OthCrops	5,088	1,799	1.6	443	4.0	6,345	1,722	0.4	443	6.6
Cattle	19	17	1.8	2	0.0	6	1	0.0	0	0.0
OAP	270	125	0.7	11	2.1	203	105	0.6	11	3.9
CMT	795	27	13.6	0	6.4	5	0	0.9	0	6.5
OMT	307	141	17.5	6	7.7	112	4	3.0	4	4.0
RawMilk	1	0	0.0	0	0.0	0	0	0.0	0	0.0
Dairy	582	448	4.6	28	5.8	67	2	22.3	16	15.3
Forestry	376	56	0.2	179	0.1	63	4	0.6	3	3.2
Fishing	224	34	1.4	24	1.0	161	105	0.8	11	1.3
CMOG	610	85	1.8	164	0.2	9,278	5,412	0.3	2,571	0.6
ProcFood	7,538	1,875	12.1	2,115	6.8	8,112	3,163	2.9	774	9.3
Textiles	11,624	1,101	7.2	835	2.8	7,099	3,150	8.4	686	2.9
Apparel	1,340	59	13.2	23	5.2	11,218	7,330	10.8	52	4.8
LSMnfc	1,520	165	3.5	138	4.6	10,057	3,735	14.6	282	3.2
WoodProducts	3,252	838	6.1	1,275	2.9	6,528	3,998	0.4	183	3.4
MProc	45,671	11,630	4.4	9,950	4.5	11,841	3,837	1.0	3,253	5.5
ElecEquip	9,083	2,338	0.9	1,457	0.9	9,940	1,630	0.2	1,048	1.1
OthMnfc	25,607	7,111	6.5	3,717	5.6	12,082	5,840	0.7	1,393	5.5
Util_Cons	646	114	0.0	19	0.0	478	74	0.0	,23	0.0
TransComm	2,679	528	0.0	147	0.0	2,208	508	0.0	101	0.0
OthServices	4,194	1,131	0.0	150	0.0	3,141	912	0.0	122	0.0
Total	**121,474**	**29,623**	**4.9**	**20,687**	**4.3**	**102,416**	**41,959**	**4.7**	**12,945**	**6.6**

Note: Viet Nam's exports are based on the partner countries' c.i.f. import values.

Source: Authors' calculation from GTAP Database version 9

Viet Nam's exports to the world, TPP and AEC partner countries are also reported in Table 5. Note that all the figures in the table are evaluated by the partner countries c.i.f. import values, so that the average applied import tariff rates can be computed. Viet Nam's total exports surpass 100 billion USD, and main sectoral exports are OthMnfc, MProc, and Apparel. Similarly, for TPP partners, Viet Nam exports mostly manufactured products. The largest sectoral export to TPP members is Apparel (7.3 billion USD) and it faces relatively high average applied import tariff rates of 10.8 percent. The highest tariff rate is observed for Rice exports from Viet Nam (33.5 percent), followed by Dairy exports (22.3 percent). For AEC tariff rates are also relatively high for Rice (5.4 percent for import to Viet Nam and 21.9 percent for export from Viet Nam), Dairy (5.8 percent and 15.3 percent, respectively), and ProcFood (6.8 percent and 9.3 percent, respectively). However, the amounts of exports of Rice and especially Dairy are not significant in value as compared to the other manufacturing products. In general, we are expecting to observe larger changes in export volumes which are subject to higher tariffs, once the TPP partners remove the import tariffs.

Non-tariff barriers

For the services trade, there is no tariff data reported in the GTAP database. It is a challenging and difficult task to obtain tariff equivalent information with respect to bilateral services trades. There are some attempts to estimate tariff equivalents of services trade barriers, such as Thelle *et al*. (2008), Copenhagen Economics and Francois (2007), and Wang *et al*. (2009). Their estimation is based on sector specific gravity model, and country average of tariff equivalents are obtained from estimation results. It is rather extreme to assume that all the tariff equivalents of services trade can be eliminated by trade liberalization, given the existence of natural trade barriers, for example. Following the empirical study by Hayakawa and Kimura (2014), we assume that the TPP and AEC will lower the non-tariff barriers by 7 percent. The size of reduction in tariff equivalents of services trade is reported in Table 6. Note that Singapore and the US are used as benchmark countries, and Brunei does not have an estimate due to data limitation.

Table 6. Reduction in Tariff Equivalents of Services Trade Barriers (%) and Shipping Days

	Util_Cons	TransComm	OthServices	Days
Viet Nam	4.22	4.14	4.11	1.26
Australia	1.75	1.59	1.58	0.7
NewZealand	0.49	0.34	0.22	0.56
Japan	1.8	1.61	1.59	0.84
Brunei	..	..	..	..
Malaysia	2.72	2.54	2.55	0.7
Singapore	0	0	0	0.42
Canada	1.44	1.56	1.47	0.98
US	0	0	0	0.42

Mexico	3.58	3.56	3.53	0.98
Chile	2.19	1.89	2.18	1.12
Peru	3.16	3.03	2.99	1.4
Cambodia	3.1	3.2	3.2	1.54
Indonesia	4.5	4.5	4.3	1.68
Laos	2.4	2.4	2.6	1.96
Philippines	4.1	4.0	3.9	0.84
Thailand	3.5	3.5	3.4	0.7
RoSEAsia	..	..	..	0.56
China	2.5	4.4	4.0	1.19
Korea	2.5	2.2	2.3	0.7
India	5.1	5.0	5.1	1.68
EU_25	0.8	0.8	0.6	0.77
RestofWorld	2.9	2.9	2.9	1.33

Source: Authors' calculation, based on Wang, *et al*. (2009); Hayakawa and Kimura (2014) and Minor (2013)

We also consider the potential gains arising from logistic improvement as a form of trade facilitation implemented by TPP and AEC. Minor (2013) estimates the average cost of time delays in trade, and which can be another form of non-tariff barriers. His estimate can be used with the World Bank's Doing Business Survey that provides on logistic time of importing merchandise goods. Thus, if they combined, we can incorporate the potential effect of TPP and AEC on trade facilitation expressed as tariff equivalents of time saving. We assume 7 percent logistic improvements on importing goods in our simulation. Table 6 reports the amount of days to import to be reduced, except for Brunei where the estimate is not available.

Besides, the improvement of services trade and logistics in TPP/AEC countries, in reality, is the advancement of the whole trading system in these countries. As a result, in the optimistic scenarios, we assume that the 7 % reduction in non-tariff barriers can be spread to all 23 regions thanks to the spillover effect of trade facilitation.

Main assumptions

Regarding our simulation, several assumptions are made. We simulate removals of tariffs and reductions in non-tariff barriers for the TPP and AEC member countries based on the GTAP Database version 9 with the benchmark year of 2011 and additional data. They are not reflecting the actual year of the TPP implementation, but we assume that the tariff rates and estimated non-tariff barriers are approximately close to the actuals. As we apply the comparative static GTAP model, we assume the followings: no explicit treatment of time, perfectly competitive markets, constant returns to scale production technology, fixed endowments of primary factor inputs such as land, natural resources, capital, skilled and unskilled labor for production activities. Goods and services are allowed to move across borders but not for the primary factors.

Scenarios

In this study, we construct 6 scenarios to be used in GTAP model:

a. Tariff removal for the TPP partner countries,
b. Scenario a + 7% reduction in non-tariff barriers (NTBs) for the TPP partner countries
c. Scenario a + 7% reduction in NTBs for all countries/regions
d. Tariff removal for the ACE partner countries
e. Scenario d + 7% reduction in NTBs for all AEC partner countries
f. Tariff removal for TPP and AEC countries + 7% reduction in NTBs for all countries/regions

Aiming at assessing the impacts of international integration, particularly the TPP and AEC, on the Vietnamese economy and its livestock sector, the 6 scenarios are designed regarding the scope of trade liberalization. The first 5 scenarios are to simulate the effects of joining TPP and AEC separately, while the last one is for the joint impact of implementation of both blocs.

The first 3 scenarios deal with the impacts of tariff removal or/and reduction of ad valorem equivalents of NTBs when TPP comes into effect. In scenario a, tariffs are lifted completely while NTBs still remain. In scenario b, intra-TPP trade is further liberalized by an additional reduction of 7% ad valorem equivalent of NBTs due to the improvement in logistics and services as signatory countries' commitment of trade facilitation. Scenario c implies that this enhancement of logistics and services will not only benefit TPP countries but also non-TPP countries thanks to the spillover effect.

Similar to the first 2 scenarios, scenario d and e simulate the case when tariffs and NTBs are lifted among AEC countries.

Finally, scenario f is for the broadest case when both TPP and AEC are implemented, therefore tariffs among countries joining these two blocs will be removed completely plus a 7% cut of NTBs for all countries/regions in the world owing to the spillover of trade facilitation to global scale.

Analysis of the impacts of TPP and AEC on Viet Nam's economy

This section is devoted to presenting and discussing the results of the simulation exercises using the model we described above. The impacts of TPP and AEC on various aspects of Viet Nam's macroeconomy and its sectors in relation to its trading partners and competitors are provided. It should be noted that changes in the main economic indicators discussed below are under the impact of TPP and/or AEC only. Other factors such as technology growth, possible economic crises, and government policies… can promote or hinder these changes in the economy.

Real GDP[3]

Table 7 reports the simulation results on real GDP obtained from the six scenarios. Impacts on real GDP are computed both in percent change as well as change in million USD measured in 2011 constant prices. Viet Nam's increase in real GDP stands out in percent change for all three scenarios of TPP (scenario a, b, and c) and scenario f for TPP and AEC. Given the fact that scenario d and e of AEC result in positive but small gain in real GDP, it can be reasonably understood that liberalization components of TPP are the driving forces generating gains in real GDP.

As the liberalization of TPP extended from the removal of import tariff (scenario a) to the reduction in non-tariff barriers (Scenario b and c), the gains accrued to real GDP are increasing for all TPP partner countries. However, in AEC scenarios (scenario d and e), countries participating in TPP only, namely Japan, Australia, the US, etc., hardly experience any effect on real GDP. Meanwhile, similar to Viet Nam, countries joining both blocs such as Brunei, Malaysia and Singapore gains significant increases in real GDP in all scenarios. In contrast, the rest which belongs to neither of these two blocs, with the outstanding example of China and India, will be worse off after TPP and/or AEC being implemented, depending on scenarios.

Table 7. Simulation Result on Real GDP (% change, billion USD)

	% change						change in billion USD					
	a	b	c	d	e	f	a	b	c	d	e	f
VietNam	1.03	1.32	2.11	0.11	0.28	2.04	1.40	1.79	2.86	0.15	0.38	2.77
Australia	0.07	0.12	0.20	0.00	0.00	0.19	0.96	1.65	2.74	-0.02	-0.02	2.69
NewZealar	0.06	0.11	0.15	0.00	0.00	0.15	0.10	0.18	0.24	0.00	0.00	0.25
Japan	0.21	0.23	0.28	0.00	0.00	0.31	12.44	13.80	16.60	-0.09	-0.11	18.36
Brunei	0.19	0.19	0.19	0.16	0.16	0.20	0.03	0.03	0.03	0.03	0.03	0.03
Malaysia	0.14	0.30	0.57	0.12	0.19	0.67	0.41	0.86	1.66	0.34	0.55	1.95
Singapore	0.01	0.07	0.14	0.06	0.09	0.17	0.04	0.19	0.39	0.16	0.26	0.46
Canada	0.22	0.34	0.41	0.00	0.00	0.42	4.00	6.03	7.26	-0.01	-0.01	7.54
US	0.00	0.01	0.03	0.00	0.00	0.03	0.04	1.88	4.19	-0.09	-0.11	4.24
Mexico	0.03	0.15	0.22	0.00	0.00	0.24	0.32	1.74	2.63	0.00	0.00	2.86
Chile	0.01	0.11	0.26	0.00	0.00	0.26	0.03	0.27	0.64	0.00	0.00	0.66
Peru	0.00	0.10	0.27	0.00	0.00	0.27	0.01	0.17	0.46	0.00	0.00	0.47
Cambodia	-0.16	-0.17	0.74	0.12	0.59	1.75	-0.02	-0.02	0.09	0.02	0.08	0.23
Indonesia	-0.02	-0.02	0.25	0.02	0.08	0.35	-0.13	-0.15	2.12	0.21	0.68	2.95
Laos	0.01	0.01	0.69	-0.04	0.45	0.70	0.00	0.00	0.06	0.00	0.04	0.06
Philippines	-0.01	-0.02	0.27	0.08	0.14	0.40	-0.03	-0.04	0.61	0.19	0.30	0.90
Thailand	-0.06	-0.07	0.58	0.10	0.19	0.90	-0.21	-0.24	1.99	0.35	0.65	3.11
RoSEAsia	-0.01	-0.01	0.04	-0.01	0.01	0.06	0.00	0.00	0.02	-0.01	0.01	0.03
China	-0.03	-0.03	0.17	0.00	0.00	0.14	-1.99	-2.24	12.86	-0.14	-0.18	10.77
Korea	-0.03	-0.04	0.22	-0.01	-0.01	0.21	-0.36	-0.43	2.63	-0.07	-0.09	2.48
India	-0.01	-0.01	0.52	-0.01	-0.01	0.50	-0.20	-0.25	9.72	-0.10	-0.12	9.45
EU_25	0.00	0.00	0.17	0.00	0.00	0.17	-0.67	-0.83	29.76	-0.23	-0.27	29.36
RestofWor	-0.01	-0.01	0.34	0.00	0.00	0.33	-0.85	-1.13	50.14	-0.21	-0.26	49.58

Source: Authors' simulations

However, once the global reduction in non-tariff barriers is implemented under scenario c and f, then even non-TPP and non-AEC member countries are experiencing gains in real GDP.

[3] As GTAP 9 has base year of 2011, real GDP = nominal GDP in 2011

Examples are China, India, EU-25, albeit with different levels of gains as compared to the size of their GDP.

Though remarkable, it should be noted that as Viet Nam's GDP level is small compared to some other members and thus the gain in GDP value is much smaller as measured in dollars, about one eighth of Japan's and one third of Canada's in most scenarios. Remarkably, the US can only achieve considerable gains in GDP value in cases where not only tariff but non-tariff barriers are partly removed as well. The main reason for this is that import tariffs imposed by the US are already at low rates prior to TPP. Both Japan and the US, being not a member of AEC, stand to lose in cases d and e where only AEC comes into effect. In both TPP and AEC cases, China will lose a small amount but will gain considerably if the removal of tariffs and partial non-tariff barriers by TPP and AEC members spills over to China as well (case c and f). The same happens to EU and India. Obviously, the removal of trade barriers can bring considerable benefits in GDP term to all countries.

For scenario b and e, Table 8 decomposes the change in real GDP by its components: consumption, investment, government expenditure, and exports and imports. Large increases in investment and consumption (9.2 and 5.1 percent, respectively) in Viet Nam explain the total increase of 1.32 percent in real GDP, offsetting the small decline in export and the large increase in imports (11.2 percent) in scenario b. Simulation results shows that components of GDP change increase in almost all TPP countries after TPP being in effect. In this scenario, Table 8 also shows considerable increases in consumption in New Zealand and Japan and in export in Canada, Japan and Singapore in value terms. On the other hand, import also increases in most countries especially New Zealand, Australia, Canada and Japan. Again, as GDP of these countries are already high, even though percentage changes are small, in value terms, the changes are larger than those of developing countries. In contrast, exports and investment tend to decrease slightly in non-TPP countries.

Table 8. Decomposition by GDP Components (%)

	Scenario b					Scenario e				
	C	I	G	EXP	IMP	C	I	G	EXP	IMP
Viet Nam	5.1	9.2	0.2	-1.9	-11.2	1.1	2.6	0.0	-1.2	-2.2
Australia	0.1	0.4	0	0.1	-0.5	-0.0	0.0	0.0	0.0	0.0
NewZealand	0.4	0.3	0.1	0.1	-0.8	-0.0	0.0	0.0	0.0	0.0
Japan	0.3	0.2	0	0.4	-0.6	-0.0	0.0	0.0	0.0	0.0
Brunei	0.2	0.7	-0.1	-0.1	-0.4	0.2	0.5	-0.1	-0.1	-0.3
Malaysia	0.2	1.4	-0.1	1.3	-2.5	0.2	0.6	0.0	0.7	-1.3
Singapore	0.2	0.2	0	0.4	-0.7	0.5	1.0	0.1	1.3	-2.9
Canada	0.3	0	0	0.8	-0.7	0.0	0.0	0.0	0.0	0.0
US	0.1	0	0	0.1	-0.2	-0.0	0.0	0.0	0.0	0.0
Mexico	0.1	0	0	0.3	-0.3	0.0	0.0	0.0	0.0	0.0
Chile	0.1	0.1	0	0.1	-0.2	0.0	0.0	0.0	0.0	0.0

Peru	0.1	0.1	0	0.3	-0.4	0.0	0.0	0.0	0.0	0.0
Cambodia	-0.7	-0.5	0	0.3	0.8	-0.0	2.5	-0.2	3.3	-5.1
Indonesia	0	-0.1	0	0	0.1	0.0	0.2	0.0	0.3	-0.5
Laos	1.6	2.7	1	-4	-1.3	0.3	2.0	0.1	1.6	-3.6
Philippines	-0.1	-0.1	0	0.1	0.1	0.4	0.3	0.0	0.3	-0.9
Thailand	-0.2	-0.4	0	0.2	0.4	0.2	1.3	0.0	1.0	-2.2
RoSEAsia	0	-0.1	0	0.1	0.1	-0.0	0.1	0.0	0.2	-0.3
China	0	-0.1	0	0	0.1	-0.0	0.0	0.0	0.0	0.0
Korea	-0.1	-0.1	0	0	0.1	-0.0	0.0	0.0	0.0	0.1
India	0	-0.1	0	0	0.1	-0.0	0.0	0.0	0.0	0.0
EU_25	0	-0.1	0	0.1	0.1	-0.0	0.0	0.0	0.0	0.0
RestofWorld	0	-0.1	0	0	0.1	0.0	0.0	0.0	0.0	0.0

Source: Authors' simulations

Meanwhile, result for scenario e reveals that Viet Nam gain the largest increases in GDP components, albeit smaller than in TPP case. However, while imports increase, exports drop slightly and investment increase by a small amount, leading to the small improvement of Viet Nam's GDP. Different from scenario b, in case AEC becoming into effect, the impacts of AEC on non-AEC countries are not clear, except small changes in their GDP components and the trend of small increases in imports.

Investment

Being the leading factor to explain the gain in real GDP, the change in investment are reported in Table 9. It is clearly seen that the increase in investment in Viet Nam is the most outstanding as compared to other countries in both percentage change and in value terms. The results indicate that TPP will stimulate Viet Nam's fixed capital formation that is defined as investment in the model. For AEC (scenario d and e) investment in Viet Nam grows at a lesser extent, partially reflecting the fact that share of AEC partners in Viet Nam's total trade is less than half of TPP partners. It is interesting to note that Cambodia expands investment substantially under the AEC scenarios.

Besides, simulation results show that almost all member countries gain positive changes in investment and vice versa, non-members see declines in their investment once TPP and/or AEC come into effect. In particular, the total investment in all TPP countries rise especially in scenarios of reduction in NTBs. In value terms, Japan also shows similar increases in investment to Viet Nam's but again these are very modest in terms of percentage. Only-AEC members such as Thailand, Laos and Indonesia are likely to see decreases in investment in TPP scenarios and increases in cases of AEC implementation.

Regarding the group of two bloc signatories, Malaysia also gains remarkably from trade liberalization in terms of investment, only following Viet Nam. Investment in others of this group namely Brunei and Singapore also experience increases to different extents depending on different scenarios. Meanwhile, countries outside of TPP and AEC such as China and the EU will see their

investment decline after these agreements come into effect. Nevertheless, the investment decreases in terms of percentage change of these regions remain relatively small.

Table 9. Simulation Result on Investment (% change, billion USD)

	% change						change in billion USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Viet Nam	25.33	27.05	29.81	6.86	8.11	30.62	10.73	11.46	12.63	2.91	3.44	12.97
Australia	1.56	1.69	1.58	-0.07	-0.09	1.50	5.76	6.27	5.86	-0.26	-0.32	5.53
NewZealand	1.48	1.69	1.40	-0.07	-0.08	1.41	0.46	0.52	0.43	-0.02	-0.02	0.43
Japan	0.77	0.89	0.59	-0.23	-0.26	0.99	9.24	10.66	7.05	-2.73	-3.11	11.87
Brunei	3.90	3.81	3.35	3.17	3.15	3.49	0.13	0.13	0.11	0.10	0.10	0.11
Malaysia	5.68	6.28	6.27	2.21	2.64	7.02	3.97	4.39	4.38	1.55	1.85	4.91
Singapore	0.33	0.69	0.62	2.83	3.35	1.82	0.25	0.52	0.46	2.12	2.50	1.36
Canada	-0.27	0.10	-0.12	-0.04	-0.05	-0.17	-1.13	0.40	-0.49	-0.16	-0.19	-0.71
US	0.13	0.26	-0.12	-0.09	-0.10	-0.35	3.77	7.40	-3.38	-2.47	-2.84	-10.17
Mexico	-0.16	0.19	-0.10	-0.04	-0.04	-0.13	-0.39	0.46	-0.25	-0.09	-0.10	-0.32
Chile	0.12	0.32	0.06	-0.03	-0.04	0.09	0.07	0.18	0.04	-0.02	-0.02	0.05
Peru	0.00	0.55	1.13	-0.03	-0.03	1.00	0.00	0.22	0.46	-0.01	-0.01	0.41
Cambodia	-3.65	-3.79	-0.73	18.26	20.01	39.72	-0.08	-0.08	-0.02	0.39	0.42	0.84
Indonesia	-0.38	-0.46	-0.31	0.59	0.74	1.54	-1.04	-1.25	-0.84	1.62	2.03	4.23
Laos	-0.28	-0.38	0.81	6.13	7.69	7.59	-0.01	-0.01	0.02	0.14	0.17	0.17
Philippines	-0.63	-0.78	-0.14	1.39	1.73	2.90	-0.28	-0.35	-0.06	0.62	0.77	1.29
Thailand	-1.35	-1.55	-0.11	4.78	5.31	12.37	-1.26	-1.45	-0.11	4.48	4.97	11.58
RoSEAsia	-0.34	-0.41	-0.53	0.18	0.23	-0.30	-0.06	-0.07	-0.09	0.03	0.04	-0.05
China	-0.22	-0.27	-0.27	-0.05	-0.06	-0.42	-7.42	-9.36	-9.37	-1.88	-2.19	-14.26
Korea	-0.40	-0.50	-0.26	-0.11	-0.13	-0.49	-1.47	-1.86	-0.95	-0.41	-0.49	-1.83
India	-0.20	-0.25	0.28	-0.05	-0.06	0.16	-1.28	-1.57	1.78	-0.33	-0.38	1.00
EU_25	-0.45	-0.56	-0.14	-0.07	-0.08	-0.32	-14.61	-18.44	-4.66	-2.27	-2.62	-10.35
RestofWorld	-0.36	-0.46	0.15	-0.05	-0.06	-0.01	-11.61	-14.68	4.77	-1.70	-1.99	-0.22

Source: Authors' simulations

Trade

On examining the changes in exports and imports of countries belonging to both blocs, we can observe that the impacts of TPP on signatories are greater than those of AEC, not only in investment but also in trade.

Change in import volume to Viet Nam is notably large in terms of percent change (Table 10). As mentioned earlier, about one fourth of Viet Nam's imports are from TPP partner countries (Table 5), and imports to GDP ratio is high as compared to the other countries (Appendix 5). Given these facts, large responses of import volume to TPP's liberalization are not surprising. For absolute change in import volume, Japan shows the largest increase, whereas the size of Viet Nam's import expansion is comparable to Canada's results. Also notable from the results are the changes in trade directions. Countries within TPP and AEC, in general, increase trade with each

other and reduce trade with outsiders. In scenario b, for example, where trade barrier removal is limited within TPP, outsiders such as China and the EU see their imports decline. Similarly, tariff removal in case of AEC improves the intra-region import of ASEAN. In percentage, Cambodia and Laos are the two beneficiaries in imports in AEC scenarios. Meanwhile, countries joining TPP only are likely to decrease their imports such as New Zealand, Australia, the US…

Table 10. Simulation Result on Import Volume (% change, billion USD)

	% change						change in billion USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Viet Nam	10.98	11.49	12.21	2.19	2.45	12.19	13.34	13.96	14.83	2.66	2.98	14.80
Australia	2.35	2.60	2.97	-0.16	-0.19	3.03	6.05	6.71	7.65	-0.41	-0.50	7.82
NewZealand	2.56	2.88	2.81	-0.09	-0.10	2.96	1.12	1.26	1.23	-0.04	-0.05	1.29
Japan	3.54	3.82	4.09	-0.24	-0.28	5.06	33.86	36.54	39.16	-2.34	-2.71	48.45
Brunei	1.70	1.66	1.43	1.33	1.31	1.42	0.09	0.08	0.07	0.07	0.07	0.07
Malaysia	3.38	3.67	3.73	1.61	1.81	4.21	7.29	7.90	8.04	3.47	3.89	9.08
Singapore	0.53	0.71	0.57	2.43	2.80	1.68	1.38	1.87	1.49	6.37	7.36	4.40
Canada	2.43	2.92	2.97	-0.03	-0.04	3.11	11.56	13.90	14.14	-0.14	-0.17	14.82
US	0.79	1.05	1.02	-0.09	-0.10	1.00	21.08	28.14	27.31	-2.33	-2.73	26.68
Mexico	0.56	1.03	1.00	-0.01	-0.01	1.18	1.79	3.33	3.21	-0.04	-0.04	3.79
Chile	0.56	0.75	0.54	-0.02	-0.02	0.63	0.45	0.61	0.44	-0.01	-0.02	0.51
Peru	0.72	1.77	3.32	-0.01	-0.01	3.33	0.29	0.70	1.33	0.00	-0.01	1.33
Cambodia	-1.28	-1.31	-0.91	7.81	7.91	16.55	-0.14	-0.14	-0.10	0.83	0.84	1.77
Indonesia	-0.57	-0.66	0.06	1.91	2.19	5.94	-1.14	-1.32	0.13	3.81	4.36	11.86
Laos	-0.08	-0.12	0.00	7.24	7.79	6.50	0.00	0.00	0.00	0.29	0.31	0.26
Philippines	-0.39	-0.46	0.13	2.13	2.31	4.26	-0.35	-0.40	0.11	1.88	2.03	3.76
Thailand	-0.56	-0.65	0.25	3.29	3.59	7.53	-1.37	-1.61	0.62	8.09	8.84	18.52
RoSEAsia	-0.25	-0.30	-0.24	1.34	1.36	1.99	-0.03	-0.04	-0.03	0.17	0.17	0.25
China	-0.36	-0.45	0.26	-0.14	-0.16	-0.11	-6.64	-8.18	4.76	-2.53	-3.00	-1.96
Korea	-0.23	-0.30	0.31	-0.12	-0.15	0.09	-1.35	-1.80	1.82	-0.72	-0.90	0.55
India	-0.18	-0.23	0.92	-0.10	-0.12	0.74	-0.96	-1.20	4.86	-0.51	-0.61	3.89
EU_25	-0.12	-0.16	0.28	-0.04	-0.05	0.21	-8.56	-11.08	19.59	-2.80	-3.25	14.76
RestofWorld	-0.19	-0.25	0.79	-0.04	-0.05	0.66	-8.13	-10.66	33.17	-1.83	-2.19	27.74

Source: Authors' simulations

Simulation results of change in export volume are reported in Table 11. Export gains can be seen in most countries except Viet Nam and Brunei and in some scenarios Australia. Drops in exports in TPP and/or AEC scenarios are reported for this group of economies. At the same time, China and Korea are the two outsiders who gain from TPP with sufficient increase in exports but lose from AEC with shrinking exports. Also gains are remarkable especially in the case of Japan, Canada, the US and EU, while declines are small in all cases.

Table 11. Simulation Result on Export Volume (% change, billion USD)

	% change						change in billion USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Viet Nam	-2.23	-2.57	-3.15	-1.30	-1.65	-3.63	-2.17	-2.49	-3.06	-1.26	-1.60	-3.53
Australia	0.19	0.30	0.87	-0.03	-0.03	1.03	0.55	0.85	2.45	-0.08	-0.10	2.90
NewZealand	0.17	0.28	0.42	0.00	-0.01	0.49	0.08	0.13	0.20	0.00	0.00	0.23
Japan	2.17	2.24	2.94	0.17	0.19	3.04	20.48	21.12	27.70	1.63	1.81	28.64
Brunei	-0.31	-0.29	-0.20	-0.29	-0.28	-0.21	-0.03	-0.03	-0.02	-0.03	-0.03	-0.02
Malaysia	1.53	1.65	1.82	0.82	0.87	2.10	3.77	4.05	4.47	2.02	2.15	5.15
Singapore	0.27	0.32	0.22	0.92	1.05	0.67	0.87	1.03	0.72	3.00	3.43	2.20
Canada	2.91	3.13	3.45	0.00	0.00	3.63	13.99	15.04	16.59	0.02	0.02	17.45
US	0.60	0.67	1.26	0.07	0.07	1.75	11.38	12.60	23.70	1.24	1.39	33.00
Mexico	0.78	1.04	1.32	0.01	0.01	1.54	2.75	3.66	4.64	0.04	0.05	5.41
Chile	0.23	0.32	0.49	0.00	0.00	0.56	0.21	0.30	0.46	0.00	0.00	0.52
Peru	0.65	1.01	1.78	0.01	0.01	1.89	0.32	0.50	0.88	0.00	0.00	0.93
Cambodia	0.42	0.44	0.11	5.85	5.61	5.82	0.04	0.04	0.01	0.57	0.55	0.57
Indonesia	0.06	0.10	1.02	1.04	1.19	4.24	0.12	0.20	2.11	2.15	2.45	8.77
Laos	0.36	0.41	-0.19	4.90	4.37	3.65	0.01	0.01	-0.01	0.15	0.14	0.11
Philippines	0.24	0.30	0.50	0.96	0.88	2.61	0.17	0.21	0.34	0.66	0.61	1.80
Thailand	0.24	0.25	0.63	1.51	1.58	2.96	0.61	0.63	1.59	3.82	3.99	7.48
RoSEAsia	0.51	0.62	0.90	1.71	1.66	3.16	0.05	0.06	0.08	0.16	0.15	0.29
China	0.05	0.08	1.03	-0.01	-0.02	0.96	1.13	1.68	22.14	-0.23	-0.32	20.62
Korea	0.09	0.10	0.59	-0.01	-0.02	0.60	0.56	0.63	3.67	-0.04	-0.10	3.69
India	0.16	0.19	1.81	0.00	0.00	1.86	0.61	0.71	6.78	0.02	0.00	6.95
EU_25	0.14	0.17	0.39	0.01	0.01	0.43	9.57	11.92	26.31	0.61	0.68	29.06
RestofWorld	0.09	0.12	0.87	-0.01	-0.01	0.87	4.53	5.67	42.06	-0.53	-0.60	42.17

Source: Authors' simulations

Viet Nam shows negative export volume changes, albeit by a small amount, ranging from 1.2 to 3.5 billion USD depending on scenarios. These negative results can be explained by the shift in Viet Nam's export destination. For example scenario b, Appendix 7a reports sectoral export volume changes by destinations; exports to TPP partners and to non-TPP countries. Exports to the TPP partners increased by 8.423 billion USD in total, diverting from non-TPP countries by about 10 billion USD. This results in overall export volume change to be negative as observed in Appendix 7a. As relatively high sectoral import tariffs imposed on Viet Nam's exports (Table 5) are removed by TPP, the exports of Textile, Apparel, and LSMnfc destined for TPP partner countries increases significantly by 5.8, 4.3 and 1.5 billion USD, respectively. These increases in export volume are attributed to corresponding output increases (Table 16).

Given the fixed amount of endowments for production activities, sectors compete over the endowments such as labor and capital for production by offering higher wage rates and rental rates. In scenario b, wage rate for unskilled labor rises by 12.4 percent, for skilled labor by 14.3 percent (Table 13), while rental rate of capital increases 13.9 percent. As the price of labor and capital

become higher, some sectors contract while other sectors expand (Table 16). Taking the other manufacturing sector (OthMnfc) as an example, Table 12 reports changes in trade volume for Viet Nam, other TPP members, and non-TPP countries in scenario b, and for Viet Nam, AEC and non-AEC countries in scenario e. For scenario b, Viet Nam's sectoral export volume of other manufacturing decreased by 0.846 and 1.263 billion USD with respect to TPP member and non-TPP countries. Other TPP members increase their export to Viet Nam (3.8 billion USD) and other TPP (31 billion USD), diverting from non-TPP countries (-22 billion USD).

Meanwhile, in case of AEC, both exports and imports of OthMnfc between Viet Nam and AEC experience an increase of 0.6 and 1.7 billion USD respectively. Trade among other AEC members (not included Viet Nam) also rise by 13.3 billion USD after AEC implementation. At the same time, both exports and imports of AEC with non-AEC countries decrease slightly (Table 12)

Table 12. Trade Volume Changes of OthMnfc (million USD)

		Importer:						
		Scenario b				Scenario e		
		Viet Nam	TPP (excl.VNM)	Non-TPP		Viet Nam	AEC (excl.VNM)	Non-AEC
Exporter:	Viet Nam	..	-846	-1,263	Viet Nam	..	589	-414
	TPP (excl.VNM)	3,815	31,110	-22,203	AEC (excl.VNM)	1,737	13,336	-2,559
	Non-TPP	-549	-8,462	9,809	Non-AEC	-601	-5,079	176

Source: Authors' simulations

There are a few other possible explanations for the decline in total export value by Viet Nam in addition to changes in trade direction. *First*, some of Viet Nam's currently main exports, agricultural products and mining, shows decline after TPP due to competition in both input and output markets. Though the increase in textile, apparel and shoes/leather is to be expected (especially to the US), it may not be able to compensate for the loss in exports of other declining sectors. *Second*, even though Viet Nam gains substantially in investment (including FDI), this investment is likely to go into the three major expanding export sectors of Viet Nam and non-tradable sectors such as utilities and construction rather than into the declining sectors. *Third*, regarding the decline in exports of electronics equipment which is currently one of the key exports of Viet Nam, it is possible that because in 2011 (the base year of current GTAP database), electronics export was still small and the database does not incorporate the current change and that potential competition from Japan and other TPP members when TPP comes into effect might be the reasons for the decline in electronics equipment export in the simulation results. Also, related to modeling, it should be noted that we are using static GE model in this study and thus, the results could not capture the dynamics and therefore might be bias.

The simulation results are based on the assumption of fixed factor endowments as in the standard trade theory. However, this implies no growth in labor (skilled and unskilled)[4], land, capital and natural resources which may not be true in reality.

To examine this assumption on the impacts on export, we relax this assumption on labor in scenario b and e and report the results in Table 13. First, we fix wage rate of unskilled labor, allowing the amount of unskilled labor to adjust. The result shows total export volume of Viet Nam increases significantly from negative 2.5 to negative 0.3 billion USD and from negative 1.6 to negative 1.3 billion USD in scenario b and e respectively. Further, we alternate the assumption by allowing both skilled and unskilled labor amounts to adjust, then export volume after TPP turns positive and increases by 2.7 billion USD. However, in scenario e, exports decline though with smaller size of -0.6 billion USD.

Sooner than later, Viet Nam will not be able to sustain the advantage of cheap labor due to the increase in demand for skilled labor in particular and economic growth in general like what is happening in China. Obviously, not only free movement of labor among sectors of the economy is needed to facilitate the structural change of the economy after TPP and AEC come into effect, but the need to improve labor quality (i.e. increase the supply of skilled labor through education and training) is also essential in the restructuring progress. These efforts in the labor market can help boost the restructuring process of the economy but also improve export growth and economic growth.

Table 13. Changes in Wage Rates and Employment (%) and Export Volume (million USD)

	Unskilled Labor		Skilled Labor		Total Export
	Employment	Wage rate	Employment	Wage rate	Volume
Scenario b	0	12.4	0	14.3	-2,492
Fixed Unskilled Wage	17.7	0	0	19.4	-292
Fixed Wages	19.3	0	26.3	0	2,706
Scenario e	0	3.6	0	3.7	-1,598
Fixed Unskilled Wage	5.1	0	0	5.3	-1,260
Fixed Wages	5.7	0	7.3	0	-636

Source: Authors' simulations

[4] It should also be noted that labor inputs are measured in million USD. GTAP database does not have information on labor input in terms of work hour nor headcount. Value of unskilled labor input in Viet Nam, 2011, is worth 35 billion USD, and value of skilled labor input 16 billion USD. These values correspond to the sum of producer expenditure on unskilled and skilled labor. Let the initial wages for unskilled and skilled to be indexed as unity (1.0), and then the corresponding "quantities" coincide with the labor input values. Therefore, quantity of unskilled labor input is 35 billion USD, skilled 16 billion USD. As we observed from the TPP simulation (for example scenario b), wages rise by 12.4% (unskilled) and 14.3% (skilled). Since "quantities" of labor are fixed or given by assumption as endowments, which is standard and conventional in international trade theory, quantities are same as 34 billion USD and 16 billion USD. However, total values of unskilled and skilled labor inputs are increased because of the rise in wages; 39 billion USD and 19 billion USD respectively.

Table 14 indicates the changes in exports of selected countries/regions by sector under scenario b. Accordingly, Viet Nam's exports mainly decrease in manufacturing sector such as ProcFood; WoodProducts, MProc, ElecEquip and OthMnfc. In this scenario, total reduction in exports of these sectors amounted to 8.4 billion USD, mainly due to Viet Nam's commodities are hardly able to compete with commodities from other countries such as the US (ProcFood); Japan (MProc and OthMnfc) or China (ElecEquip) after TPP. For example, in other manufactures OthMnfc, exports from Viet Nam fell by more than 2 billion USD, from the US by 9.4 billion USD while Japan, with comparative advantage in this sector, experiences an increase of up to 16.2 billion USD. Regarding the sector for processed food ProcFood, Canada and the US are the two dominant exporters with the rise of 1.9 billion USD and 4.1 billion USD respectively; whereas that figure of Viet Nam drops by 1.1 billion USD. For MProc goods (gasoline, chemicals, plastics, metals and n.e.c.), Viet Nam (experiencing a drop of 2.1 billion USD) and the US (falling by 1.3 billion USD) lose their export markets to Japan (increasing 4.7 billion USD), Malaysia (2.1 billion USD), Canada (1.1 billion USD) and EU (3 billion USD).

Meanwhile, exports of Apparel and LSMnfc of Viet Nam tended to sharply increase, especially to the US market. It causes the reduction in exports of almost all non-TPP countries. For instance, China's exports in leather, footwear and silk LSMnfc falls by 2.5 billion USD.

Table 14. Export Changes by Selected Country and Sector (scenario b, million USD)

	VietNam	Australia	Japan	Malaysia	Canada	US	Mexico	China	EU_25	RestofWorld
Rice	-209	651	17	32	1	6743	0	-18	3	-8
OthCrops	-549	-274	258	-17	666	-1174	65	-188	378	416
Cattle	-1	-39	1	0	36	-31	14	1	17	20
OAP	-12	-45	11	6	19	39	-6	-50	-67	-25
CMT	0	1703	6	0	268	982	34	-6	225	70
OMT	-32	-55	8	-7	7445	6283	822	-1284	-1543	-1747
RawMilk	0	0	0	0	0	-1	0	0	0	0
Dairy	-7	-8	17	30	1564	6303	1	-4	-441	-32
CMOG	-497	-720	-17	-84	-182	15	-41	23	112	1865
ProcFood	-1096	542	505	344	1940	4075	63	-631	-754	-815
Textiles	772	-11	214	323	-1	-52	-40	280	72	-183
Apparel	5227	10	47	1007	-1	201	-137	-750	-145	-952
LSMnfc	2931	-141	283	87	34	1382	-1	-2504	-393	-164
WoodProducts	-1371	-31	-75	300	455	-272	112	584	691	220
MProc	-2121	-479	4717	2052	1127	-1325	613	30	2991	705
ElecEquip	-1700	-37	-3412	-740	72	-1081	602	3999	1731	2166
OthMnfc	-2107	-121	16222	803	1531	-9385	1565	189	1241	517
OthServices	-985	-371	-1011	-389	17	-2052	-38	480	3323	1306

Source: Authors' simulations

Considering the livestock sub-sectors, these are the ones Viet Nam does not have comparative advantage as well as remain insignificant in exports (Table 5). Therefore, after TPP, exports of livestock sub-sectors cannot compete with comparatively advantaged countries namely Canada and the US (in OMT) or Australia (in CMT). The livestock export value of Viet Nam drops by 52 million USD, accounting for only a small proportion of total exports of Viet Nam. The

similar situation can be observed in the case of AEC, in which livestock exports of Viet Nam to ASEAN fall mainly in sub-sector of OMT (swine meat and poultry) (Table 15).

Table 15 describes the changes in trade in selected countries and important sectors in scenario e, when tariffs among AEC countries are removed completely and NTBs are partly reduced. In this scenario, except for Rice and OthMnfc (transportation, motor vehicles, machinery, etc.), almost all sectors of Viet Nam have the tendency of contracting exports, in small size though (about 100-350 million USD). Similar situation happens to Indonesia, Thailand and the Philippines, when these countries experience declines in exports of almost all sectors but remarkable surge in OthMnfc exports. Meanwhile, exports of Malaysia and Singapore change most significantly after AEC implementation, mainly in ProcFood, MProc and OthMnfc.

In other words, within ASEAN, each economy has its own advantage in a/a number of commodities whose exports can be expanded after AEC comes into effect. In the case of Viet Nam, these export keys are Rice or other manufacturing products (OthMnfc) even though the change remains small. They are ProcFood in case of Malaysia, MProc of Singapore and Malaysia, or OthCrops from Philippines, etc.

Table 15. Export Changes by Selected Country and Sector (scenario e, million USD)

	VietNam	Australia	Japan	Malaysia	Singapore	Cambodia	Indonesia	Laos	Philippines	Thailand	China	Korea	India	EU_25	RestofWorld
Rice	674	3	1	22	0	-11	1	-1	6	204	1	0	62	17	1
OthCrops	-273	-56	2	58	1	82	297	49	800	31	-186	-2	-106	28	-288
Cattle	-1	3	0	0	0	-1	0	0	0	0	0	0	0	-1	0
OAP	-7	1	0	18	6	-1	7	0	0	2	3	0	1	2	2
CMT	0	16	0	4	0	-1	3	0	0	28	0	0	6	-2	1
OMT	-13	9	0	14	3	1	-3	0	-7	-82	18	0	0	49	32
RawMilk	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Dairy	-4	22	0	20	3	0	2	0	9	2	2	0	1	14	5
CMOG	-109	151	3	-217	5	0	-324	24	-52	-20	29	1	12	53	1450
ProcFood	-180	-38	-14	1246	556	6	-260	7	47	620	-139	-42	-40	-54	-390
Textiles	-201	1	31	106	26	258	-109	1	-18	-106	79	-19	45	1	-45
Apparel	-343	1	0	27	79	-133	-159	-12	-83	-175	277	-4	44	59	102
LSMnfc	-346	7	0	35	69	107	-161	-1	-8	-54	249	-2	20	83	14
WoodProducts	-327	5	31	-10	241	2	-232	4	-54	-141	76	11	2	139	15
MProc	-15	-258	188	1742	5054	39	6	39	-82	-427	-274	-263	-36	96	-1316
ElecEquip	-189	7	660	-1898	-2701	6	13	1	-1043	711	798	368	13	440	237
OthMnfc	175	-36	394	1151	1904	129	3170	39	1392	2861	-1141	-35	-167	-2663	-867
TransComm	-111	52	281	-261	-1331	9	-140	-6	-190	-966	394	48	54	792	415
OthServices	-285	65	247	-305	-2431	-39	-82	3	-205	-424	233	103	155	1075	400

Source: Authors' simulations

Output

Sectoral output change in Viet Nam is reported in Table 16. Corresponding to the larger increases in sectoral export volume, Apparel, LSMnfc, and Textile expand its production approximately by 5 billion USD (around 44% increase), 3.5 billion USD (28% increase), and 1.3 billion USD (12% increase) for TPP (scenarios a, b, c and f). In contrast, under AEC scenarios d and e, services sectors such as utility and construction (Util_Cons), and transportation and communication (TransComm) expand slightly, whereas other sector outputs contract. Notice that Util_Cons increases its output to support fixed capital formation to meet higher investment demand. Rice production also increases under AEC scenarios by almost 6%, equivalent to nearly 1.2 billion USD. Viet Nam exports rice mainly to neighboring countries (rather than advanced economies) due to consumption preferences, transportation costs and the low quality of Viet Nam's rice, and faces with high import tariff in both AEC and TPP market. The removal of tariffs leads to higher rice export to AEC countries which in turn leads to higher rice output in Viet Nam.

Largest output decline can be seen most prominently in agriculture, forestry and wood products, electronics equipment, mining and manufacturing. These declines come mainly as the result of TPP. Note that as agriculture sub-sectors are small in value terms, large declines in percent terms such as in the case of OMT (mainly pigs and poultry) equivalent to small declines in value term. On the other hand, declines in value term in mining and mining related industries and other manufacturing industries can be up to more than 3 billion USD.

Table 16. Sectoral Output Change in Viet Nam (% change, million USD)

	% change						change in million USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Rice	-0.55	-0.68	-0.65	5.92	5.86	3.85	-110	-136	-131	1,184	1,173	770
OthCrops	-5.69	-6.04	-6.58	-3.50	-3.73	-8.31	-654	-694	-756	-402	-428	-955
Cattle	3.45	3.75	4.40	0.24	0.43	4.09	44	48	57	3	5	53
OAP	2.12	2.46	3.08	0.21	0.39	2.76	103	120	150	10	19	134
CMT	-2.27	-2.32	-2.34	-1.10	-1.15	-2.95	-2	-2	-2	-1	-1	-3
OMT	-22.67	-23.00	-23.48	-3.47	-3.76	-24.89	-179	-181	-185	-27	-30	-196
RawMilk	-6.81	-7.06	-7.04	-1.69	-1.81	-7.47	0	0	0	0	0	0
Dairy	-6.69	-6.87	-6.84	-1.61	-1.69	-7.22	-72	-74	-73	-17	-18	-77
Forestry	-16.07	-16.87	-18.25	-3.79	-4.41	-18.59	-467	-490	-531	-110	-128	-540
Fishing	-0.71	-0.65	-0.45	-0.29	-0.28	-0.54	-53	-49	-33	-22	-21	-40
CMOG	-4.97	-5.28	-5.83	-0.87	-1.05	-5.91	-802	-853	-941	-141	-169	-955
ProcFood	-6.87	-7.16	-7.56	-1.83	-2.05	-7.87	-1,503	-1,567	-1,654	-400	-449	-1,722
Textiles	12.28	11.83	10.68	-3.20	-3.69	8.48	1,373	1,322	1,194	-358	-413	948
Apparel	43.45	43.99	43.76	-2.60	-3.01	35.07	5,371	5,437	5,408	-322	-372	4,335
LSMnfc	28.13	27.46	27.22	-3.33	-3.86	23.54	3,608	3,522	3,491	-428	-495	3,019
WoodProducts	-17.99	-18.84	-20.41	-4.39	-5.13	-20.86	-1,777	-1,860	-2,016	-434	-507	-2,060
MProc	-8.74	-9.21	-10.33	-1.44	-1.75	-9.93	-3,250	-3,424	-3,839	-536	-652	-3,693
ElecEquip	-16.28	-16.25	-15.07	-1.81	-1.72	-14.93	-1,965	-1,962	-1,819	-219	-208	-1,801

OthMnfc	-13.36	-13.53	-14.08	-0.13	-0.27	-13.28	-3,016	-3,056	-3,180	-30	-61	-2,999
Util_Cons	13.53	14.46	15.90	3.65	4.34	16.31	5,609	5,997	6,590	1,512	1,798	6,763
TransComm	2.59	2.81	3.16	0.58	0.74	3.17	775	842	946	173	223	950
OthServices	-1.64	-1.74	-1.76	-0.56	-0.57	-1.84	-555	-587	-592	-188	-193	-620

Source: Authors' simulations

Impact of TPP and AEC on outputs of livestock sub-sectors are mixed in direction of changes, but in general not significant as compared to other sectors. Among the livestock sub-sectors, the largest positive impact is observed in other animal products (OAP) under scenario c, 150 million USD increase, followed by cattle products (57 million USD). On the other hand, negative impact on other meat products (OMT) is observed clearly under the TPP scenarios in both percent and absolute changes. Dairy and raw milk result in similar negative percent change, but the former decreased by about 70 million USD whereas the latter shows insignificant change in US dollar. This is because the level of production of raw milk is very small to begin with.

Changes in livestock outputs can be decomposed into liberalization components of TPP and AEC, such as import tariff removals and reduction in non-tariff barriers. Taking scenario f as an example, Table 17 reports the decomposition results of the total impacts of TPP and AEC on livestock outputs. Tariff cut by Viet Nam in the livestock sector negatively affect the total production value of the sector mainly due to higher competition from imported products. Other animal products (OAP) gain by 134 million USD, of which non-livestock tariff cut contributes most by 133 million USD, followed by reduction in non-tariff barriers (49 million USD). Recall the import tariff rates in Table 5, imports of OAP to Viet Nam are virtually free trade, i.e. mere 0.7 percent tariffs. Because of this low tariff, OAP's negative impact of livestock tariff cut in Viet Nam is not large (-46 million USD) as compared to OMT. Among the livestock sub-sectors in Viet Nam, other meat product (OMT) is protected by relatively high import tariff rates. Once the tariffs are removed by TPP and AEC, substitution for cheaper imports of OMT reduces the demand for domestically produced OMT, and this effect is captured as -107 million USD. These results also show that in Viet Nam OAP, OMT and Dairy are the most, among livestock sub-sectors, affected by tariff cut in non-livestock sectors albeit in opposite directions. This implies a higher degree of linkages with non-livestock sectors by these three compared to other sub-sectors. While tariff cut in non-livestock sectors positively affects OAP due mainly to cheaper imports in these sectors, it negatively affects OMT and Dairy.

Table 17. Decomposition of Livestock Outputs (scenario f, million USD)

		Decomposition by Liberalization Components			
	Total	Livestock tariff cut in Viet Nam	Livestock tariff cut by others	Non-livestock tariff cut	Reduction in NTB
Cattle	53	-5	3	42	13
OAP	134	-46	-2	133	49
CMT	-3	0	0	-3	0
OMT	-196	-107	-6	-76	-7

RawMilk	0	0	0	0	0
Dairy	-77	-43	26	-59	-1

Source: Authors' simulations

Output changes in livestock sectors due to the non-livestock tariff cuts of TPP countries are reported in percentage term. Cattle and OAP expands production while other livestock sectors are contracted. This contrast can be explained by the decomposition of output change by markets: domestic sales or foreign sales (exports). Cattle and OAP increase domestic sales, and other sectors experiences fall in sales in both domestic and foreign markets. Further, we can decompose the change in domestic sales by economic agents; producers, private household, and government. Increases in domestic sales of Cattle and OAP can be explained by the rise of private household consumption demand, thanks to the increase in factor income. Negative domestic sales of CMT, OMT, and Dairy (excluding RawMilk due to near zero level of production) are caused by the falls in firm's demands for these sub-sectors' products as intermediate inputs to production, mainly attributed to substitution for imported inputs for falling prices.

Labor demand

Changes in production are translated into demand for primary factor inputs that include labor, land, capital and natural resources. Sectoral change in demand for un-skilled labor is reported in Table 18, and for skilled labor is in Table 19. In terms of percentage change, Apparel shows more than 40 percent change in demand both for un-skilled and skilled labor, for TPP scenarios. In absolute term measured in million US dollar, Util_Cons resulted in 0.7, 0.8, and 0.9 billion USD (scenarios a, b and c, respectively) for un-skilled labor, and about 0.4 billion USD for skilled labor, to meet the investment demand. Note that the sum of the absolute changes across sectors will become zero, meaning that the resource constraint is binding so as the rise and fall of labor demands are offsetting each other. For livestock sectors, un-skilled labor in OMT is negatively affected most by TPP and AEC. This implies that there is a scope for policy response to mitigate the adverse effects on un-skilled labor in OMT, if livestock sectors are of primal interest.

Table 18. Change in Demand for Un-Skilled Labor in Viet Nam

	% change						change in million USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Rice	-2.9	-3.2	-3.3	7.2	7.0	2.4	-85	-93	-96	211	206	70
OthCrops	-7.9	-8.4	-9.0	-3.8	-4.1	-10.5	-278	-294	-318	-132	-143	-371
Cattle	2.1	2.3	2.9	0.4	0.6	3.0	6	7	9	1	2	9
OAP	0.6	0.9	1.5	0.4	0.5	1.5	5	7	11	3	4	11
CMT	-1.5	-1.5	-1.4	-1.2	-1.2	-2.2	0	0	0	0	0	0
OMT	-22.2	-22.5	-22.9	-3.5	-3.8	-24.4	-18	-18	-19	-3	-3	-20
RawMilk	-9.1	-9.5	-9.5	-1.7	-1.9	-9.6	0	0	0	0	0	0
Dairy	-5.8	-6.0	-5.9	-1.7	-1.7	-6.5	-6	-6	-6	-2	-2	-7

Forestry	-17.0	-17.9	-19.3	-4.2	-4.8	-19.7	-180	-189	-204	-44	-51	-208
Fishing	-1.0	-0.9	-0.6	-0.5	-0.5	-0.8	-12	-11	-7	-6	-6	-9
CMOG	-7.0	-7.4	-8.2	-1.3	-1.6	-8.3	-82	-87	-96	-16	-19	-98
ProcFood	-6.0	-6.3	-6.6	-1.9	-2.1	-7.1	-106	-111	-117	-34	-37	-126
Textiles	13.4	13.0	12.0	-3.3	-3.7	9.5	103	100	92	-25	-29	73
Apparel	45.1	45.7	45.6	-2.7	-3.1	36.5	206	209	208	-12	-14	166
LSMnfc	29.4	28.7	28.6	-3.4	-3.9	24.6	218	214	212	-25	-29	183
WoodProducts	-17.1	-17.9	-19.4	-4.5	-5.2	-20.1	-120	-126	-137	-32	-37	-141
MProc	-7.8	-8.2	-9.3	-1.5	-1.8	-9.1	-261	-275	-310	-51	-60	-304
ElecEquip	-15.4	-15.3	-14.1	-1.9	-1.8	-14.1	-93	-92	-85	-11	-11	-85
OthMnfc	-12.5	-12.6	-13.1	-0.2	-0.3	-12.5	-254	-257	-267	-5	-6	-254
Util_Cons	15.0	16.0	17.5	3.5	4.3	17.7	773	825	906	182	221	911
TransComm	3.9	4.2	4.6	0.5	0.7	4.3	191	205	227	22	33	214
OthServices	-0.2	-0.2	-0.1	-0.7	-0.6	-0.5	-6	-7	-4	-21	-19	-16

Source: Authors' simulations

It should also be noted that as the changes in labor demand are measured in monetary term rather than quantity (such as number of working hours or number of labor), similar changes may mean big quantity changes in lower wage sectors such as agriculture, but much smaller changes in higher wage sectors such as manufacturing and services. Therefore, labor absorption from shrinking sectors is an issue not only in terms of skill adjustment but also quantity of labor needed to be absorbed. Also for the case of Viet Nam where underemployment is an issue especially in informal sector, particular attention need to be made to labor absorption.

Table 19. Change in Demand for Skilled Labor in Viet Nam

	% change						change in million USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Rice	-3.6	-3.9	-4.1	7.2	7.0	1.6	-8	-9	-9	16	16	4
OthCrops	-8.3	-8.8	-9.5	-3.8	-4.1	-10.9	-7	-8	-8	-3	-4	-10
Cattle	1.7	1.9	2.4	0.4	0.5	2.6	0	0	0	0	0	0
OAP	0.2	0.5	1.0	0.4	0.5	1.1	0	0	0	0	0	0
CMT	-3.2	-3.3	-3.4	-1.2	-1.3	-3.9	0	0	0	0	0	0
OMT	-23.5	-23.9	-24.5	-3.5	-3.8	-25.7	-7	-7	-8	-1	-1	-8
RawMilk	-9.5	-9.8	-10.0	-1.7	-2.0	-10.0	0	0	0	0	0	0
Dairy	-7.5	-7.7	-7.8	-1.7	-1.8	-8.1	-3	-3	-3	-1	-1	-3
Forestry	-17.3	-18.1	-19.6	-4.2	-4.8	-19.9	-5	-5	-5	-1	-1	-5
Fishing	-1.3	-1.3	-0.9	-0.5	-0.5	-1.1	0	0	0	0	0	0
CMOG	-7.3	-7.7	-8.5	-1.3	-1.6	-8.6	-37	-39	-43	-7	-8	-44
ProcFood	-7.7	-8.0	-8.5	-1.9	-2.2	-8.7	-52	-55	-58	-13	-15	-60
Textiles	11.2	10.7	9.4	-3.3	-3.8	7.3	33	32	28	-10	-11	22
Apparel	42.3	42.7	42.3	-2.7	-3.2	33.8	74	75	75	-5	-6	60
LSMnfc	27.0	26.3	25.9	-3.4	-4.0	22.4	77	75	74	-10	-11	64
WoodProducts	-18.7	-19.6	-21.2	-4.5	-5.3	-21.6	-51	-53	-58	-12	-14	-59
MProc	-9.6	-10.1	-11.3	-1.5	-1.9	-10.9	-124	-131	-146	-20	-24	-140

ElecEquip	-17.1	-17.1	-16.0	-1.9	-1.9	-15.8	-40	-40	-37	-4	-4	-37
OthMnfc	-14.2	-14.4	-15.1	-0.2	-0.4	-14.2	-112	-113	-118	-2	-3	-112
Util_Cons	12.5	13.4	14.7	3.5	4.2	15.1	391	418	458	111	130	473
TransComm	1.2	1.4	1.6	0.5	0.5	1.7	16	18	21	6	7	22
OthServices	-2.1	-2.3	-2.4	-0.7	-0.7	-2.5	-146	-155	-161	-45	-49	-167

Source: Authors' simulations

Economic welfare

Table 20 summarizes the simulation results in terms of economic welfare that is based on regional household income (Equivalent Variation). Most countries participating in either TPP or AEC have economic welfare gains, while welfare loss is reported in those not removing tariffs. For example, TPP signatories such as Australia, New Zealand, Japan and the US experience increase in economic welfare only in case of TPP implementation, and vice versa, suffer in only-AEC scenarios. In contrast, a number of ASEAN countries namely Indonesia, Philippines and Thailand are better off from AEC and worse off from TPP in terms of welfare. The highest welfare gains in monetary term is Japan under TPP. In percent change term, Viet Nam's gain in economic welfare is the largest. There are a few negative welfare cases in scenario a of TPP (Mexico and Peru) and in scenario d of AEC (Laos and Cambodia). Note that in scenarios a and d only import tariff removal is implemented.

Table 20. Simulation Result on Economic Welfare (% change, billion USD)

	% change						change in billion USD					
	a	b	c	d	e	f	a	b	c	d	e	f
Viet Nam	4.96	5.45	6.55	0.96	1.25	6.56	5.61	6.17	7.42	1.08	1.42	7.43
Australia	0.14	0.19	0.28	-0.01	-0.01	0.28	1.64	2.30	3.33	-0.11	-0.13	3.36
NewZealan	0.58	0.66	0.71	-0.01	-0.02	0.74	0.85	0.97	1.03	-0.02	-0.02	1.08
Japan	0.34	0.38	0.44	-0.03	-0.03	0.55	16.73	18.78	21.35	-1.39	-1.59	26.76
Brunei	0.75	0.73	0.67	0.58	0.56	0.69	0.11	0.11	0.10	0.09	0.08	0.10
Malaysia	0.21	0.43	0.69	0.17	0.29	0.78	0.52	1.05	1.69	0.42	0.72	1.91
Singapore	0.24	0.41	0.59	1.18	1.39	1.09	0.54	0.94	1.34	2.69	3.16	2.48
Canada	0.14	0.28	0.34	0.00	0.00	0.36	2.21	4.39	5.33	0.00	0.00	5.71
US	0.04	0.07	0.08	-0.01	-0.01	0.06	6.01	10.14	11.31	-1.21	-1.40	8.18
Mexico	-0.04	0.11	0.17	0.00	0.00	0.19	-0.38	1.19	1.79	0.02	0.02	1.94
Chile	0.12	0.24	0.34	0.00	0.00	0.35	0.27	0.52	0.74	0.01	0.01	0.78
Peru	-0.02	0.13	0.39	0.00	0.00	0.40	-0.03	0.19	0.57	0.01	0.01	0.57
Cambodia	-1.04	-1.07	0.01	-0.82	-0.32	4.98	-0.12	-0.12	0.00	-0.10	-0.04	0.58
Indonesia	-0.09	-0.10	0.17	0.09	0.15	0.47	-0.63	-0.75	1.25	0.65	1.13	3.47
Laos	-0.11	-0.13	0.66	-0.13	0.52	0.45	-0.01	-0.01	0.05	-0.01	0.04	0.03
Philippines	-0.13	-0.15	0.22	0.39	0.47	0.77	-0.25	-0.28	0.43	0.75	0.91	1.48
Thailand	-0.43	-0.48	0.40	0.25	0.42	1.59	-1.27	-1.40	1.17	0.73	1.24	4.64
RoSEAsia	-0.07	-0.08	0.00	-0.06	-0.03	0.12	-0.03	-0.04	0.00	-0.03	-0.02	0.06
China	-0.09	-0.11	0.10	-0.02	-0.02	0.02	-6.11	-7.26	6.21	-1.10	-1.30	1.41
Korea	-0.12	-0.15	0.20	-0.04	-0.05	0.12	-1.19	-1.50	2.04	-0.45	-0.53	1.25
India	-0.05	-0.06	0.49	-0.02	-0.03	0.44	-0.86	-1.03	8.30	-0.42	-0.49	7.43
EU_25	-0.03	-0.04	0.19	-0.01	-0.01	0.18	-4.85	-6.25	29.26	-1.41	-1.63	26.87
RestofWor	-0.03	-0.04	0.34	0.00	0.00	0.33	-3.58	-4.96	44.81	0.26	0.20	43.43

Source: Authors' simulations

Once TPP and AEC extend their liberalization to non-tariff barriers, then these cases disappear. Given the fact that TPP and AEC have ambitious liberalization targets beyond the tariff cuts, then it can be expected that all participating countries will gain in economic welfare. It is

obvious that Viet Nam is among the countries benefiting most thanks to the advantage of belonging to both trade blocs. While some other economies namely Brunei, Malaysia or Singapore gain only 0.7-1.1% of welfare in both AEC and TPP scenarios, the figures for Viet Nam is 6.56% increase in welfare.

Tariff Revenue Reduction

Table 21 shows that State budget revenue will decline by almost 1.9 billion USD (roughly 1.4% of GDP in 2011) due to tariff removals of TPP and AEC. Most of this reduction comes from the loss of tariff revenue in MProc (mainly petroleum, chemicals, metals and their products), in OthMnfc (mainly vehicles, machineries and other manufacturing industries) and ProcFood (vegetable oil and fat, sugar, beverages and cigarettes). The loss of revenue due to tariff reduction may lead to effort in raising taxes revenues from other sources by the government which is not advisable. We will discuss this in more detail in the last section.

Table 21. Tariff Revenue Reduction in Viet Nam for Scenario f

	Million USD	% in GDP
Rice	-0.28	-0.0002
OthCrops	-45.73	-0.0337
Cattle	-0.30	-0.0002
OAP	-1.08	-0.0008
CMT	-3.61	-0.0027
OMT	-24.93	-0.0184
RawMilk	0.00	0.0000
Dairy	-21.68	-0.0160
Forestry	-0.16	-0.0001
Fishing	-0.70	-0.0005
CMOG	-1.80	-0.0013
ProcFood	-296.06	-0.2184
Textiles	-97.32	-0.0718
Apparel	-8.74	-0.0064
LSMnfc	-11.59	-0.0086
WoodProducts	-63.47	-0.0468
MProc	-686.56	-0.5065
ElecEquip	-25.51	-0.0188
OthMnfc	-583.56	-0.4305
Util_Cons	0.00	0.0000
TransComm	0.00	0.0000
OthServices	0.00	0.0000
Total	**-1,873.10**	**-1.3820**

Source: Authors' simulations

Among imports of Viet Nam in six livestock sectors, OMT is the one bearing the highest tariffs imposed by Viet Nam, with the average of 17.3% for exports from TPP countries and 7.7%

for AEC members. Meanwhile, Dairy imports from TPP and AEC has the largest value (Table 5). As a result, when both TPP and AEC are implemented in scenario f, tariff revenue from these two sectors will decrease by 46.6 million USD in total, which can be converted to 0.03% GDP and account for the main proportion of livestock tariff revenue.

In summary, the followings can be concluded from the analysis of GE model's results.

In almost all simulation scenarios, Viet Nam is shown to be the member achieving largest GDP change in percentage term. However, the economic impact of AEC is insignificant compared to that of TPP. When decomposing the GDP change, it is observed that the increase in GDP, thanks to trade liberalization, comes primarily from increases in consumption and investment, surpassing the surge in import after tariff cut. Moreover, Viet Nam also gains the most in economic welfare in percentage change.

With regard to investment, the increase in investment is the most impressive figure compared to other countries, slightly higher than that of Japan and almost doubled that of Australia, Malaysia or the US in terms of absolute value. The structure of the Vietnamese economy will experience the contraction of less advantaged or eroding industries (i.e. other meat, dairy, forestry, wood products, mining and other manufactures). In contrast, advantaged industries and those with negligible trade will show expansion in both output and labor demand, especially in textiles, apparel, leather and footwear, utilities and construction. Moreover, there is an obvious mobility of primary factors from contracting industries to expanding ones.

Examining the scenarios assessing TPP's impacts, results show that Viet Nam's trade value with other TPP countries increases in all cases. Meanwhile, Viet Nam will see an increase in imports and a decrease in exports with non-TPP economies. Exports in textiles, apparel, leather and footwear from Viet Nam to the US surge impressively while Viet Nam's total exports slightly declines. The possible reasons for this decrease include the contraction of a number of domestic industries due to the competition from other countries, the competition (and constraint) in primary factors and the change in trade directions from outside TPP to TPP. In particular, once the condition of fixed endowment of labor is relaxed, exports turn to increase because of labor supply increase and more resources are employed. Unavoidable weaknesses of the model, the static nature and the fixed endowment assumption in particular, also cause bias in the results.

In consideration of the livestock sector, the results reveal that in both free trade blocs, output will decline in almost all livestock sub-sectors, except for other animal products (mainly live swine and poultry). In particular, the output of other meat (swine meat, poultry meat, offal and fat) will fall most remarkably in terms of absolute value and percentage change. Going the same contracting direction of livestock production, livestock exports also decline in both cases of TPP and AEC. In detail, the decrease concentrate in OMT, which includes swine meat – the potential exporting sector of Viet Nam. Moreover, the declining output also leads to a drop in the labor demand (both skilled and unskilled) in the livestock sector.

THE IMPACTS OF TPP AND AEC ON VIET NAM'S LIVESTOCK SECTOR

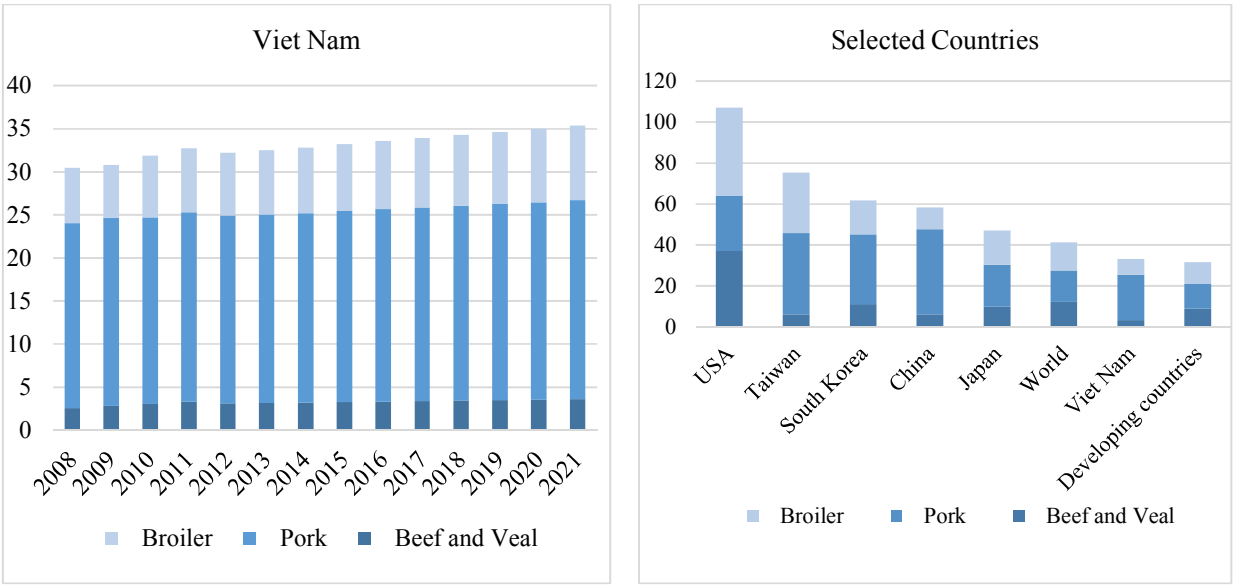
Overview of Viet Nam's Livestock sector

Consumption

According to the 2012 Outlook for the US and World agriculture of FAPRI (herein after FAPRI Outlook 2012) with the statistics until 2011 and the 2012 – 2021 forecast, the average amount of carcass consumed per capita of Viet Nam is 32.8 kg per annum in 2011 and is predicted to reach the point of 35.4 kg per capita per year in 2021.

Forecasts for meat consumption per capita of Viet Nam in 2014 is 32.8kg/person/year, including 22kg of pork, 7.6kg of chicken and 3.2kg of beef. With the total population of Viet Nam in 2014 at 92.5 million, the total meat consumption of Viet Nam in 2014 is estimated at 3,034 thousand tons, of which 2,074 thousand tons of pork, 703 thousand tons of chicken and 296 thousand tons of beef.

Figure 8. Per Capita Meat Consumption of Viet Nam (2008-2021)* and Selected Countries (2015) (kg/p.a.)



*: projection from 2012 to 2021

Source: FAPRI Outlook 2012

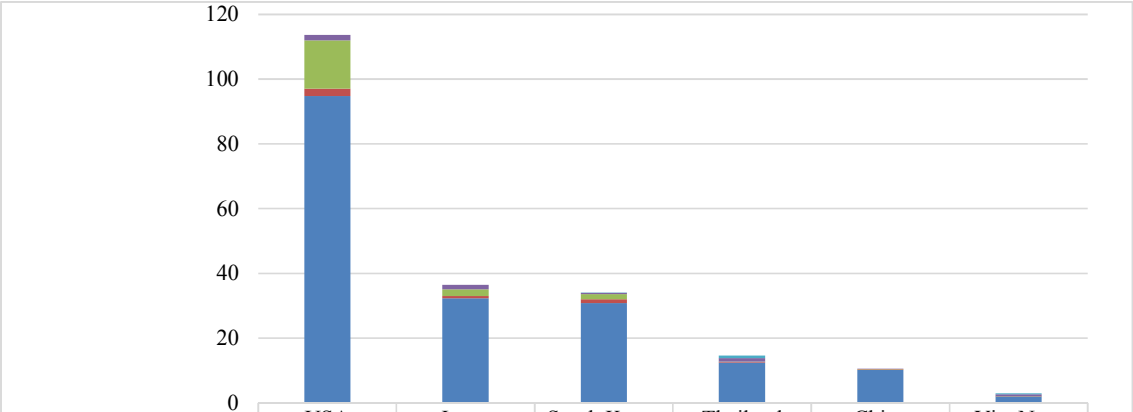
The meat consumption of Viet Nam is quite low in comparison with other Asian countries which have the similar dietary structure such as China, Taiwan, Korea and Japan. According to FAPRI Outlook 2012 the projected meat consumption of Viet Nam in 2015 is 33.2 kg per capita per year, slightly higher than the average quantity of developing countries (31.6 kg/capita/year) and lower than the world average figure (41.3 kg/capita/year), than that of Japan (47

kg/capita/year), China (58.3/capita/year), Korea (61.7 kg/capita/year), Taiwan (75.5 kg/capita/year) and the US (107.1 kg/capita/year).

Notably, the consumption of red meat and chicken in Viet Nam remains relatively low. According to FAO statistics in 2011, while the proportions of red meat and chicken in meat consumption structure of Viet Nam are 9.3% and the 17.5% respectively, swine meat accounts for up to 73.3%. According to Le Ba Lich (2015), in per capita meat consumption structure of South East Asia countries, the ratio of red meat for Laos is 33.6%, Cambodia 32%, Malaysia 84%, Thailand 55.7%, Indonesia 55% and Philippines 28%.

Viet Nam's structure of meat consumption is not going to change remarkably until 2021 with pork occupies a large part (FAPRI Outlook, 2012). Meat consumption of Vietnamese people is predicted to consist of 66.8% swine meat; 23.4% poultry and 9.8% red meat. Meanwhile the world average figures are 38%, 33.2% and 28.8%, respectively.

Figure 9. Per Capita Dairy Consumption in Selected Countries in 2011 (kg/p.a.)



	USA	Japan	South Korea	Thailand	China	Viet Nam
Wholemilk powder			0.1	0.7		0.4
NFD Milk	1.7	1.4	0.4	1.2	0.1	0.5
Cheese	15.0	2.0	1.6	0.1	0.2	0.0
Butter	2.3	0.6	1.1	0.2	0.1	0.1
Fluid Milk	94.7	32.4	30.8	12.4	10.2	1.9

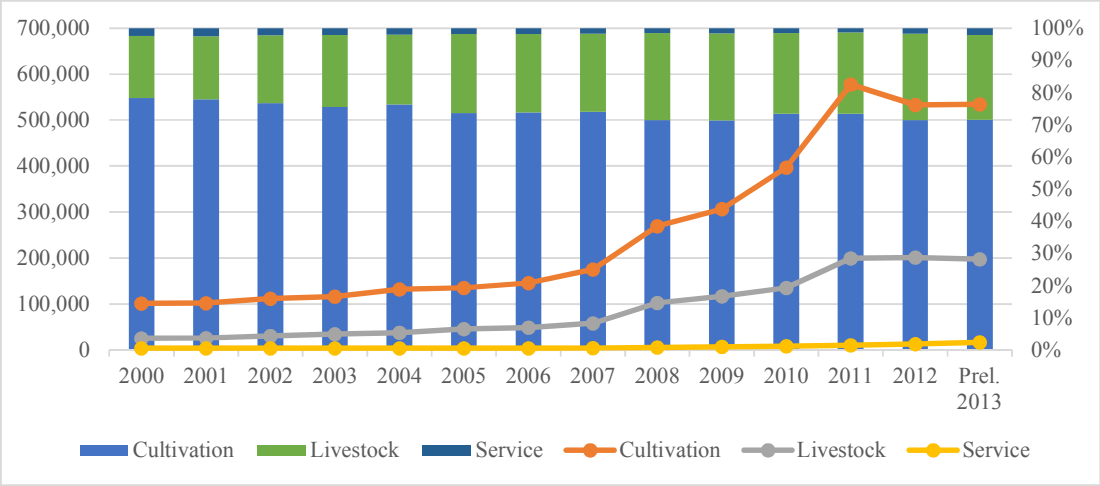
Source: FAPRI Outlook 2012

The consumption of milk and dairy products is fairly low. In 2011, Vietnamese consumed 2.9 kg milk and butter (FAPRI Outlook 2012, in dry weight). This is extremely low compared to the US (113.7kg/capita/year) or other Asian countries which do not have the custom of consuming a great amount of milk and butter like Japan (36,4kg/capita/year and Korea (34kg/capita/year). Remarkably, the quantity of whole milk powder consumed (main input for reconstituted milk) is relatively high in Thailand (0.7 kg/capita/year) and Viet Nam (0.4kg/capita/year).

Production

The share of livestock in the output of Viet Nam agriculture increased continuously through the period of 2000 – 2011, recovering from two epidemic diseases in 2006 and 2010. However, within the last 3 years, the livestock output has reached a plateau at 200 thousand billion VND.

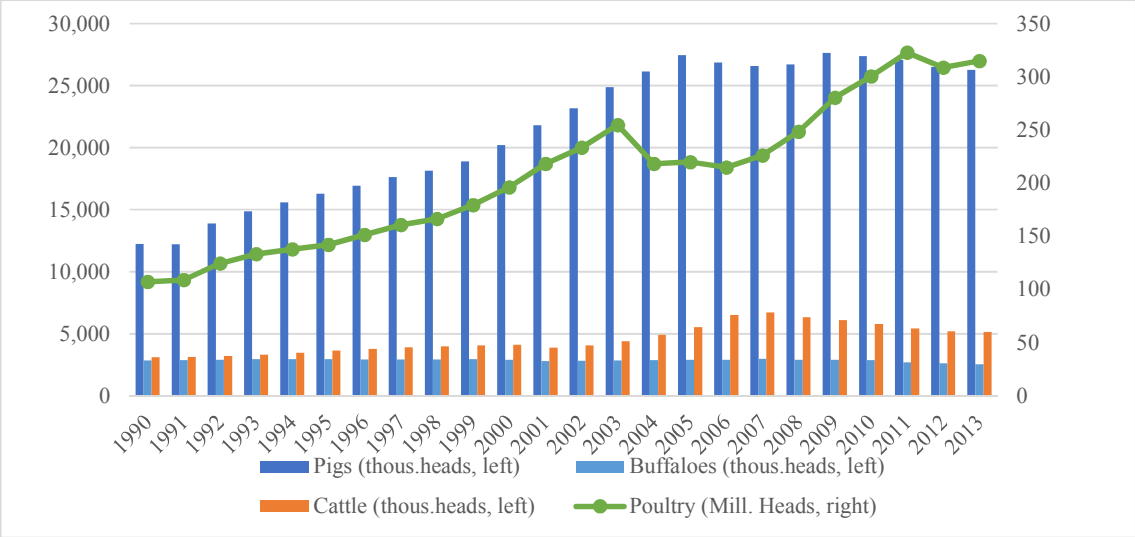
Figure 10. Gross Output of Viet Nam's Agriculture, 2000-2013 (billion VND, current price)



Source: GSO (2014)

Regarding the structure of agriculture, the proportion of livestock sector witnessed a significant increase from about 20% in 2004 to the range of fluctuation of 25 – 27% in the next period, before reaching 26.3% in 2013. This is inversely correlated to the change in share of cultivation when agricultural services in Vietnam has not developed and stay at the level of 2% over the years.

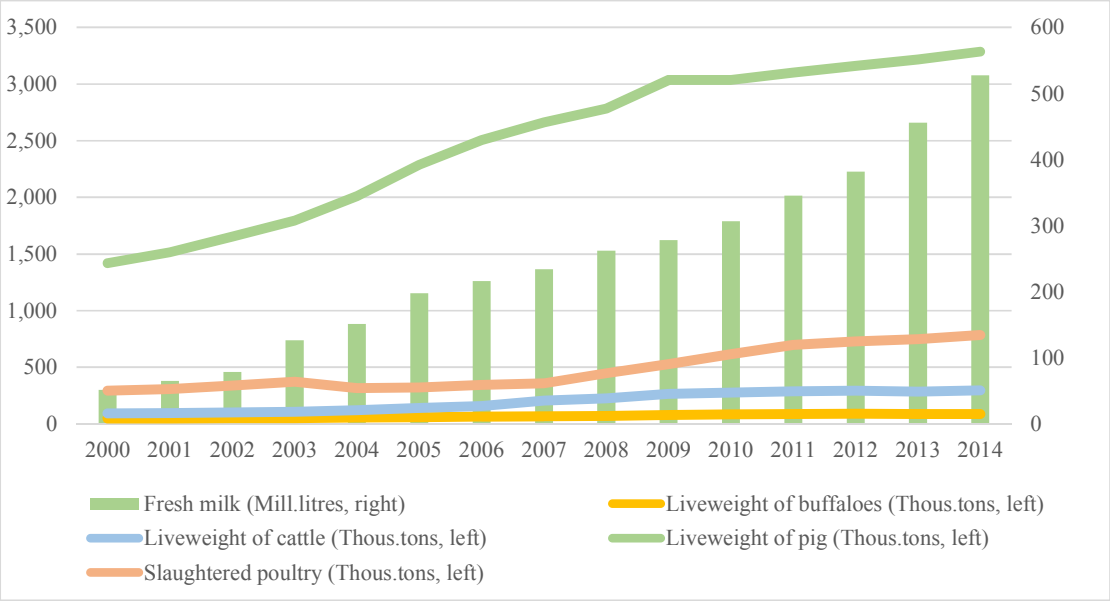
Figure 11. Viet Nam's Livestock Population, 1990-2013



Source: GSO (2014)

Consider the production of livestock sector only, most of livestock population experienced decrease (GSO 2014[5], Table 11), together with a stable trend in output of cattle output and a slight increase in the output of poultry and swine, which reflect the stagnation of this sector. The period 2008 – 2013 witnessed the fall in the population of swine by 1 – 3% to 26.3 million heads, of cattle by 1 – 5% to 7.7 million heads in 2013 and a fluctuation trend in the number of poultry around 300 million fowls with the overall increase of 5% per annual.

Figure 12. Domestic Livestock Production, 2000-2014



Source: GSO (2014)

From 2010 to 2014, the average increases in live weight output of swine, poultry, cattle and buffalo were 1.6%, 8.3%, 2.5% and 1.9% per year respectively. As a result, according to 2014 statistics, the total live weight output was 3.3 million tons of pork, 783.8 thousand tons of chicken, 297.4 thousand tons of beef and 86.5 thousand tons of buffalo. Raising milk cows became the most important part in livestock sector with the rise of 14% per year in raw milk output in the period of 2010-2014, reaching 527.5 million liters of milk in 2014 and satisfying 28% of input demand by domestic processing production.

Not only was the decrease in the domestic output of livestock caused by the reduction of domestic population but also by the epidemic disease in Asia region such as avian influenza, porcine reproductive and respiratory syndrome, foot-and-mouth disease. However, the reduction which was caused by disease was not significant. For example, according to 2013 statistics of Vietnamese Department of animal health, at the peak of PRRS in 2010, there were 439.7 thousand of swine died/being destroyed, equal to only 1.6% herd of swine that year.

[5] GSO data on livestock population is usually criticized due to applying inappropriate method of statistics (twice a year, counting number of herds on-farm at that time being without incorporating the cycle of animals per year)

On the other hand, livestock in Vietnam is still mainly concentrated in the small-scale households. According to Doan Xuan Truc (2015), the share of small and micro households in production structure by farm size remain remarkably high. If using the standard of World Organization for Animal Health (OIE), with rating scale for small farmers is <20LU[6], the size of small household in Vietnam should be lower than 55 cattle/household; or 110 pig/household, or 4000-5000 laying hens or broilers/household/year. This criterion is much higher than the standard of small-scale farms of Vietnam.

The General Investigation on Agriculture, Forestry and Fishery in 2011 of GSO showed that: of the total 4131.6 thousand households raising swine, the share of small farms (<10 pigs/household) accounted for 86.4% (in which the number of micro farms (1-4 pigs/household) accounted for 71.6% of total number of livestock households), but supplying only 34.2% of the total swine meat output. As for poultry, with 7864.7 thousand households in total, the number of small farms (<100 poultry/household) made up 89.62% (in which micro scale (1-19 poultry/household) already accounted 54.39%), but produced only 30% of total poultry output.

One of the existing difficulties in the livestock sector is the shortage of land for planting feed ingredients. In the current situation, when land reserved for rice is still large, the value added of the rice sector is not high and the objective of food security for the world does not really make sense; Department of Livestock recommended rice farmers to actively convert their cultivation (i.e. from rice to other higher-value crops or plants used for livestock such as corn, soybeans, grass, etc.) and provinces to encourage and implement policy to promote this conversion. This will be beneficial for farmers in both the cultivation and animal husbandry sectors. By decision No. 825/QD-BNN-TT dated 16.04.2012, and 1006/QD-BNN-TT dated 05/13/2014 of the Ministry of Agriculture and Rural Development, land for feed crops will increase to 100 thousand hectares in 2015 and 300 thousand hectares in 2020 (compared to rice land decreasing to 3.899 million hectares in 2015 and 3.812 million hectares in 2020). However, in reality, this conversion processes very slowly.

Viet Nam's trade of livestock products

Comparing the total carcass weight meat consumption and total carcass-weight meat production (converted from live weight by using the average dressing percentage DP), we can see that there are gaps between supply and demand, especially in items of beef and chicken, while domestic pork production still remains sufficient for domestic consumption. With average dressing DP of about 80% for pig, 75% for chicken and 40% for beef; carcasses yield of the livestock sector in 2014 is about 2,628 thousand tons of pork, 535.16 thousand tons of chicken and 119 thousand tons of beef. Compared this figure with the estimated total domestic consumption in 2014 of 3,034 thousand tons, including 2035 thousand tons of pork, 703 thousand tons of chicken and 296 thousand tons of beef (Source: Author's calculations based on FAPRI Outlook 2012, p.43), it is

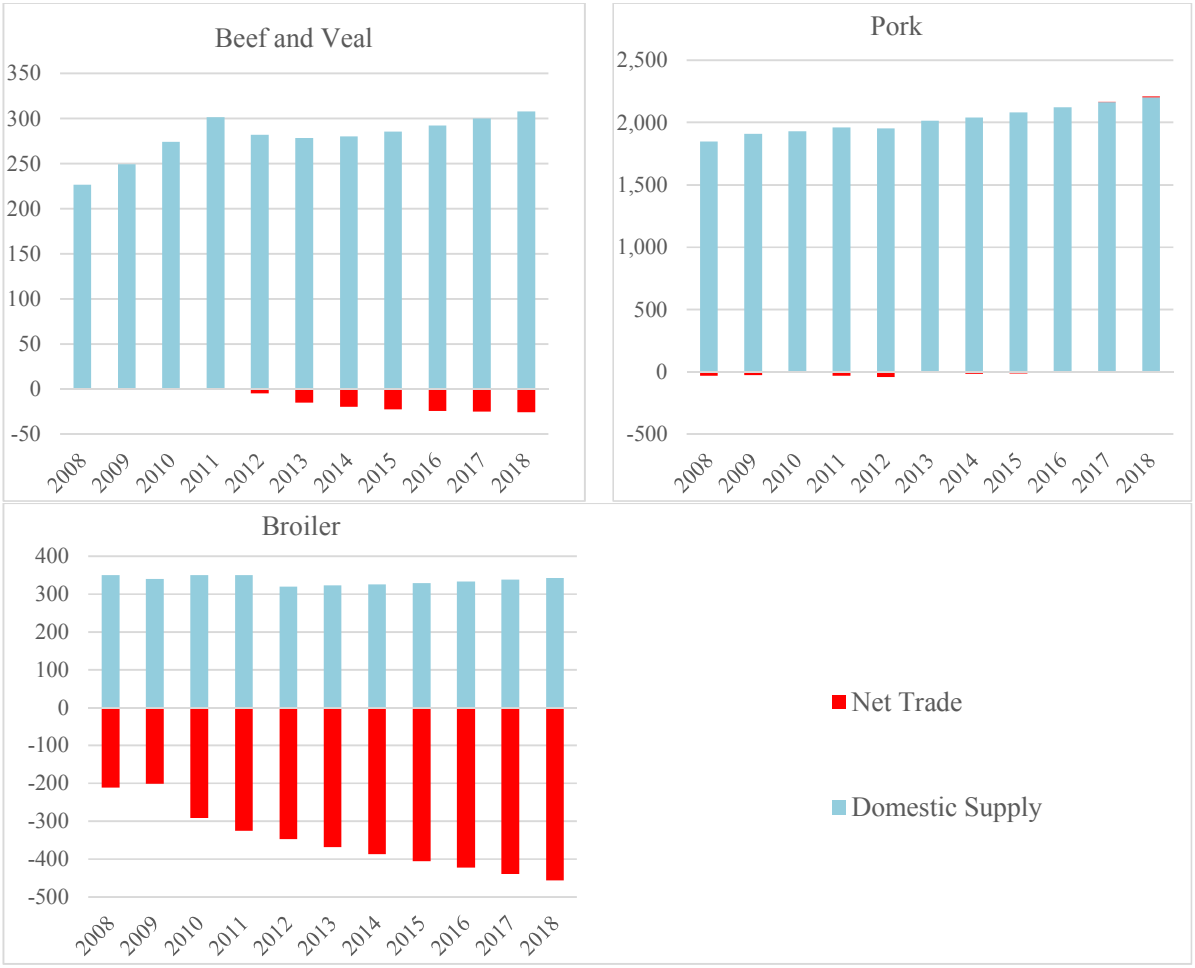
[6] 1 LU equivalent to 500 live weight swine meat/year

obvious that raising domestic production does not meet domestic demand, leading to a demand for imports from abroad.

Regarding milk production, according to the statistics of the Department of Livestock, 2014, the supply of domestic raw milk provided only 28% of the demand for domestic dairy industry. Thus, imports of raw materials such as milk powder (whole milk powder and skimmed milk powder) are indispensable, despite having the decreasing tendency (from 90% in 2000 to 72% in 2014).

Structure of consumption by sources

Figure 13. Structure of Meat Consumption in Viet Nam 2008, projected 2018 (thousand metric tons)



Source: FAPRI 2012 Outlook

With this situation of consumption and production, according to FAPRI Outlook 2012, the structure of meat consumption by sources in Viet Nam has the following characteristics: almost self-sufficiency for pork products, imported a small fraction for cattle (about 23 thousand tons, or 7.3% consumption) and large quantities for chicken (about 405 thousand tons, equivalent to 55, 2% of consumption) (Figure 13).

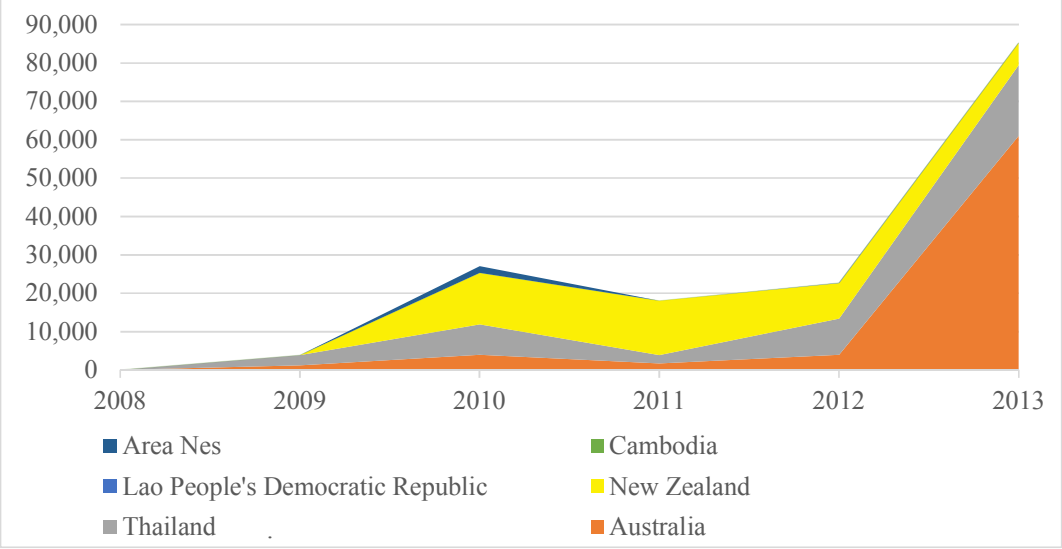
Structure of imports by countries

Bovine

Live bovine animals imported into Viet Nam increased dramatically over the years, particularly from 2009 and 2012, it's mostly from three countries Thailand, Australia and New Zealand. With geographical advantages and strengths of cattle breeds in Southeast Asia, Thailand is a traditional partner of Viet Nam for imports of live bovine animals, with transportation methods mainly in-land across Laos and Cambodia. Live cattle imported from Thailand are breeds, mostly Sin race, they're skinny and smaller than cattle of temperate countries with strong cattle sector such as the US, Australia, New Zealand. However, live cattle import turnover from Thailand is not stable, with large fluctuations in the range of 2-18 million over the 2008-2013.

After AANZFTA took effect in 2009, lowering the import tariff of live bovine animals to 0% for cattle breeds and 5% for beef cattle; the imports from Australia and New Zealand to Vietnam increased sharply. Especially in 2010 and 2011, the value of cattle imports from New Zealand reached 13.4 and 14.2 million USD respectively, corresponding to the encouragement of dairy cow husbandry in Viet Nam in this period, by not only raising cow herbs at household level but also in combination with promoting the large-scale dairy farms of TH True milk and Vinamilk. This number decreased steadily over two years 2012 and 2013, mainly due to the fall in demand for imported dairy cows (due to the lower expansion of imported pure-bred HF herds and the increase of domestically crossbred HF such as Cu Chi cows) after two years of strong investment to import purebred HF dairy cattle from New Zealand.

Figure 14. Import of Live Bovine Animals (HS0102) to Viet Nam, 2008-2013 (thousand USD)

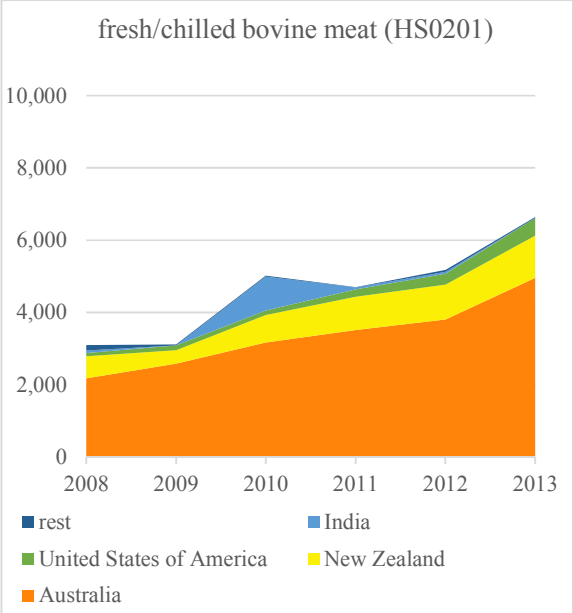


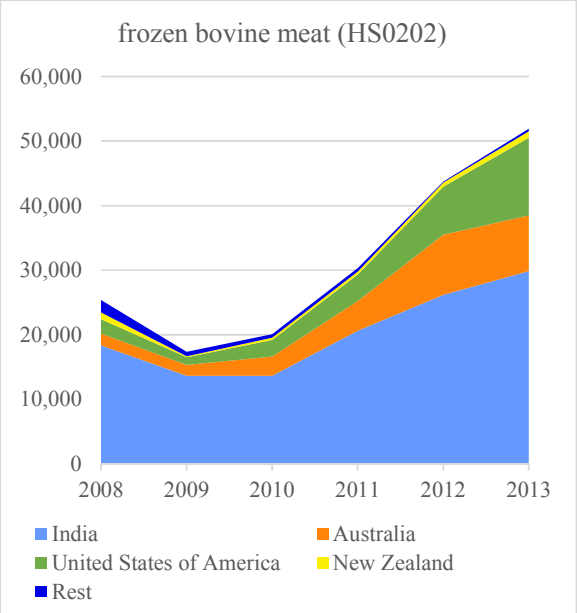
**Note:* non-cumulative chart

Source: ITC calculations based on UN COMTRADE statistics.

In an opposite trend, live cattle import turnover from Australia have increased gradually over the years, from 1.2 million in 2009 to nearly 61 million in 2013. Live cattle imported from Australia serve two main purposes: breeding (improving breeding of the Sind-crossbred cattle that have low productivity in Vietnam) and fattening and/or slaughtering (importing and providing to slaughterhouses to immediately slaughter like Ket Phat Thinh company or fatten and slaughter as Hoang Anh Gia Lai company and a number of farms in Ho Chi Minh City, Dong Nai, etc.).

Figure 15. Bovine Meat Imports to Viet Nam, 2008-2013 (thousand USD)





**Note:* non-cumulative chart

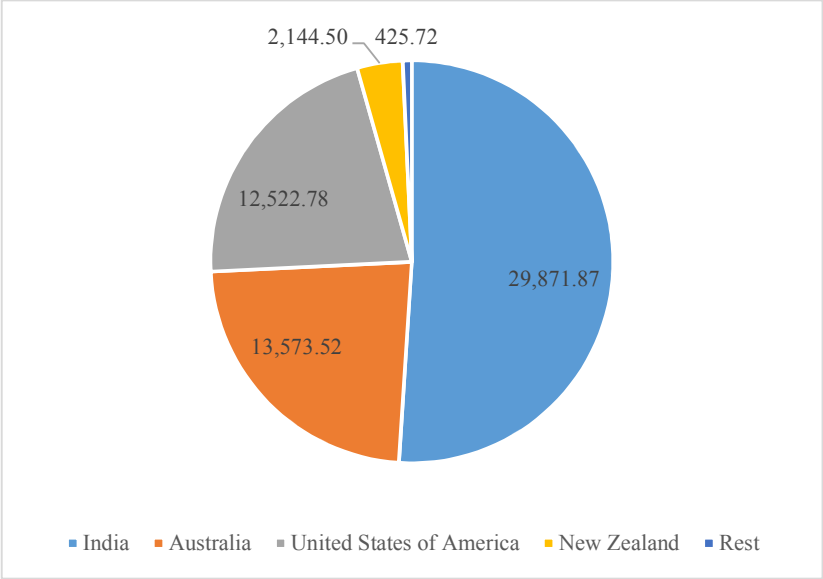
Source: ITC calculations based on UN COMTRADE statistics.

Bovine meat imported into Viet Nam are classified into two categories: fresh or chilled bovine meat (HS0201) and frozen bovine meat (HS0202). For the chilled meat, the main trade partner of Viet Nam is Australia (import turnover increased by an average of 18%/p.a., from 2.2 million USD in 2008 to approximately 5 million USD in 2013) and a small part from New Zealand (1.2 million USD in 2013) and India (0.5 million USD in 2013).

For the frozen meat (HS0202), the import in 2013 was 58.5 million USD, about 8.8 times of chilled meat (HS0201). Prevailed in the structure of HS0202 imports are frozen buffalo meat from India, increased from under 20 million USD in the years 2008-2011 up to approximately30 million USD in 2013, nearly five times of the total imported chilled buffalo meat (HS0201) of Viet Nam in 2013. In the domestic market, however, Indian buffalo meat products are almost unseen. It can be explained that the Indian buffalo meat is then smuggled to China under the label of buffaloes/cows Viet Nam because India cannot directly export bovine meat to China due to the ban for years by the Chinese Government because of the loose control on diseases of India.

Frozen buffalo meat and beef from the US and Australia are also imported with increasing quantities through the years and competing with each other in Viet Nam market. In 2013, the import of this product from the US achieved 12 million USD and from Australia 8.6 million USD.

Figure 16. Viet Nam's Bovine Imported Value in 2013 (thousand USD)



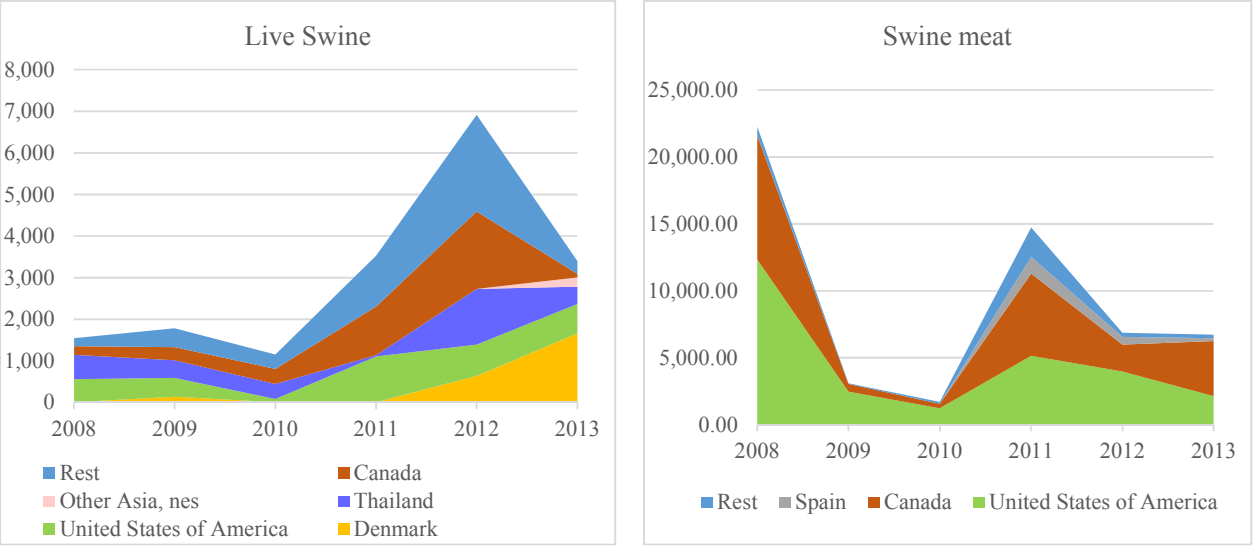
Nguồn: Authors' calculations based on UN COMTRADE statistics.

Considering the structure of total import of bovine meat of Viet Nam in 2013 (both chilled meat and frozen meat), India meat accounted for 51%, followed by Australia (23%, equivalent to 13.6 million USD) and United States (21%, or 12.5 million USD) and a small part from New Zealand and other countries.

Swine

According to the livestock experts as well as the UN Comtrade data, the import of live pigs into Viet Nam is mostly for breeding. Import structure of live pig is divided among many countries and changed over the years. In 2013, the import turnover from Denmark strongly increased and occupied the highest proportion (50%), equivalent to 16.6 million USD, followed by the United States (0.7 million USD), Thailand (0.4 million USD) and a small percentage from other countries.

Figure 17. Import of Live Swine (HS0103) and Swine Meat (HS0203) to Viet Nam, 2008-2013 (thousand USD)



**Note:* non-cumulative chart

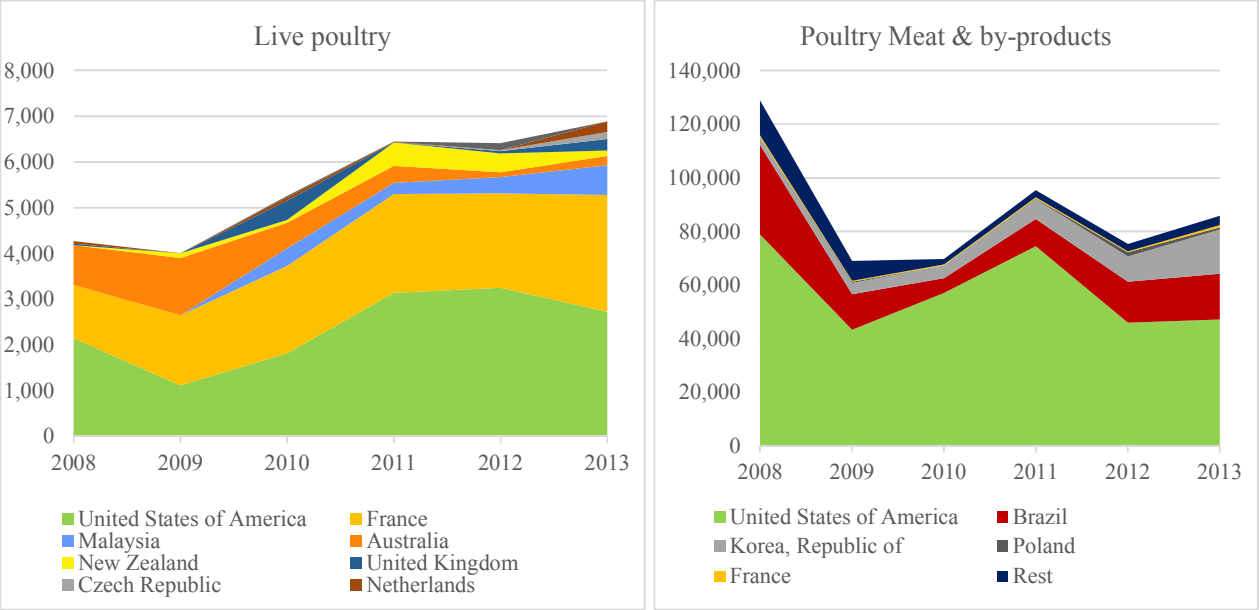
Source: ITC calculations based on UN COMTRADE statistics.

Pork imported into Viet Nam fluctuated sharply over the years, with the highest proportion belonging to the US and Canada. If as of 2008, pork was imported massively, reached 22.3 million, of which 12.3 million USD from the United States and 9.3 million USD from Canada, in 2009-2010 total turnover dropped to 2-3 million USD. After rising up to 14.7 million USD in 2011, pork import was stabilized from 6.7 to 6.9 million USD in the following 2 years.

Poultry

The United States is the biggest partner of Viet Nam in both the live chicken imports (2.7 million USD in 2013, equivalent to 39% of total import of live poultry in Viet Nam) and meat/poultry offal imports (47.2 million USD in 2013, equivalent to 55% of total imports of the meat/poultry offal). As for live poultry, the US must compete with France in Viet Nam market (i.e. France exported 2.5 million USD live poultry into Viet Nam in 2013). For meat and poultry offal, Brazil and South Korea are the two countries followed the United States in poultry meat and by-products imports to Viet Nam, although the proportion was not large, accounting for 19.8% and 19.1%, respectively.

Figure 18. Import of Live Poultry (HS0105) Poultry Meat & by-products (HS0207) to Viet Nam, 2008-2013 (thousand USD)



**Note:* non-cumulative chart

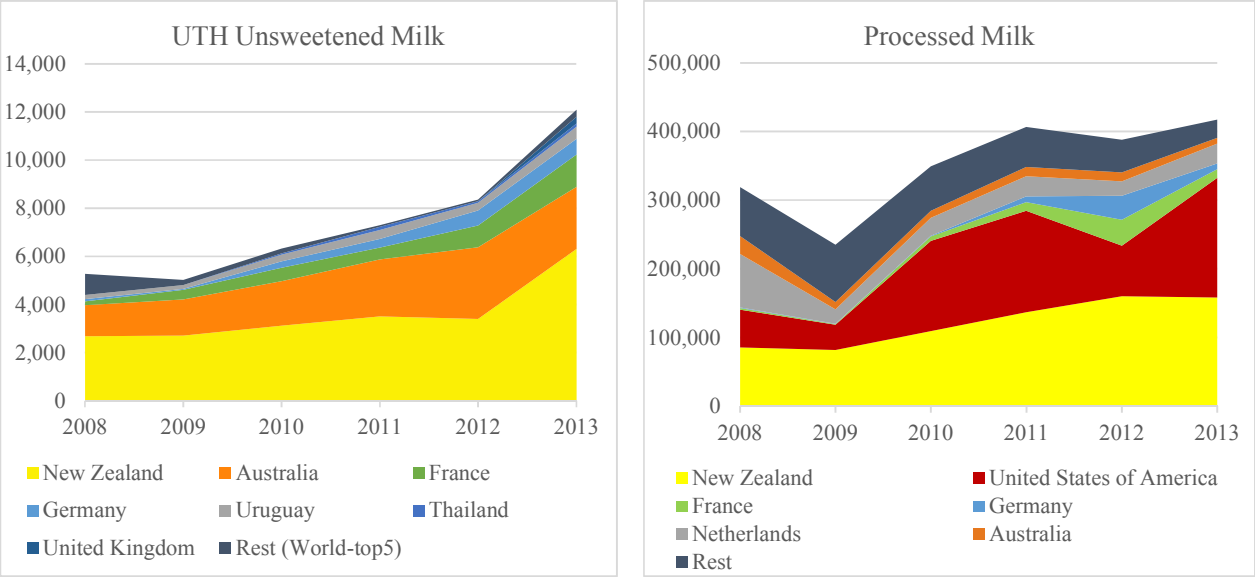
Source: ITC calculations based on UN COMTRADE statistics.

Milk and Dairy products

New Zealand and Australia are the two largest trading partners of Viet Nam in import of unsweetened UHT milk. Import value increased steadily over the years in the period 2008-2012 and rose sharply in 2013, reaching 6.3 million USD from New Zealand and 2.6 million USD from Australia. The remaining 26% of the total import of UHT milk in 2013 is shared by France, Germany, Thailand, Uruguay and other countries.

For processed milk products (condensed milk or sweetened/flavored), New Zealand and the United States are the two largest exporting countries to Viet Nam. The majority of these products is milk powder to be used as ingredients for the processing industry in Viet Nam (to make reconstituted milk, milk beverages, etc.). Import from New Zealand increased steadily through the years, from 85.4 million USD in 2008 to 158.4 million USD in 2013. Import from the United States changed during the same period, and tend to increase, from 55 million USD in 2008 up to 174.4 million USD in 2013. In addition, Viet Nam also imports a small amount from France, Germany, Netherlands, Australia and other countries (mainly Europe and Canada).

Figure 19. Import of UTH Unsweetened Milk (HS0401) and Processed Milk (HS0402) to Viet Nam, 2008-2013 (thousand USD)



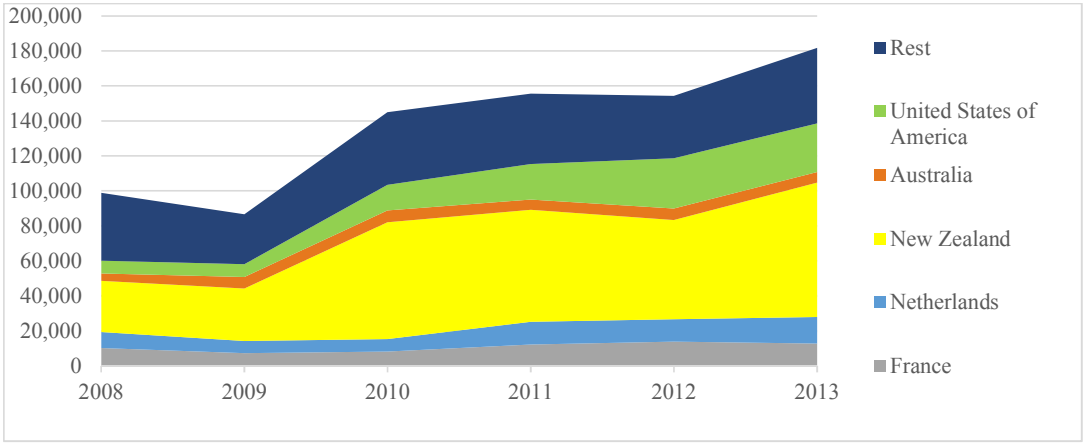
**Note:* non-cumulative chart

Source: ITC calculations based on UN COMTRADE statistics.

New Zealand is the major exporter of dairy products to Viet Nam. Total import of these products in 2013 was 181.7 million USD, of which New Zealand is 76.7 million USD, accounting for 42.2%. Followed by the US (27.7 million USD), Netherlands (15.2 million USD), France (12.7 million USD) and other countries.

Refer to the above data, we can see that Viet Nam imported a lot of livestock products from TPP countries, especially countries with the strong livestock sector as the US, Australia, New Zealand, Canada, and from AEC countries as Thailand.

Figure 20. Imports of other Dairy Products (HS0403-6) to Viet Nam, 2008-2013 (thousand USD)



**Note:* non-cumulative chart

Source: ITC calculations based on UN COMTRADE statistics.

Viet Nam's Tariffs for livestock products

Table 22 shows the average tariffs for imported livestock products in Viet Nam under the Most Favored Nation (MFN) status and some trade agreements: AFTA (with ASEAN), VJEPA (with Japan) and AANZFTA (with Australia and New Zealand). It can be seen that the import duties imposed on the products of AEC countries currently have been very low at 0-5%, while the MFN tariff and the tariff applied to some TPP countries have signed FTAs with Viet Nam as Japan, Australia, New Zealand remains high, and is especially high in pork, beef, poultry and processed meat. For live animals, by-products and milk/dairy products, tariffs are small already.

Hence after the removal of all tariff barriers by joining the TPP and the AEC, the industries currently protected by tariffs could be strongly affected. However, to evaluate the resistance ability of these sectors and the branches which are not protected but weak, we need to clarify the market structure along the supply chain of livestock products to have proactive preparation for effective integration.

Table 22. Applied Tariffs of Viet Nam on Imported Livestock Products in 2015 in some Implemented FTAs (%)

Products			**MFN**	**AFTA**	**VJEPA**	**AANZ FTA**
Live bovine		Pure breeding	0			
		Other	5	0	2	
Live swine		Pure breeding	0			
		Other	5	0	2	
Live poultry		Pure breeding	0			
		Other	10	5	2	5
Bovine	Fresh/Chilled	Carcasses and half-carcasses	30	5	12	7
		With bone in	20	5	12.5	7
		boneless	14	5	12.5	7
	Frozen	Carcasses and half-carcasses/With bone in	20	5	12.5	7
		boneless	14	5	12.5	7
Swine	Fresh/Chilled	Carcasses and half-carcasses/With bone in	25	5	19	15
		Other				
	Frozen		15			
By-products	Bovine		8	5	7	7
	Swine		8	5	7	7
	Other cattle	fresh/chilled/frozen	10	5	4.5	5
Poultry		not cut in pieces	40	5	12.5	20
		others	20	5	12.5	
		livers	20	5	12.5	7
	Swine		10	5		7

Processed meat	Bovine		15	5	12.5	7
	Chicken dice		20	5	12.5	7
Milk and cream	not concentrated, unsweetened		15	5	12.5	7
	containers of 20kg or more	solid unsweetened	3			
		solid other	5		4.5	
	Other	unsweetened	10	5	7	7
		other	20	5		15
Dairies	Yoghurt		7	5		
	butter		13	5	12.5	7
	cheese		10	5	4.5	5

Source: Viet Nam Customs

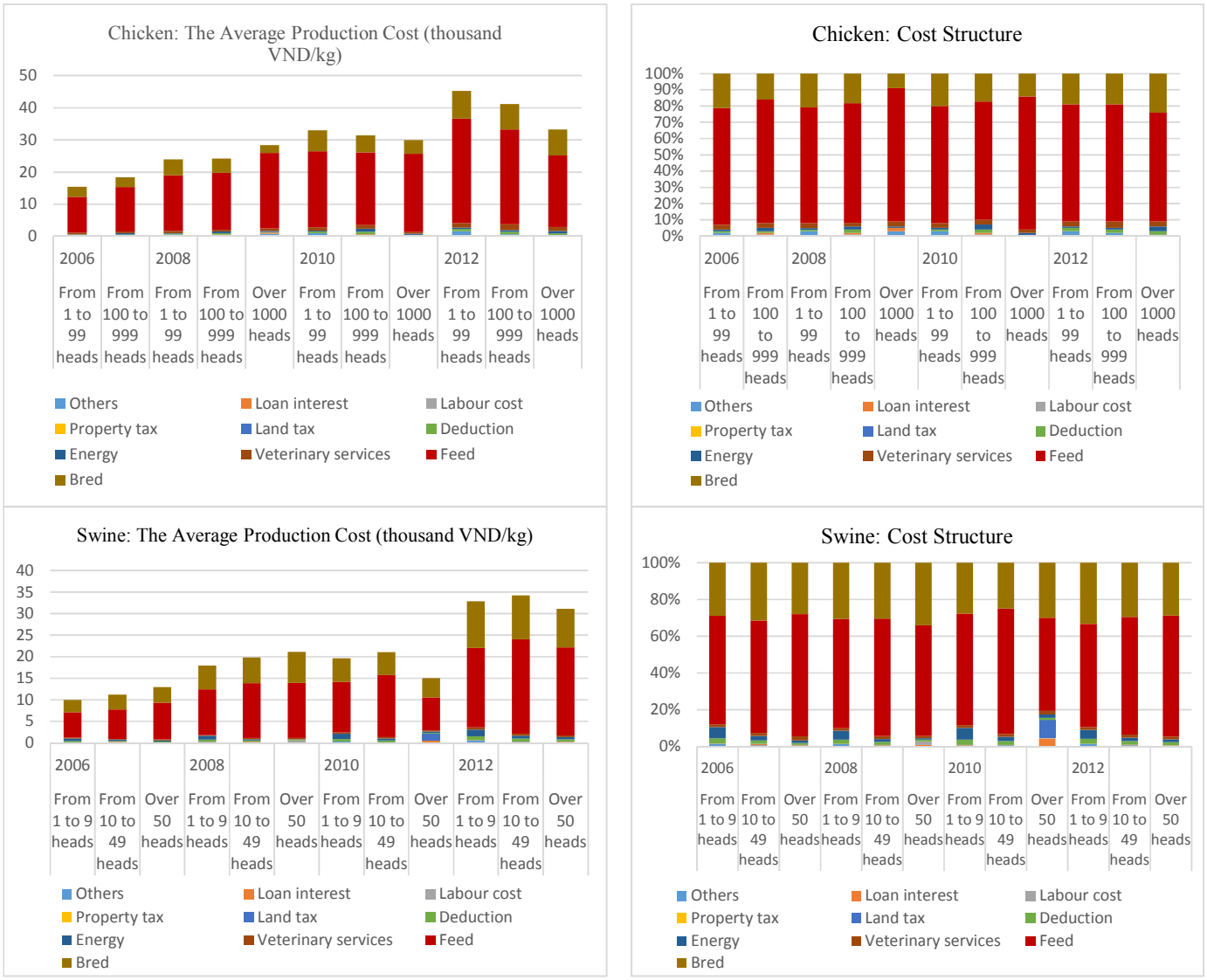
Market structure along supply chain

In order to evaluate the competitiveness of domestic livestock sector after joining the TPP and the AEC in particular and integration in general, it is necessary to assess the competitiveness in all markets with the competition of imported products: input markets (breeding animals, veterinary services, animal feed) and output markets (consumer products such as meat, eggs, milk and dairy products, by-products). However, due to constraints of time as well as the resources of the project, this study focuses on clarifying the output markets of 4 main products, which are milk, beef, pork and chicken. The characteristics of input markets structure have been clarified in the SCAP (2014).

To clarify the competitiveness of livestock products, compared to the taste factor and shopping habits, production cost is considered as the standard can easily be quantified and used to evaluate. The total production cost of main livestock products in Viet Nam in comparison with some main trading partners remains high (Nguyen Dang Vang, 2014)

Since production costs are still relatively high in meat products, except the pork carcass, the domestic livestock sector will face risk of intense competition from overseas after all tariffs lifted by TPP and AEC (especially with high tariff items as beef, whole poultry meat - table 22). In the situation that small livestock farms currently account for nearly 90% in Viet Nam, farmers need to reduce production cost by increasing production scale. The livestock sector also needs to enhance vertical integration (from inputs to retail products) as well as horizontal integration (between the units in the chain) to help lower costs by reducing the intermediation expenses.

Figure 21. The Average Production Cost per 1 kg of Chicken and Swine and Cost Structure by Farm size



Source: SCAP (2014) summarized from VHLSS 2006, 2008, 2010, 2012

Figure 22 and 24 illustrate the supply chains of two groups of livestock products: milk and meat (bovine, swine and chicken) consisting of Input, Production, Process/Slaughter, Distribution and Retail. Aiming at mapping the linkages between the chain participants both horizontally and vertically, Table 23, 24, and 25 summarize the market structure in main output markets, employing the desk studies and field trip results in a variety of cities/provinces standing for 3 regions (Ha Noi, Nghe An, Gia Lai, Lam Dong, Ho Chi Minh City) for sub-sectors of milk and bovine meat in line with incorporating SCAP (2014) for sub-sectors of swine and poultry. In details:

Milk: dairy cow market (input), raw milk market and (processing) consumer milk market (distribution and retail).

Meat: live animal marker (for slaughtering) and meat market (distribution and retail)

Figure 22. Market structure along supply chain

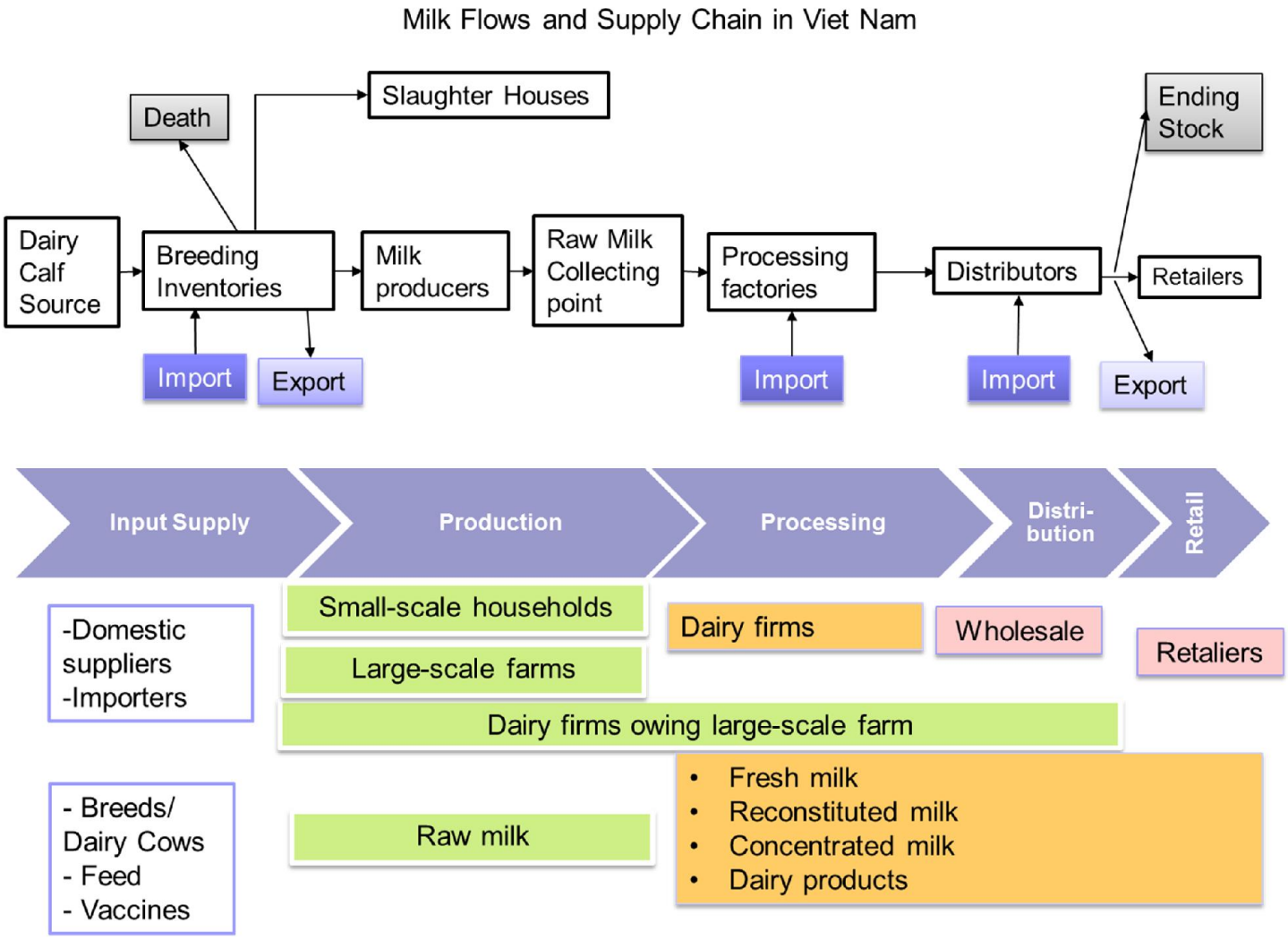


Table 23. Market structure along Liquid Milk supply chain

No.	Participant	Role	Quantity	Position	Behavior
Breeding/raising milk cows and producing raw milk (Inputs and Production)					
1	Breeding Inventories	Import breeds, cross-breed and supply milk cows to household	A few	- With households - With dairy firms	- Decreasing breed's price/increasing productivity to compete with imported purebred (ex. Cu Chi dairy cows)
2	Dairy firms	- Import breed for their own farms and their contracted household - Produce milk	A few	- With household: financial and technical support - Independent: TH True Milk - Buy cows from breeding inventories or firms	- Sell imported breeds to households, buy raw milk from household, AND/OR - Produce raw milk in their own large-scale farms, reducing cost by the economy of scale - Buy either cheap/low productivity cows OR expensive/high productivity cows
3	Households	Produce raw milk	Many	- Self-supplying on feed and outsource a part	- 80% independent in feed, 20% buy from feed mills through retailers
4	Large-scale farms (Independent)	Produce raw milk	Few	- Import cows directly from abroad - Self-supplying on feed and outsource a part - Supply milk to firms	- Buy expensive/high productivity cows - Strictly follow quality standards and contract with dairy firms (long-term contracts)
5	Collectives	- Increase size of order → cheaper price for inputs	A few	- Between household and other participants	- Bargaining power: higher than households in buying inputs - Collect membership fee or earn the difference in prices

6	Slaughter house	Buy bull from household/dairy firms/large-scale farm	Many	With household/farms	Buy bull at competitive price
7	Government	Policy on breeds		Unclear	- Inefficient policy on breeding - Support policy for households and high-technology dairy firms is unclear and difficult to access
From raw milk to final product (Collecting and Processing)					
1	Dairy firms	- Collect milk from household or their own farms - Buy ingredients	A few	- With household: monopsony - With foreign exporters - With collectives	- Raw milk collecting price influenced by Vinamilk, using automatically-renewable 1-year contract, emphasizing loyalty - Choose between buying raw milk from household and buying ingredients from abroad at competitive price - Free market rules with collectives
2	Foreign exporters	Sell whole milk powder to dairy firms	Many	- With dairy firms	Competitive price
3	Collectives	- Type 1: serve as intermediaries, let households work directly with dairy firms - Type 2: collect milk and sell to dairy firms	A few	- Between household and other participants	- Bargaining power: higher than households in buying inputs and selling raw milk to dairy firms - Seeking for new buyers for households in case of market change
4	Households	Supply raw milk	Many	Sell raw milk to dairy firms/collectives	- Strictly follow quality standards and contract with dairy firms

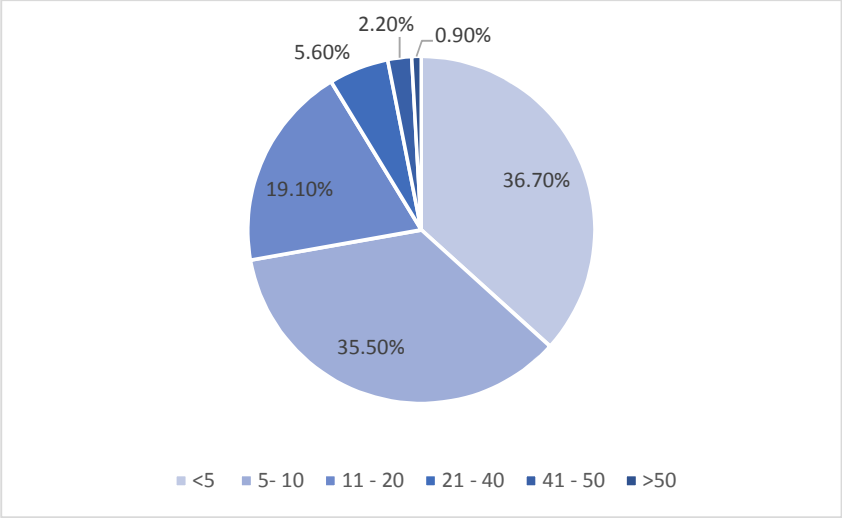
5	Government	Regulate on milk processing		Unclear	- Support policy for households and high-technology dairy firms is unclear and difficult to access
Post-production (Distribution and Retail)					
1	Dairy firms	Supply milk to wholesale/retailers/exporters	A few	Supply milk to wholesale/retailers/exporters	Due to the lack of transparency of current market in Viet Nam: - Dairy firm producing fresh/UHT milk: compete by focusing on quality, requiring improving market transparency and not investing too much on advertising to cut cost - Dairy firm producing reconstituted milk: compete by focusing on price, investing on advertising, packaging and PR to attract customers; not promoting market transparency
2	Retailers	Sell milk to consumers	Many	- Grassroots retailers: buy from wholesale - Big supermarkets: buy directly from dairy firms	- Competitive price - Choose between fresh milk (requiring investment on cooling system), UHT milk and reconstituted milk (not investing in cooling system). - For UHT milk: choose between domestic products and imported ones
3	Wholesaler	Sell milk to retailers	Many	- With dairy firms	- Competitive price
4	Importers	Import substitute products	Many	- With big retailers/wholesaler	- Competitive price for all products - Cannot import fresh milk and difficult to compete in yoghurt market

5	Exporters	Export milk products	One (Vinamilk)	- With foreign importers	- Export reconstitute milk to China and Laos
6	Consumers	Buy milk from retailers	Many	- With retailers	- Choose among different type of milk; powdered milk or liquid milk, among different types of liquid milk, between domestic products and imported ones - Based on preferences on price, quality, origins and taste
7	Government	Regulations on price and trade		General	- Passive response and weak management for imported milk

The main participants in milk market is:

Households: According to statistics of Department of Livestock (MARD), currently there are more than 19 thousand household of dairy cow husbandry, with an average of 3.3 cows/household, of which 12,626 household in the South (average 6.3 cows/household) and 7,013 households in the North (average 3.7 cows/household). Figure 28 presents the production scale of dairy household farms in Viet Nam in 2013.

Figure 23. Farm Size of Dairy Producing Household in Viet Nam 2013 (head/household)



Source: Nguyen Dang Vang (2014)

According to field trip results, households buy dairy cows from 2 main sources: (1) dairy firms for full-blooded (or purebred) Holstein Friesian (HF) cows at the price of 100-120 million VND with the milk yield of 3600-4300kg/lactation, (2) breeding inventories in Ba Vi, Moc Chau, Cu Chi at a lower price from 70-90 million VND for crossbred HF cows depending on the degree of breed purity (F1 50%HF cow producing 2830-2970kg/lactation, F2 75% HF cow 2520-3220kg/ lactation and F3 7/8HF 2650-3250kg/lactation).

Households are relatively self-supplying on feeds (mainly forage) thanks to sufficient land size for small-scale husbandry. The rest 20% of feeds (starches and minerals) is supplied by retailer (direct contact) or wholesale agents (through collectives, at cheaper price in return for membership fee or profit share to collectives depending on different types).

Linkages between household and dairy firms: relatively weak and lack of bargaining power for household. The term of contract is short and will be extended automatically only in case of no trouble; there is neither financial nor technical support; loyalty is important (for instance, if a household leaves certain dairy firm to supply for another dairy firm due to price factor, he has no chance to re-sign a contract with former firm in the future); and household is constrained in terms of farm size and raw milk collecting price (varying by the milk quality with a high rate of deduction)

Large-scale Dairy Farm: Currently there are 2 types of large-scale dairy farms: (1) the ones belonging to the dairy firms such as TH True Milk[7], Vinamilk[8], Dalat Milk[9]; and (2) the ones only in charge of husbandry and supplying raw milk to contracted dairy firms namely Hoang Anh Gia Lai[10], Duc Long Gia Lai (under construction[11]).

With the advantage of high productivity (i.e. all above farms invest in HF cows with high degree of breed purity, resulting in high milk yield, e.g. 20-25 liters/day in HAGL or 30-40 liters/day in TH True Milk, and consistent milk quality) and economy of scale (hence low cost of input thanks to (i) wide feed ingredient planting area leading to independence on forage. (ii) Buy input directly from wholesale agents without intermediaries; lower production cost and transportation cost, etc…. This is the modal of livestock husbandry that Viet Nam is heading for.

Regarding the linkages of these intensive farms and dairy firms: thanks to the limited number of large-scale farm and their close relations with dairy firms, their raw milk output is supplied to the dairy processing factories of the same corporation or long-term contracted ones. As a result, compared to household, these farms are not restricted in farm size and controlled in price but all deals are based on free market principles.

Dairy firms: There are 3 types of dairy firms: (1) the ones owning their own large-scale farms (thousands dairy cows) with closed production chain (TH True Milk); (2) the ones having no large-scale farm but outsourcing their production to household or private farms (Friesland Campina, Moc Chau, Ba Vi, Long Thanh), and (3) mixed of type 1 and 2 (Vinamilk, Dalat Milk – in the process of transforming to type 1).

The number of domestic dairy firms is limited. The competition is most severe on liquid milk market.[12]. In 2013, Vinamilk made up 48.7% liquid milk market, Friesland Campina 25.7%, TH True Milk 7.7% and 17.9% from the rest (Moc Chau, Ba Vi, Long Thanh, Dalat Milk, etc.).

It worth noticing that the raw milk supply from domestic production can satisfy on 28% of domestic demand for process production (both liquid milk and yoghurt) of Viet Nam in 2014

[7] As of July 2015, TH True Milk has already completed 2 groups of farms in Nghia Dan, Nghe An with the size of 45,000 heads of dairy cows, towards the planned 203,000 heads separated into 4 groups of farms in 2020.
[8] As of July 2015, Vinamilk has already established 7 large-scale farms in Tuyen Quang, Thanh Hoa, Nghe An, Ha Tinh, Binh Dinh, Lam Dong, Tay Ninh with the total population of 46,000 heads of dairy cows.
[9] As of July 2015, Dalat Milk has only 1 farm with nearly 1,000 heads of dairy cows in Don Duong District, Lam Dong Province.
[10] As of July 2015, HAGL already established a farm of 6,000 dairy cows in Dak Ya, Gia Lai Province, supplying to Nutifood an amount of 10 metric tons of raw milk per day.
[11] Duc Long Gia Lao has announced their plans to construct a farm of 80,000 dairy cows in Dak Nong in cooperation with Vinamilk. However as observed during our field trip in April 2015, plus the dramatic fall of DLGL on stock marker, authors assume that this project is unlikely to be realized in the near future.
[12] The yoghurt marker is currently dominated by Vinamilk (80%) thanks to their advantage of distribution system (Pham Le Duy Nhan, 2014); while the powdered milk market experiences the strong competition among Vinamilk (24.6%), Friesland Campina (15.8%) and foreign players such as Abbott (30%) and Mead Johnson (14.4%) (Euromonitor International 2014)

(Department of Livestock, 2015). In the case of Vinamilk, the raw milk supplied by household accounts for only 27% of their input demand (Pham Le Duy Nhan, 2014). Therefore, most of products on liquid milk and yoghurt market of Viet Nam are reconstituted from milk powder (mainly whole milk powder WMP and skim milk powder SMP. However, the market information is not clear among pasteurized milk, UHT milk and reconstituted milk, leading to indifference in price of these totally different kinds of milk. Therefore, when the price of milk powder drops, type 2 and 3 dairy firms will be better off and have the tendency to substitute the raw milk collected/produced domestically by imported milk powder[13] because the production cost is reduced intensively while the consumer price is unchanged[14].

Collectives: There are different types of collectives, of which 2 different models are observed in dairy sub-sector.

In case of localized membership-fee-based collectives such as Collective Cau Sat, Tu Tra, Don Duong District, Lam Dong Province, participating households have to pay an annual fee of 5 million VND each. Collectives play the role of intermediary, supporting the signing of contract between households and buyers (dairy firms such as Dalat Milk, Vinamilk and Friesland Campina) or suppliers (breeding animals, veterinary services, animal feeds); assisting to seek for the dairy production promotion projects (providing technical training, financial support to buy equipment, facility building, etc.) and seeking for new buyers in case current buyers cut the collecting amount of raw milk. For example, after the M&A by TH True Milk, Dalat Milk is now transforming from collecting raw milk from household to in-house production with newly-established large-scale farm; therefore current Dalat Milk's suppliers need to find their new buyers otherwise they have to change to other production activities.

In case of collectives not only restricted to its geographical area such as Collective Tan Thong Hoi, Cu Chi District, Ho Chi Minh City, members do not have to pay the membership fee. The collective makes profits from the difference between the raw milk collecting price and the selling price to buyers (dairy firms like Long Thanh or process food firms). In this model, collective plays a role of an intermediary business, different from the traditional intermediary/collector in the sense that collective will sign a yearly contract with household and also provide technical support such as training, equipment, veterinary services in order to obtain the high quality milk.

[13] There are cases when the dairy firms encourages households to expand the farm size to increase the raw milk supply at first, then restrict the collection amount when the world price of milk powder fell dramatically from 4,541USD/metric ton (Oct 2013) to 1,702USD/metric ton (July 2015) for SMP and from 5,208USD/metric ton (Oct/2013) to 1,848USD/metric ton (July 2015) for WMP (http://www.globaldairytrade.info). It led to the strike of household farmers in 2014 by throwing milk. At such a low price of milk powder, the production cost of reconstituted milk is estimated to be 11,000VND/liter (Pham Le Duy Nhan, 2014), while the collecting price at farm gate by Vinamilk was already 12,741VND/liter in 2013.

[14] Pham Le Duy Nhan (2014) pointed that the fluctuation in world price of milk powder and changes in the gross profit margin of Vinamilk are inversely correlated.

Distributor-Retailers: The cooling system for pasteurized milk distribution and retail requires high investment hence under-developed, located mainly in big cities in Ha Noi and Ho Chi Minh. Therefore, the most popular liquid milk on the market currently are UHT milk and reconstituted milk. Due to the lack of market information when there is no distinguishing between pasteurized/UHT milk and reconstituted milk on packaging, it is an unfair competition between UHT milk and reconstituted milk produced domestically. Besides, on consumer market, domestic products also face the strong competition with UHT milk imported from New Zealand, Australia, etc.

Government: The government has issued policies supporting large-scale production using high technology as well as expanding dairy cow husbandry, as summarized in Livestock Sector Restructuring Scheme (page 76)

Figure 24. Bovine Meat Flows and Supply Chain in Viet Nam

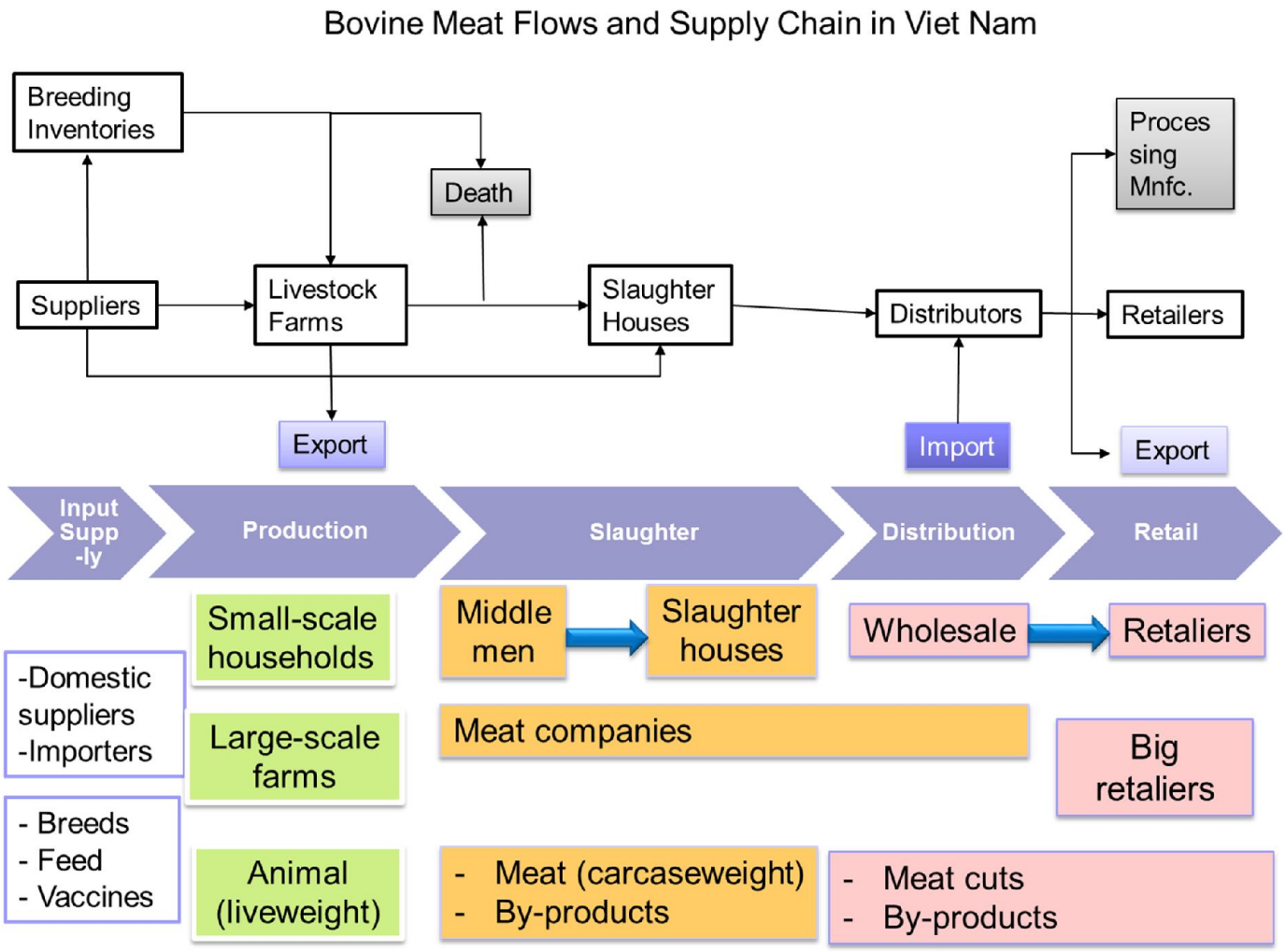


Table 24. Market Structure along Bovine Meat Supply Chain

No	Participant	Role	Quantity	Position	Behavior
Live animal market					
1	Breeding inventories	- Import breeds and cross-breed to increase supply	A few	- With households	- Import from Thai/Laos (cheaper but lower productivity) or Australia/US (more expensive but high productivity) - Sell to households
2	Households	- Buy breed and raise animal	Many	- With breeding inventories - With grassroots slaughter houses	- Difficult to enter the market because of high requirements of raising technology
3	Large-scale farms	- Import breed directly or assigned by investors	Not many	- With slaughterhouses	- Self-supplying for feeds to cut cost - Import live bovine (not through breeding inventories) to cut cost - Contracted with industrial slaughterhouses, not through intermediaries - Choose either only raising calf or also breeding by themselves for next herd generation
4	Grassroots slaughter houses	- Buy live animal and sell carcass weight meat, OR - Supply slaughter service	Many	- With household/ independent farms	- Work through intermediaries
5	Industrial slaughter houses	Slaughter	A few	- With large-scale farms	- Contracted with large-scale farms for long-time - Maybe or not work through intermediaries
6	Collectors	Buy live animal and sell without slaughtering	Many	- With households or farms	- Prefer low buying price (from farms) and high selling price (to slaughter houses) - Prefer households so they can have more bargaining power and less risk (short-time contract)
7	Government	Construct long-term planning		General	- Encourage large-scale farms and slaughter houses but policy implementation is slow

Meat market					
1	Grassroots slaughter houses	Sell meat to retailers	Many	- With grassroots retailers	- Short-term contract with floating price
2	Industrial slaughter houses	Sell meat to retailers	A few	- With retailers	- Long-term contract with less adjusted buying price
3	Wholesale	Buy meat from contracted inventories/slaughter house	A number	- With slaughter houses - With grassroots retailers	- Either short-term contract with grassroots slaughter houses or long-term contract with industrial slaughter houses
4	Big retailers (Supermarket)	Buy meat from industrial slaughter houses	A number	- With slaughter houses - With importers - With consumers	- Offer best price to consumers (but mostly a bit higher than grassroots retailers in return for higher cost in sanitary and phytosanitary and costly distribution system) - Balance between fresh meat and chilled/frozen meat: + Fresh meat: Long-term contract with big slaughter houses + Chilled/frozen meat: long-term contract with importers
5	Grassroots retailers	Sell meat to consumers	Many	- With slaughter houses - With wholesale retailers	- Buy meat from wholesale or directly from slaughter houses - Compete with imported meat
6	Importers	Import meat	A number	With retailers	- Import chilled/frozen meat competing with fresh meat produced domestically - Mainly contract with supermarkets for cooling distribution system
7	Consumers	Buy meat from retailers	Many	With retailers	- Prefer cheaper products and convenient shopping place (currently grassroots retailers but gradually changing to comfortable and trustworthy supermarkets) - Habit changes gradually
8	Government	Policy on price		Unclear	

Main participants in live bovine and bovine meat markets:

Household: In 2006, summary from local reports shows that there were 3,404 household farm of beef cattle, of which 1,064 farms equivalent to 31.3% were in the North and 2,340 farms in the South, accounting for 68.7% total number. However, most bovine husbandry is conducted in small scale and scattered in households (Do Kim Tuyen, 2009). The farm size of 1-5 heads make up for 93.81% and the ratio of household farms having more than 10 heads is only 1.14% (Nguyen Dang Vang, 2014)

The main barriers for Vietnamese farmers to enter this sub-sector are huge initial investment, high technical barriers and severe competition pressure (i.e. on price and quality with imported bovine). Moreover, the constraint of land and longer cycle of animals (due to longer life cycle of bovine cattle) discourage the incentive of household to raise bovine animals compared to swine and poultry husbandry (which has the capability of more intensive large-scale farm in the same land and the larger number of animal cycle per annual). These are the reasons explaining for the erosion of the total bovine population and the stagnation of total bovine domestic output.

Large-scale farms: The model of bovine large-scale farm is mainly to fatten live bovine imported from Australia, e.g. Hoang Anh Gia Lai[15], Duc Long Gia Lai and a number of farms in Dong Nai or suburb of Ho Chi Minh City. Australian heifers weighted around 200-250kg/head are imported directly from Australian exporters to these farms and fatten to approximately 500kg/head in 6 months (average fatten rate is 1.5kg/day/head). The average imported price of live bovine from Australia is 3 USD/live-weight kg plus another 300USD/head for transportation cost. After fattening in Viet Nam, the price falls to around 2USD/live-weight kg, which is completely competitive at domestic market.

The farms having huge land capital for feed ingredients planting like HAGL will be independent on feeds (completely self-supplying on forage and outsourcing part of starches and minerals). The large-scale farms without sufficient land can buy feeds at a cheaper price compared to households thanks to the discount for large purchases and direct contact with feed wholesalers instead of retailers. All intensive farms gave their own vegetarian teams and have to satisfy the strict requirement on animal rights imposed by exporting countries.

Currently, after fattening stage, live bovine will be sold to private intensive slaughter houses (industrial or half-industrial). Contracts are made based on free market principle with price motivation.

[15] As of May/2015, there are nearly 60,000 bovine being raised at HAGL farms in Lao, Cambodia and Viet Nam (of which 22,000 heads in Gia Lai). HAGL planned to expand to total 100.000 heads later this year.

Collectors: Currently, there are two types of collectors: (1) buying live bovine from domestic household and sell to slaughter houses and (2) importing live bovine directly from abroad through foreign exporters and sell to intensive/wholesale slaughter houses.

Type 2 collectors are the main rival of large-scale farms doing fattening as described above. At the moment, live bovine cattle from Australia are imported at the main seaports in the South and North, with 4 big companies in charge in the southern region and 3 in the northern region.

Slaughter Houses: There are two types of slaughter houses: (1) intensive/large-scale ones (industrial, semi-industrial and concentrated) working directly with collectors (if bovine animals raised in household or imported from abroad) and large-scale farms (in case of fattened bovine); a limited number of which owns their distribution and retail system, taking example of VISSAN; while a bigger proportion will supply to supermarket or wholesale for further stages of supply chain; (2) small-scale ones supplying carcass for markets/local retailers.

Distributors - Retails: Most bovine carcass from industrial/semi-industrial slaughter houses will go to supermarkets or wholesale, then distributed to markets and local retailers. Another flow of bovine carcass comes from small-scale household-level slaughter house to markets and local retailers.

After slaughtering, the consumer price of Australia at markets and supermarkets fluctuates from 300,000-500,000 VND/kg depending on type and age. This price is considered as reasonable as and not remarkably higher than domestic beef with a difference of only around 20,000 VND/kg. Therefore, for distributors-retailers, Australian beef and domestic beef can be substituted strongly to each other.

However, in the condition of large scale of raising and/or slaughtering Australian bovine, it is necessary for establish a cooling/chilling distribution and retailing system because this type of meat cannot be consumed as fast as warm meat slaughtered in small quantity at scattered slaughter houses. As a result, Australian beef often goes to supermarkets or a limited number of retailers equipped with appropriate chilling system. For distributors and retailers satisfying this requirement, they will have another substitute product – chilled or frozen bovine meat imported from abroad (Australia, the US, New Zealand)

Government: The government has issued policies supporting large-scale production using high technology as well as expanding dairy cow husbandry, as summarized in Livestock Sector Restructuring Scheme (page 76).

Table 25. Market structure along Swine and Poultry meat supply chain

No	Participant	Role	Quantity	Position	Behavior
Live animal market					
1	Breeding inventories	- Import breeds and cross-breed to increase supply	A few	- With households	- Import from abroad and cross-breeding then sell to households/farms - Sell to households - Choose between being independent or becoming contractors for big firms/investors (CP, Japfam, Emivest)
2	Households	- Buy breed and raise animal	Many	- With breeding inventories - With investors/big firms	- Independent: free to choose feed/breed suppliers, but unstable buyers - Contractor: depend on investors in choice of inputs and no choice of buyer; lower price compared to independents but stable sale - Have to bear the environment cost
3	Large-scale farms	- Import breed directly or assigned by investors	Not many	- With investor: either close (owed by investor) or loose (outsourced by investor)	- Choose between being independent or becoming contractors for big firms/investors (CP, Japfam, Emivest) - Selling at competitive price compared to households thanks to scale of production
4	Investors/Big firms	Control the whole supply chain from breeding to production and retail	A few	- With household: monopoly in feeds and monopsony in live animal	- Strict control with households and leave the environment cost for households - Cooperate with chained retailers (i.e. supermarkets) at competitive price (due to environment cost cut) and long-time contract
5	Grassroots slaughter houses	- Buy live animal and sell carcass-weight meat, OR - Supply slaughter service	Many	- With household/ independent farms	- Work through intermediaries

6	Industrial slaughter houses	Slaughter	A few	- With large-scale farms	- Contracted with large-scale farms for long-time - Maybe or not work through intermediaries
7	Intermediaries	Buy live animal and sell without slaughtering	Many	- With households or farms	- Prefer low buying price (from farms) and high selling price (to slaughter houses) - Prefer households so they can have more bargaining power and less risk (short-time contract)
8	Government	Construct long-term planning		Unclear	- Encourage large-scale farms and slaughter houses but policy implementation is slow
9	Consumers	Buy directly from households	Many	With household	- Prefer live animal (mainly poultry) and do slaughtering by themselves
Meat market					
1	Grassroots slaughter houses	Sell meat to retailers	Many	- With grassroots retailers	- Short-term contracts with floating price
2	Industrial slaughter houses	Sell meat to retailers	A few	- With retailers	- Long-term contracts with less adjusted buying price
3	Wholesale	Buy meat from contracted inventories/slaughterhouse	A number	- With slaughter houses - With grassroots retailers	- Either short-term contract with grassroots slaughter houses or long-term contracts with industrial slaughter houses
4	Big retailers (Supermarket)				- Offer best price to consumers (but mostly a bit higher than grassroots retailers in return for higher cost in sanitary and phytosanitary and costly distribution system) - Balance between fresh meat and chilled/frozen meat: + Fresh meat: Long-term contracts with big slaughter houses + Chilled/frozen meat: long-term contracts with importers

5	Grassroots retailers	Sell meat to consumers	Many	- With slaughter houses - With wholesale retailers	- Buy meat from wholesale or directly from slaughter houses - Compete with imported meat
6	Importers	Import meat	A number	With retailers	- Import chilled/frozen meat competing with fresh meat produced domestically - Mainly contract with supermarkets for cooling distribution system
7	Exporters	Export meat	A few	- With wholesale	- Export mainly swine meat (comparative advantage of Viet Nam compared to Taiwan)
8	Government	Regulations on price		Unclear	
9	Consumers	Buy meat from retailers	Many	With retailers	- Prefer cheaper products and convenient shopping place (currently grassroots retailers but gradually changing to comfortable and trustworthy supermarkets) - Habits change gradually

Preparation for integration

Facing with the risk of strong influence by trade liberalization, especially intense competition with imported products from countries with strong livestock, such as the US, Australia, New Zealand, Canada in the domestic market, livestock sector should have measures to shore up in short and long term.

Consumption habits

In short-term, the most positive factor is the Vietnamese consumption habits. First, the tradition of using fresh meat instead of frozen meat may help restrict the competition of imported frozen meat. However, live animals imports for fattening and slaughter are trending upwards; this is not a long-term support of the domestic livestock sector. Simultaneously, the strong rise of the middle class, especially in the urban areas in Viet Nam, with busy life, higher income and consumer awareness, particularly on the issue of food safety and origin, will also accelerate the process of adjusting their consumption habits towards chilled and frozen meat.

Second, consumer preferences for specialties that cannot be replaced by imported products help determine the competitive advantage of domestic livestock in some niche markets. However, there are two issues to be set out here: (1) consumption habits of young people are gradually changing, under the influence of fast food chains and foreign cuisine; (2) domestic livestock for specialty products is also in small scale and doesn't get much investment, then the output is generally not high. Thus, the attack on the niche market requires studies to proposed reality development plans, which not destabilize supply and demand, especially when demand is changing.

High technology costs for distribution systems, particularly for chilled or frozen products, affect to domestic livestock in two directions: (1) to obstruct the process of infiltrating market of imported frozen meat because small, street markets are more popular than super markets; (2) however, it make transportation costs of UHT milk and cleanliness dairy products higher, which reduces the competitiveness of dairy products using domestic raw milk compared to reconstituted milk, imported pasteurized milk...

Livestock sector restructuring scheme

Along with the international economic integration, the Government and the Ministry of Agriculture and Rural Development have made strategies and schemes to develop Viet Nam's livestock sector towards higher value and sustainable development. After joining the WTO, the Prime Minister approved the development strategy of livestock to 2020 in 2008. Then, from 2012 to date, the Master Plan of production development of agriculture and Restructuring scheme for agricultural sector were approved. On this basis, in May 2014, the Ministry of Agriculture and

Rural Development approved the Scheme "Restructuring the livestock sector towards greater added value and sustainable development". This Scheme was launched with the aim of promoting the advantages of the capacity to produce some domestic animals in order to improve productivity, quality, competitiveness, added value and sustainable development in order to ensure social security, environmental protection.

The main content of the project revolves around four major focus, including: (i) restructuring the production of the livestock sector by region, gradually shifting livestock farms from high population density areas to low population density areas, forming key breeding areas, disease safety, far from the city and residential areas; (ii) restructuring domestic animal production in the direction of reducing the proportion of pork, increasing the proportion of poultry, beef and developing other potential animals; (iii) restructuring livestock production methods, shifting livestock farming from small-scale households to large-scale farms, identifying appropriate farm scale with each kind of livestock, each region or locality; developing livestock farmers towards industrial farming, with control, applying technical advances, biosafety, reducing environmental pollution; and (iv) restructuring the value chain, commodities and organizing to link product chain, from production to market, which emphasizes the role of enterprises in association with the organization of production.

The Scheme has also given some policy measures in the implementation of the restructuring on issues such as land, credit, taxation and trade. On land, the project offers solutions for reserving land to plan concentrated breeding areas, extend the time for land tax to farmers who make facilitate investment and/or build infrastructure for husbandry. Concurrently, there are tax incentives for feed materials importers, VAT exemption for animal feeds products. On trade, the Scheme simplifies administrative procedures for organizations and individuals to consume domestic products and exports, improve the standards and technical regulations of quality control and food safety with imported goods.

According to the Action Plan, there are six major tasks given in implementation of the scheme from 2014 until the end of 2020. In the first two years, we need to build, review the livestock development planning, specifically planning based on the livestock sector restructuring; to build safety models of animal diseases, to build the linked production model... The second task is to develop policies, legal documents and to improve institutions by the Department of Livestock in collaboration with relevant units under the Ministry. Third, improving productivity and quality of cattle, poultry breeds, and upgrading livestock breeding firms; importing new cattle, poultry breeds; building national management system of livestock breeds. Next is to study and apply science and technology, technological advances in livestock production, invest resources for scientific research in the field of animal husbandry; build models using alternative, supplementary

feed and new feed for livestock animals... Two last tasks in the Action Plan include deploying the propaganda, training and veterinary work which is mainly implemented by departments of agriculture and rural development.

Awareness of participants

Although the policy has made remarkable progress, lack of information on integration, especially at local levels, businesses and farmers before and even after the signing of trade agreements is still very popular. This result in a passive situation when faced with the challenges of integration. According to the investigation of the Hanoi Young Business Association, 80% of the surveyed enterprises were apathetic, not interested in integration. Additionally, the University of Economics and Business, Viet Nam National University, Hanoi also conducted a survey of nearly 700 small and medium enterprises in five cities Hanoi, Hai Phong, Ho Chi Minh City, Da Nang, and Can Tho. The result showed that 60% of Vietnamese enterprises don't know anything about the basic content of the AEC. In addition, in fieldwork of our research group at Ha Noi, Nghe An, Gia Lai, Lam Dong and Ho Chi Minh City, the farmers are not interested or do not have any information about TPP and AEC.

Methodology

Literature Review: Assessment on Viet Nam's livestock sector

One of the weaknesses of global CGE models when assessing the impacts of integration on a specific sector in details is that CGE models tend not sufficient to capture the diverse results across the sub-sectors, of livestock in this case.

To assess the impacts of the trade policy changes, partial equilibrium models are commonly used to analyze these impacts at sectoral level. In general, PE analysis offers several advantages compared to GE models. Even though a PE model cannot takes into account inter-market linkages as a GE modal does, it can be as disaggregated as we want, thus avoid the aggregation bias which are usually found in a GE model. In addition, the data requirements are typically smaller and only data at sectoral level are needed: trade flows, trade policy and elasticities, thus, PE model can use more updated data.

Another advantage of PE models is the availability and ease of use. Also, their simulation results are relatively understandable, since these models only use some basic equations to calculate the market equilibrium. However, this may be seen as weaknesses of PE models because these models do not include constraints on production factors. Table 26 below provides the main features of PE and GE models:

Table 26. Partial vs. General Equilibrium models

	PE models	GE models
Capturing economy wide linkages		x
Consistency with budget constraints		x
Capturing disaggregated effects	x	
Capturing complicated policy mechanisms	x	
Use of timely data	x	
Capturing short and medium term effects	x	
Capture long term effects		x

Source: WITS Advanced Course Presentation (WB, 2008), cited from WTO and UNCTAD (2012)

Currently, there are many ready-made PE models, which users could choose according to their need. Several models are widely known such as SMART model; Global Simulation Analysis of Industry-level Trade Policy (GSIM); Tariff Reform Impact Simulation Tool (TRIST); and Agricultural Trade Policy Simulation Model (ATPSM).

SMART, for example, is typically used to evaluate the impacts of a tariff change that provides a more favorable treatment for only one trading partner. The GSIM model was developed and expanded from SMART aims to simulate globally, with changes in tariff policies of one or more countries simultaneously. Meanwhile, TRIST focuses on analysis of the impacts on government revenues, especially for low-income countries. Also, unlike other PE models, TRIST also analyzes the impacts to actual revenues, not only tariff revenue but all taxes levied on trade such as VAT. Finally, ATPSM was developed by UNCTAD in the 1990s to assess the impacts of agricultural trade liberalization to developing countries, particularly focuses on standard agricultural policies such as quotas or subsidies after quantified.

GSIM was developed by Francois and Hall (2003) in order to simulate the changes in welfare, output, commodity prices and the trade flows as a result of the trade liberalization. In GSIM model, trade policies are reflected directly through the tariff changes among countries. A change in tariff will lead to a change in trade flows, both origins and destinations of goods. To simulate this change, GSIM model requires data on bilateral trade matrices; initial bilateral tariffs matrix; scenarios of tariff changes; and information on elasticities (import demand elasticity, elasticity of export supply and elasticity of substitution). The model estimates the effects of trade liberalization in terms of changes in trade flows; output; and economic welfare comprising of producer surplus, consumer surplus and changes in tax revenues.

In recent years, many studies applied the GSIM model to evaluate the impact of participation in FTAs on industry level of some countries such as Wörz, Pindyuk, Holzner, and

Astrov (2007), Holzner (2008), Holzner and Ivanic (2012), Leudjou (2012), Burkitbayeva and Kerr (2014),...

Wörz *et al*. (2007) used GSIM model to analyze the impact of the Russia's WTO accession in the medium and long run. Wörz *et al*. (2007) indicates that using a fully-fledge general equilibrium model (which would have to include a full endogenization of income and expenditure levels across the region) would be a too ambitious, especially given the outdated input-output tables. In addition, in some other studies, Holzner also applied GSIM model to assess the EU accession of some countries such as Serbia (Holzner & Ivanic, 2012); the Balkans and Turkey on agricultural trade (Holzner, 2008).

Burkitbayeva and Kerr (2014) analyzed the wheat export industry in the world when Kazakhstan, Russia and Ukraine, which accounted for about a quarter of wheat exports worldwide, accessed to the WTO. This study used the data with 2007 as the base year, a year before the official Ukraine's WTO accession. Also, the wheat market in 2007 was stable and without any major volatility before the global economic crisis which accompanied much volatility in world food prices in 2008. The results showed that the change to MFN tariffs led to KRU countries trading more with markets such as Turkey, the EU and China. Meanwhile, major traditional wheat exporters such as Australia, Canada, the EU, and the US did not seem to be negatively impacted significantly.

Using the GSIM model, Leudjou (2012) simulated multilateral tariff reduction scenarios for the Camaroon dairy sector under the framework of the Doha Round. This study assessed the impact of trade liberalization on food security in dairy sector, focused on the changes in domestic prices and consumer surplus. Moreover, the author used sensitive analysis by changing the parameters of elasticity to ensure that consumer surplus was basically insensitive to the values of elasticity. Accordingly, sensitivity analysis showed that consumer surplus maintained negative after liberalization.

However, partial equilibrium (PE) models alone have limitations to predict the changes in price and quality at the level of whole industry or economy, which interrelated with other sectors in the economy. Therefore, there has been a number of attempts by scholars trying to combine the PE and GE models to complement each model. Narayanan, Hertel and Porridge (2010) in their study on trade liberalization's impacts on Indian automobile industry showed that the PE/GE model is superior to the GE model in terms of disaggregate impact-evaluation and dominates the PE model in terms of endogenous determination of aggregate supply and demand as well as aggregate welfare assessment. More importantly, when compared to the simple, aggregated GE model, the integrated PE/GE model shows higher allocative efficiency gains and lower terms of trade losses, because the GE model ignores disaggregated details of trade flows and tariffs.

Regarding Viet Nam's livestock sector, there have been two studies using the combined approach to assess the impacts of trade liberalization on this industry. Nin, Lapar and Ehui (2003) applying an approach combined of GTAP model and the simple micro model, using GTAP 5 database and data from other sources. Nin *et al*. (2003) constructed 9 scenarios depending on the coverage of liberalization by sector (agriculture; manufacture and services; all sectors) and by geographical factor (unilateral trade liberalization of only Viet Nam; regional integration in ASEAN; and World). Results showed that welfare for Viet Nam would be maximized if trade liberalization is implemented in all sectors and market access for Viet Nam's manufacture exports is enhanced. The impact of livestock production was small but a more integrated Vietnamese economy will lead to a more deficit trade balance of livestock products. Optimistically, the authors concluded that (1) trade liberalization could open opportunities for the poor livestock producers to compete and improve their income; (2) the number of poor producers will decrease accordingly to the size of integration; and (3) the best choice is pig production, especially for the well-trained households, with small household size and better resources and infrastructure, who adopt appropriate productivity-improving technologies.

A more recent studies sharing the same topic is Linh, Burton and Vanzetti (2008), which employed GTAP model combined with LES-AIDS model (i.e. a household model) and SplitCom software. They used GTAP 6.2 database and constructed 7 scenarios: tariff removal only in Viet Nam, AFTA, AFTA+3, between Viet Nam – US, Viet Nam – EU25. Multilateral and Global. This study shows that Viet Nam's small livestock households would benefit from trade liberalization, mainly by the effect of household's labor allocation between off-farm and on-farm job, rather than the increase in production profit and consumption on commodities only. The greatest benefit for them is in the global trade liberalization scenario.

Also aiming at assessing the integration's impacts on both the whole economy and the livestock sector, without going too deep into the household level but mainly on all livestock producers and consumers, this study in addition to employing the GTAP model, also use GSIM model. While the above combined GE/PE studies using GTAP database as the main input for their model, by using GSIM separately with data updated to 2013 and HS-6 code, we hope to improve this weakness of GTAP database[16].

The GSIM model

As detailed analysis on the simulation results obtained from the GTAP model has been provided in the previous section, this section focuses on the GSIM model.

[16] The most updated version of GTAP database has the base year of 2011, which is usually criticized as outdated and not incorporating the recent implemented trade agreements.

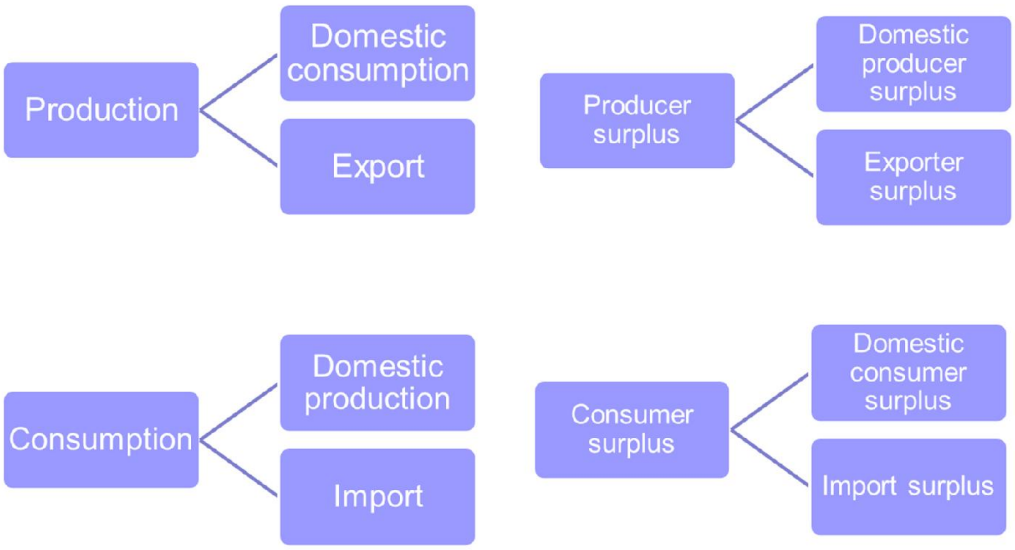
Framework

The GSIM model was introduced and developed by Francois and Hall (2003) for the analysis of global, regional or unilateral trade policy changes. Accordingly, GSIM is a partial equilibrium model with the basic assumption of national product differentiation, in which imports across countries are imperfect substitutes. The elasticity of substitution is assumed to be equal and constant across products from different sources. The elasticity of demand in aggregate import and elasticity of export supply are also constant in initial GSIM model (Francois & Hall, 2003).

The GSIM model allows us to assess the impact of changes in import tariff/export subsidies into changes in trade flows, welfare, prices and output. This model is built on the Excel platform, where the Excel Solver tool is used to solve core equations for the global market clearing condition.

In initial GSIM model, the required inputs are bilateral trade matrix; initial bilateral tariffs matrix and scenarios of tariff changes; elasticity of substitution; elasticity of demand in aggregate import and elasticity of export supply. Changes in welfare are measured by the total surplus of the importer, exporter's surplus and tax revenue changes. In this version, Francois & Hall (2003) mentioned the inclusion of data on trade with self (domestic absorption) on the diagonal of the bilateral trade matrix. It is noticed that the domestic production and consumption can be classified as shown in the below figure:

Figure 25. Distribution of Production and Consumption



Source: Authors'

Therefore, as we have sufficient data on domestic absorption, the changes in producer surplus could include surplus of domestic firms and exporters. Similarly, consumer surplus not only includes importer surplus but also welfare of the consumer who consume domestic products.

Parameters and data

To compensate for limitations of CGE models in outdated data usage without disaggregation of livestock sector to desirable level, we use GSIM model for 9 livestock sub-sectors including: (1) live bovine; (2) live swine; (3) live poultry; (4) bovine meat; (5) swine meat; (6) poultry meat; (7) raw milk; (8) milk powder; and (9) other dairy products.

Bilateral trade

Bilateral trade data classified by HS 6-digit code were collected from UN Comtrade Database in 2013 as the base year. Data of commodities which Viet Nam has trade relation with TPP or AEC countries, will be aggregated into 9 livestock sub-sectors. Domestic absorption is included as trade with self, which are calculated from PSDO[17] database. However, due to statistical limitations of some countries in TPP as well as some Southeast Asian countries, domestic absorption data are only estimated for the sub-sectors (4), (5) and (6). In those cases, we are able to evaluate more accurately the impact of trade liberalization on domestic producers and consumers of Viet Nam, not only on exporters and importers.

We also notice that this study focuses on simulating the impact of trade liberalization on Viet Nam, therefore only items on which Viet Nam has traded in the base year were included. Commodities which Viet Nam did not trade with TPP and/or AEC countries, are not considered.

Tariff and Equivalent of non-tariff barrier

Besides tariffs, this study also considers the influence of the reduction in Ad Valorem Equivalents of Non-Tariff measures. Information on applied tariffs classified by HS 6-digit code had been taken from Market Access Map database of the International Trade Center (UNCTAD/WTO). The average tariffs were calculated for 9 sub-sectors based on the applied tariffs and the import value of each sub-sectors component.

Meanwhile, the Ad Valorem Equivalents were extracted from Looi Kee, Nicita, and Olarreaga (2009), which estimated trade restrictiveness indices. This research shows that the tariff equivalents ranges from 0% to 2.5% in all considered countries, yet this figure could not be applied to not include Viet Nam and some AEC countries due the lack of appropriate data. Thus, in order to make use of this information into the model, we assume that the tariff equivalent of Viet Nam

[17] *Production, Supply and Distribution Online (United States Department of Agriculture, Foreign Agricultural Service)*

is of the group with highest non-tariff barrier of which tariff equivalent data would be applied to Viet Nam and other missing data countries.

Elasticity of substitution, elasticity of export supply, import demand elasticity

Regarding the elasticity of substitution, the default value of 5 was adopted for all countries and commodities in this model (Francois & Hall, 2003). However, to ensure that the impact of tariff removal on welfare is not sensitive to changes in elasticity, this study uses the sensitivity analysis with the value of elasticity of substitution of 7.5 as well.

Aggregate import demand elasticities are applied using the default value of GSIM model, -1.25 (Francois & Hall, 2003). Similarly, the value 1.5 was adopted for elasticities of export of all countries and all sub-sectors.

Scenarios

With the data of tariffs and equivalent of NTBs as described above, this simulation by GSIM model employs similar scenarios as in the simulation by GTAP model, consisting of the followings:

a. Tariff removal for the TPP partner countries,
b. Scenario a + 7% reduction in non-tariff barriers (NTBs) for the TPP partner countries
c. Scenario a + 7% reduction in NTBs for all countries/regions
d. Tariff removal for the ACE partner countries
e. Scenario d + 7% reduction in NTBs for all AEC partner countries
f. Tariff removal for TPP and AEC countries + 7% reduction in NTBs for all countries/regions

Simulation results of GSIM model

The GSIM model allows us to complement the results obtained from the GTAP model and also to break the livestock sector down into smaller sub-sectors and thus have a more detailed picture of the impacts of TPP and AEC.

Welfare of livestock sector

Change in welfare by country

Simulation results show that, while the TPP affects most of the participants (scenario a, b, c and f), AEC has no obvious influence to the participating countries (scenario d, e). It should be noted that welfare measure used in GSIM model is based on economic agent's surplus, unlike the equivalent valuation in GTAP model.

It also should be remarked that the tariff equivalents of NTBs only range from 0% to 2.5% in all considered countries. Thus, we can see that the impacts of non-tariffs barriers are not clear in all scenarios (scenario b, c, e and f).

Table 27. Change in Total Welfare of Livestock Sector (million USD)

	Scenario					
	a	b	c	d	e	f
Australia	267.9	268.8	268.8	0.0	0.0	268.8
Brunei	-2.1	-2.1	-2.1	0.0	-0.1	-2.1
Canada	219.1	219.1	219.1	0.1	0.1	219.1
Chile	5.4	5.4	5.4	0.0	0.0	5.4
Japan	315.6	314.8	314.8	0.0	0.0	314.8
Malaysia	-45.5	-45.7	-45.7	-0.1	0.0	-45.8
Mexico	211.1	210.3	210.3	0.1	0.1	210.4
New Zealand	219.5	220.6	220.6	-0.3	-0.3	220.3
Peru	-10.9	-11.0	-11.0	0.0	0.0	-11.0
Singapore	-130.4	-130.6	-130.6	-0.2	-0.2	-130.9
US	318.1	318.3	318.3	-0.1	-0.1	318.2
Viet Nam	-31.1	-31.2	-31.2	-0.2	-0.2	-31.3
Cambodia	-0.4	-0.4	-0.4	-0.1	-0.1	-0.5
Indonesia	-76.5	-76.9	-76.8	0.1	0.1	-76.7
Thailand	-57.3	-57.2	-57.0	0.7	0.8	-56.3

Source: Authors' simulations

In the case TPP was signed, the total welfare of the livestock sector in some countries, which have comparative advantages such as Australia, New Zeeland and the US, would increase significantly. It mainly due to the gains of exporters, where TPP is a potential market because the tariffs applied by all countries is now still very high. Conversely, other countries such as Japan, Mexico or Canada will gain large surplus of consumers/exporters, thus, increase their total welfare in livestock sector. It mainly because these countries is now applying very high tariffs on livestock products.

Table 28. Welfare Decomposition (scenario b, million USD)

	Producer surplus X	Consumer surplus Y	Tariff revenue Z	Net welfare effect W=X+Y+Z
Australia	374.77	-105.44	-0.55	268.78
Brunei	0.00	-2.12	-0.01	-2.13
Canada	114.63	744.49	-640.04	219.08
Chile	90.87	-62.36	-23.08	5.43
Japan	-714.49	4,125.02	-3,095.76	314.77
Malaysia	5.78	-48.00	-3.44	-45.66

Mexico	-392.04	2,171.49	-1569.16	210.29
New Zealand	258.17	-31.91	-5.68	220.58
Peru	-1.53	-6.65	-2.80	-10.97
Singapore	12.36	-141.74	-1.24	-130.63
US	1,575.43	-1,036.73	-220.42	318.27
Viet Nam	-14.54	19.07	-35.70	-31.17
Cambodia	0.00	-0.39	-0.06	-0.45
Indonesia	0.37	-75.80	-1.44	-76.87
Thailand	0.62	-45.30	-12.55	-57.23

Source: Authors' simulations

After TPP, if all tariffs were removed, Canada, Japan and Mexico would be the three countries losing the largest tax revenue. Meanwhile, the US have the largest losses in consumer surplus after TPP. Several other countries also have negative surplus but in lower levels. It is due to the shift of the destinations of trade flows (as a result of TPP) from the US to other countries which have higher tariff rates before TPP. In other words, after TPP, many countries such as Japan or Mexico have to eliminate tariffs and non-tariff barriers, thus, these countries become more attractive markets. Commodities will be exported to these markets rather than the US. It is obvious that except Canada and Peru, the impact of TPP to welfare of producers/exporters and consumers/importers in all countries are opposite.

For scenarios only for AEC (scenario d and e), the simulation results show that there is no clear impact on Viet Nam's livestock as well as other countries. Most countries in AEC (except for Thailand and Indonesia) bear negative effect in total welfare, however, the changes are quite small and almost insignificant compared to changes in the case of the TPP. This is understandable because of the low tariffs among ASEAN countries (only 5% or below in almost commodities). Thus, the tariff removal scenarios would not have much impact on livestock sector of AEC countries.

Change in welfare by sub-sector

For all scenarios, liberalization has caused negative effects on Viet Nam's livestock sector at different levels. Accession TPP with all tariff removal could make a negative effect on Viet Nam livestock sector. The total welfare of this sector might lose from 31.05-31.46 million USD, depending on various scenarios. Except the "poultry" sub-sector, all the sub-sectors were negatively affected. In which, milk powder sub-sector experienced the largest losses with 20.3 million USD of total welfare.

Table 29. Change in Viet Nam's Welfare (million USD)

	a	b	c	d	e	f
Live bovine	-0.44	-0.44	-0.45	0.00	-0.01	-0.45

Live swine	0.00	0.00	0.00	0.00	0.00	0.00
Live poultry	-0.44	-0.44	-0.44	-0.01	-0.01	-0.44
Bovine meat	-0.98	-0.99	-0.99	0.00	0.00	-0.99
Swine meat	-0.28	-0.28	-0.28	0.00	0.00	-0.28
Poultry meat	0.23	0.22	0.22	0.00	0.00	0.22
Raw milk	-0.07	-0.07	-0.07	0.00	0.01	-0.06
Milk powder	-20.22	-20.29	-20.29	-0.01	-0.01	-20.29
Others	-8.86	-8.88	-8.88	-0.17	-0.17	-9.05
Total	***-31.05***	***-31.16***	***-31.18***	***-0.18***	***-0.19***	***-31.34***

Source: Authors' simulations

For two scenarios assessing the impact of AEC to Viet Nam, the simulations results indicate that the influence of tariff reductions in the AEC is not significant to Viet Nam's livestock sector. In that case, the welfare of livestock sector of Viet Nam only lost by 0.18-0.19 million USD.

Viet Nam's welfare decomposition

As in the above analysis, the welfare in this model is measured through consumer/importer surplus, producer/exporter surplus; and changes in tax revenue. Overall, consumers/importers tend to gain more than the losses of the producers/exporters after TPP. For scenario b, the surplus of Viet Nam's consumers/exporters is 19.07 million USD, while producers/exports only lose by 14.54 million USD. This is similar to the other scenarios which assesses the TPP effect. Notice that this deficit of producers are primarily in three meat sub-sectors (no. 4, 5, 6), while other sub-sectors without sufficient data on domestic absorption, have no any clearly impact on domestic producers.

The reduction of tariff barriers has always caused tax burdens for government because of the absence of tax revenue from import. For TPP, in scenario b, Viet Nam's tax revenue lost about 35.7 million USD, thus, total welfare of Viet Nam's livestock sector is negative in all scenarios.

Another remarkable point is that the dairy market showed the opposite effects of trade liberalization. In this case, we can see obviously that current applied tariffs of some countries such as Canada, Mexico and Japan are very high, especially in livestock sector[18]. Therefore, when tariffs are removed, dairy products from other countries tend to shift to these markets (except for raw milk). This has significant impacts on the movement of trade flows among countries. The large reduction in tariff causes dairy products' tendency to move to these countries. It is due to the decline in Viet Nam's domestic supplies, the domestic prices are pushed up. Thus, consumer will

[18]Average tariff of milk powder sub-sector in Canada, Japan and Mexico are 200-270%; 101%; and 38-40%, respectively; while the highest average tariffs of other items in these countries are respectively 185%; 172%; and 46%, depends on the specific partner.

suffer in this case. Instead, a part of domestic producers will be more beneficial when the domestic prices of dairy products increases.

In addition, unlike other sectors, the gain of consumers of poultry sub-sector is greater than the losses of producers and tax revenue, thus the welfare of this sub-sector is also positive after TPP.

Table 30. Viet Nam's Welfare by Component (million USD)

	Scenario b				*Scenario e*			
	X	***Y***	***Z***	***W***	***X***	***Y***	***Z***	***W***
Live bovine	0.00	2.12	-2.56	-0.44	0.00	0.01	-0.01	-0.01
Live swine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Live poultry	0.00	-0.28	-0.16	-0.44	0.00	0.01	-0.02	-0.01
Bovine meat	-2.36	4.29	-2.92	-0.99	0.00	0.00	0.00	0.00
Swine meat	-0.85	1.51	-0.94	-0.28	0.00	0.00	0.00	0.00
Poultry meat	-11.46	20.93	-9.25	0.22	0.00	0.01	0.00	0.00
Raw milk	0.02	0.54	-0.62	-0.07	0.00	0.01	-0.01	0.01
Milk powder	0.00	-7.27	-13.03	-20.29	0.00	0.10	-0.11	-0.01
Other dairy products	0.10	-2.77	-6.21	-8.88	0.01	0.08	-0.27	-0.17
Total	***-14.54***	***19.07***	***-35.70***	***-31.17***	***0.01***	***0.22***	***-0.43***	***-0.19***

Source: Authors' simulations

In contrast, in cases of AEC, tariff reduction in dairy products sub-sector helps consumer/importers gain more benefits because more trade flows from regional countries would move to Viet Nam. However, Viet Nam's total trade of livestock sector with these countries is still very low, thus the changes in consumers/importers surplus are not large. Therefore, the welfare of livestock sector is still negative because of large reduction in tax revenues.

Trade flows

In GSIM model, based on the assumptions about elasticities, a change in tariff rate will lead to a change in trade value among countries. Then, there is a new equilibrium in which prices, output will be vary by country.

By country

Considering the whole livestock sector, Japan, Mexico and Canada are countries which currently have the highest average tariff rates on imported products from other countries, respectively 48.8%; 45.5% and 31.8%. Meanwhile, tariff rates of some countries have already reduced to 0% or nearly 0% such as Australia, Singapore or Brunei. This difference leads to trade flows' tendency to shift from countries applying lower rate of tariff to the others after TPP.

For all scenarios after TPP implementation, Japan and Mexico have the largest increases in imports, respectively 4.2 and 2.1 billion USD (corresponding to 60-62% of imports before TPP).

Canada also has a larger increase in imports than the rest, depending on different scenarios, Canada's imports might extend about 0.56 billion USD, corresponding to 28% imports of livestock sector in 2013.

Table 31. Change in Import Value of Livestock Sector (million USD)

	a	b	c	d	e	f	Total import
Australia	-35.63	-35.16	-35.16	0.01	0.01	-35.15	709.26
Brunei	-1.41	-1.40	-1.40	-0.01	-0.01	-1.40	49.58
Canada	563.05	564.66	564.66	0.00	0.00	564.64	2,015.86
Chile	77.44	77.74	77.74	0.00	0.00	77.74	338.50
Japan	4,236.75	4,239.20	4,239.21	0.08	0.09	4,239.20	6,794.45
Malaysia	-22.38	-21.80	-21.71	0.76	0.86	-21.05	1,041.47
Mexico	2,115.47	2,118.09	2,118.09	0.03	0.03	2,118.09	3,472.44
New Zealand	-1.99	-1.83	-1.83	0.00	0.00	-1.83	259.48
Peru	2.81	2.93	2.93	0.00	0.00	2.93	185.74
Singapore	-51.07	-49.80	-49.77	-0.10	-0.02	-49.80	2,673.86
US	435.13	439.13	439.13	0.02	0.02	439.14	6,812.04
Viet Nam	64.52	65.32	65.34	0.42	0.45	65.54	671.38
Cambodia	-0.21	-0.20	-0.19	0.90	0.90	0.75	14.39
Indonesia	-27.92	-27.95	-27.14	-0.02	-0.01	-27.14	1,515.64
Thailand	-5.50	-5.68	-5.41	-0.01	0.01	-5.40	563.49

Source: Authors' simulations

In contrast, some countries reduce in import values such as Australia, Singapore and Malaysia. After TPP, simulation results also show that imports of non-TPP countries have negative influence when these markets are no longer as attractive as before because of larger tariff barriers.

Viet Nam is also one of the countries which has increases in imports after TPP, approximately 64-65 million USD, corresponding to 9.6-9.8% of total imports of livestock sector. In scenarios d and e, AEC only have small effects on Viet Nam's imports. Besides Viet Nam, imports of Malaysia and Cambodia also increased slightly after AEC, while trade flows tend to withdraw from some countries such as Indonesia, Singapore and Brunei as in the case of TPP.

Table 32 indicates the changes in trade flows by source and destination for whole livestock sector. Accordingly, Japan, Canada and Mexico will increase import from other countries such as the US, Australia and New Zealand, instead of consuming domestic products. Also for the US, Australia and New Zealand, instead of production for domestic consumption or exports to some specific markets, after TPP, these countries tend to export to potential markets because of the higher tariff reductions. Especially in Japan, Mexico and Canada, imports of these countries increase from almost the TPP countries. In scenario b, the increase of Japan's imports (4.2 billion USD) mainly comes from the US, Australia and Canada (2.1; 0.8 and 0.7 billion USD

respectively), in addition to 1.8 billion USD reduction in domestic absorption. In the case of Viet Nam, the positive changes of import gradually replace the domestic production, but at moderate level. Domestic absorption decreased by approximately 37 million USD while the imports increase (65.3 million USD, in which 19 million USD from the US; 36.2 million USD from New Zealand and 7.6 million USD from Australia).

Table 32. Change in Trade Value of Livestock Sector by Origin and Destination (scenario b, million USD)

		Destination															
		Australia	Brunei	Canada	Chile	Japan	Malaysia	Mexico	New Zealand	Peru	Singe pore	United States	Viet Nam	Cambodia	Indonesia	Thailand	**Total***
Origin	Australia	-2.1	-0.1	65.9	0.8	763.0	-7.0	7.8	1.4	0.0	-32.1	98.4	7.6	0.0	5.8	2.5	**914.1**
	Brunei	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Canada	-16.3	0.0	-406.7	7.1	654.5	-0.4	76.8	-3.6	0.2	7.3	-44.8	2.0	0.0	-0.3	-0.2	**682.4**
	Chile	0.0	0.0	2.5	-81.1	162.4	0.0	129.0	0.0	-2.9	-0.3	15.9	0.0	0.0	0.0	0.0	**306.7**
	Japan	0.0	0.0	0.4	0.0	-1,836.6	0.3	0.0	0.0	0.0	4.1	7.5	0.0	0.0	0.1	1.5	**14.0**
	Malaysia	0.1	1.2	0.0	0.0	0.0	7.2	0.0	0.1	0.0	4.5	0.0	0.6	0.0	2.3	0.2	**9.1**
	Mexico	0.0	0.0	-0.1	0.0	368.7	0.0	-1,441.0	0.0	0.0	10.4	48.0	1.7	0.0	0.0	1.2	**430.0**
	New Zealand	29.4	0.3	93.7	6.6	162.4	21.9	-34.9	-3.5	6.5	-17.9	314.1	36.2	0.0	31.6	15.6	**665.5**
	Peru	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.8	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Singapore	-3.4	-3.2	0.0	0.0	38.7	-3.8	0.0	-1.5	0.0	1.6	0.0	-0.5	-0.4	-4.6	-3.6	**17.6**
	United States	-44.9	0.0	402.4	63.1	2,089.7	-34.5	1,939.4	1.8	-0.9	-28.8	-530.7	19.0	-0.1	-63.7	-23.2	**4,319.4**
	Viet Nam	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.2	0.0	-37.0	0.1	0.0	0.0	**0.7**
	Cambodia	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.0**
	Indonesia	0.0	0.2	-0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.3	**1.2**
	Thailand	0.0	0.0	0.0	0.0	-0.1	1.1	0.0	0.0	0.0	1.8	0.0	-1.2	0.3	0.1	0.1	**1.8**
	Total*	**-35.2**	**-1.4**	**564.7**	**77.7**	**4,239.2**	**-21.8**	**2,118.1**	**-1.8**	**2.9**	**-49.8**	**439.1**	**65.3**	**-0.2**	**-28.0**	**-5.7**	

*: not including changes in domestic absorption

Source: Authors' simulations

In contrast to imports, the TPP scenario simulations show that not only TPP countries but also the non-TPP countries gain in exports. Exports of all countries increase depending on each country and trade volume between countries. It is understandable because both the TPP and AEC enhance trade liberalization not only intra-group but also outside of it. It is due to the movement of trade flows and the reduction of NTBs which non-TPP or non-AEC countries can also enjoy. When trade flows are shifting from TPP countries which have lower tariff rate or non-TPP countries to others, these countries have to strengthen their trade with each other in order to offset shortages of commodity supply caused by TPP. For instance, 78.7 million USD decrease of Singapore's imports is due the reduction of export to this market by major partners such as Australia, New Zealand and the US. Therefore, Singapore has to seek other partners outside TPP such as Indonesia and Thailand in order to compensate for the supply shortages in livestock sector. Thus, TPP gives opportunities for non-TPP countries to enhance their exports, not just for TPP countries.

Table 33. Change in Export Value of Livestock Sector (million USD)

	a	b	c	d	e	f	Total export
Australia	909.56	914.15	914.55	-0.15	-0.18	914.34	5,456.56
Brunei	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canada	680.49	682.36	682.37	0.00	0.00	682.36	4,250.29
Chile	306.44	306.72	306.72	0.00	0.00	306.71	378.73
Japan	14.82	14.02	14.02	0.00	0.00	14.02	25.99
Malaysia	9.01	9.06	9.07	0.26	0.35	9.10	111.57
Mexico	429.04	429.97	429.97	-0.01	-0.01	429.97	1,627.86
New Zealand	662.42	665.53	665.63	-0.61	-0.64	665.26	5,485.51
Peru	0.00	0.00	0.00	0.00	0.00	0.00	0.01
Singapore	17.60	17.60	17.61	0.34	0.37	17.83	43.94
US	4,315.20	4,319.38	4319.88	-0.29	-0.31	4,319.34	9,524.36
Viet Nam	0.69	0.69	0.70	0.35	0.36	1.05	7.74
Cambodia	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indonesia	1.16	1.16	1.18	0.15	0.17	1.34	20.52
Thailand	1.85	1.82	1.99	2.06	2.24	4.11	130.67

Source: Authors' simulations

The US is the country which has the largest export change after TPP. All scenarios indicate that exports of the US livestock sector may increase by 45.3% exports in 2013, corresponding to 4.3 billion USD. Some countries which have comparative advantages in livestock sector such as Australia, New Zealand or Canada may also increase by 0.66-0.91 billion USD, corresponding to 12-16% of export values in 2013.

In case of AEC implementation, despite the fact that the impacts on signatories are insignificant, the flows of trade illustrate the movement from non-AEC countries to AEC members. It results in the decline in exports of a number of countries namely Australia, Mexico, New Zealand and the US while exports of AEC participants increase such as Thailand, Singapore or Viet Nam.

Change in Viet Nam's trade by commodity and partner

Table 34, 35 and 36 provide information about the changes in Viet Nam's imports by partner as well as sub-sector (in scenarios b and f). By partner, Viet Nam mainly imports livestock products from some TPP countries such as the US, New Zealand and Australia. As analyzed above, Viet Nam's imports might increase by 9.6-9.8% after TPP, this changes in import basically stems from the US, New Zealand and a part from Australia.

It is obvious that the change imports from New Zealand are mostly in milk powder and dairy products, which commodities New Zealand has comparative advantages. The simulation results also show that the movement of import flows in this case. Rather than importing from the US, Viet Nam tends to increase milk powder and dairy products imports from New Zealand. Therefore, the total import values of these sub-sectors increase 10.24 and 2.83 million USD respectively. However, this is mainly because of the higher domestic prices rather than import quantity, the milk powder price increased by 1.96% according to scenario b (Table 37). Meanwhile, imports from Australia might sharply increase in live bovine sub-sector.

The major products imported from the US are meat products such as bovine, swine and poultry sub-sectors, with the largest change in poultry sub-sector. After TPP, for scenario b, poultry meat imports from the US might increase by 34.14 million USD, while bovine meat imports only rose 7.64 million USD.

Table 34. Change in Viet Nam's Import by Partner (million USD)

	a	b	c	d	e	f	Total import
Australia	7.44	7.58	7.56	-0.03	-0.04	7.55	91.89
Brunei	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Canada	2.03	2.04	2.04	-0.01	-0.01	2.04	10.66
Chile	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Japan	0.01	0.01	0.01	0.00	0.00	0.01	0.08
Malaysia	0.61	0.62	0.62	0.52	0.53	0.61	4.59
Mexico	1.65	1.65	1.65	0.00	-0.01	1.65	2.92
New Zealand	35.93	36.19	36.19	-0.29	-0.29	36.15	250.59
Peru	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Singapore	-0.55	-0.54	-0.54	0.22	0.23	-0.54	1.36
US	18.62	19.03	19.03	-0.26	-0.26	19.01	284.18

Viet Nam*	-36.83	-36.98	-36.98	-0.01	-0.01	-36.98	5,103.69
Cambodia	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indonesia	-0.04	-0.04	-0.04	0.30	0.31	0.28	1.52
Thailand	-1.19	-1.21	-1.17	-0.04	0.00	-1.22	23.60

*: change in domestic absorption (for three meat sub-sectors)

Source: Authors' simulations

Note that if we had sufficient data on domestic absorption, the change in imports of Viet Nam from Viet Nam could indicate the reduction of domestic production for domestic consumption (for three meat sub-sectors in this study). The results showed that the domestic producers is slightly affected. In all scenarios, production of three meat sub-sectors (4, 5 and 6) fall by only 0.72% of total production while the impact of the AEC is not clear.

Table 35. Change in Viet Nam's Import by Partner and Sub-sector (scenario b, million USD)

	Live bovine	Live swine	Live poultry	Bovine meat*	Swine meat*	Poultry meat*	Raw milk	Milk powder	Others	***Total***
Australia	4.35	0	0.03	1.08	0.00	0.03	0.21	1.40	0.48	***7.58***
Brunei	0	0	0	0	0	0	0	0	0	***0.00***
Canada	0	0.00	0	0.01	1.98	0.08	0	0.31	-0.35	***2.04***
Chile	0	0	0	0	0	0	0	0	0	***0.00***
Japan	0	0	0	0	0	0.01	0	0.00	0.00	***0.01***
Malaysia	0	0	0.16	0	0.00	0.01	0	0.39	0.05	***0.62***
Mexico	0	0	0	0.05	0	0	0	0	1.60	***1.65***
New Zealand	-0.25	0	0.03	0.19	0	0	0.55	17.99	17.68	***36.19***
Peru	0	0	0	0	0	0	0	0	0	***0.00***
Singapore	0	0	0	0	0	0	0.00	0.12	-0.66	***-0.54***
US	0	0.00	-0.17	7.64	1.28	36.14	0.00	-9.97	-15.89	***19.03***
Viet Nam	0	0	0	-6.06	-2.25	-28.67	0	0	0	***-36.98***
Cambodia	0	0	0	0	0	0	0	0	0	***0.00***
Indonesia	0	0	0	0	0	0	0.00	0.00	-0.04	***-0.04***
Thailand	-1.12	0.00	0	0	0	0.00	-0.03	0	-0.06	***-1.21***
Total*	***2.98***	***0.00***	***0.05***	***8.97***	***3.26***	***36.27***	***0.72***	***10.24***	***2.83***	

*: not including changes in domestic absorption

Source: Authors' simulations

Table 36 simulates impact of AEC on Viet Nam's imports, the results showed that imports from AEC countries has increased in almost all sub-sectors such as live bovine from Thailand; milk powder and dairy products from Malaysia, Thailand and Singapore. Besides, imports from non-AEC countries tend to decrease, although the changes are not significant.

Table 36. Change in Viet Nam's Import by Partner and Sub-sector (scenario e, million USD)

	Live bovine	Live swine	Live poultry	Bovine meat*	Swine meat*	Poultry meat*	Raw milk	Milk powder	Others	***Total***
Australia	-0.01	0	0.00	0.00	0.00	0.00	-0.01	-0.01	-0.01	***-0.04***
Brunei	0	0	0	0	0	0	0	0	0	***0.00***
Canada	0	0.00	0	0.00	0.00	0.00	0	0.00	0.00	***-0.01***
Chile	0	0	0	0	0	0	0	0	0	***0.00***
Japan	0	0	0	0	0	0.00	0	0.00	0.00	***0.00***
Malaysia	0	0	0.05	0	0.00	0.01	0	0.34	0.13	***0.53***
Mexico	0	0	0	0.00	0	0	0	0	-0.01	***-0.01***
New Zealand	0.00	0	0.00	0.00	0	0	-0.02	-0.15	-0.12	***-0.29***
Peru	0	0	0	0	0	0	0	0	0	***0.00***
Singapore	0	0	0	0	0	0	0.00	0.10	0.12	***0.23***
US	0	0.00	-0.02	0.00	0.00	0.00	0.00	-0.15	-0.08	***-0.26***
Viet Nam	0	0	0	0.00	0.00	-0.01	0	0	0	***-0.01***
Cambodia	0	0	0	0	0	0	0	0	0	***0.00***
Indonesia	0	0	0	0	0	0	0.00	0.00	0.30	***0.31***
Thailand	0.03	0.00	0	0	0	0.00	0.03	0	-0.06	***0.00***
Total*	***0.02***	***0.00***	***0.02***	***0.00***	***0.00***	***0.01***	***0.01***	***0.12***	***0.27***	

*: not including changes in domestic absorption

Source: Authors' simulations

Prices

Changing trade among countries makes the supply of livestock products in each country varying, and leads to the changes in commodity prices and output as well. Table 37 describes the percentage change in the prices in Viet Nam's livestock sector, including both consumer prices and producer prices. The reduction of consumer prices benefit consumers/importers, and the surplus of producers/exporters tend to increase as the producer prices increase. It is noticed that the producer prices of one country will only change when this country has exports or the data of domestic absorption of a product is available. In this study, live animals groups (1, 2 and 3) do not have any changes in producer prices. Meanwhile, meat groups (4, 5 and 6) have full simulation results based on export values and estimated data of trade with self. Finally, the changes in producer prices in milk and dairy products groups (7, 8 and 9) are only included the changes in price of exports because of the limitation of data in domestic absorption.

After TPP, with the assumptions of tariffs and non-tariffs, the producer prices in meat groups tend to decrease. The main reason comes from the competition from other countries in TPP. It makes these products more available in the domestic market. The results presented in Table 30 shows that the producers of poultry sub-sector suffered the most in meats group with the welfare reduction of 11.46 million USD. Unlike meat groups, dairy groups recorded the small exports in

powder milk and other dairy products. Therefore, the prices of exported commodities tend to rise due to the removal of tariffs applied by other countries, so Vietnamese exporters have a small surplus (Table 30).

For consumers/importers, the market will become more competitive after tariff removal but it uncertainty could help domestic prices drop. Simulation results show that prices of meat groups and live bovine sub-sector (group 1, 4, 5 and 6) decrease due to competition. Similar to the producers, the consumers of poultry sub-sector are also the biggest beneficiaries, where the surplus increased by 20.93 million USD in scenario b.

Meanwhile, a number of other items such as milk powder and other dairy products have completely opposite results. Increases in consumer prices of these sub-sectors causes the welfare of consumers/importers to decrease after trade liberalization. As explained about the changes in trade flows, the flow of goods and products withdraw from Viet Nam to other countries and the commodity supply become scarce. Finally, it negatively affects the domestic consumers/importers of these sub-sectors after TPP.

Table 37. Change in Prices of Livestock Products (% change)

	Change in Overall Consumer Prices						Change in Producer Price for Home Good					
Scenario	**a**	**b**	**c**	**d**	**e**	**f**	**a**	**b**	**c**	**d**	**e**	**f**
Live bovine	-2.30	-2.35	-2.36	0.00	-0.01	-2.36	0.00	0.00	0.00	0.00	0.00	0.00
Live swine	0.11	0.07	0.05	0.00	-0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Live poultry	6.92	6.92	6.92	-0.26	-0.26	6.92	0.00	0.00	0.00	0.00	0.00	0.00
Bovine meat	-0.44	-0.45	-0.45	0.00	0.00	-0.45	-0.25	-0.26	-0.26	0.00	0.00	-0.26
Swine meat	-0.06	-0.06	-0.06	0.00	0.00	-0.06	-0.03	-0.03	-0.03	0.00	0.00	-0.03
Poultry meat	-1.35	-1.36	-1.36	0.00	0.00	-1.36	-0.78	-0.78	-0.78	0.00	0.00	-0.78
Raw milk	-5.23	-5.28	-5.29	-0.13	-0.13	-5.39	1.15	1.18	1.18	0.14	0.18	1.18
Milk powder	2.03	1.96	1.96	-0.03	-0.03	1.96	1.42	1.44	1.44	0.02	0.06	1.44
Other dairy products	1.89	1.84	1.84	-0.05	-0.06	1.82	2.63	2.64	2.64	0.30	0.33	2.66

Source: Authors' simulations

According to the AEC scenarios, consumer prices of these commodities decreased slightly while the producer prices increased. Thus, both consumers/importers and producers /exporters are beneficial from trade liberalization.

Output

Table 38 provides the results of changes in livestock sub-sectoral output of Viet Nam under different scenarios of trade liberalization. Output changes can be allocated for domestic consumption or for export purpose, depending on each sub-sector and the availability of data.

Therefore, in this study, we only evaluate the change in output of meat group (for domestic consumption) and milk and dairy products group (for export).

For TPP scenarios, the flow of meat products imported from Australia, New Zealand or the US into Viet Nam shrinks the size of Viet Nam's production. In terms of percentage change, the poultry meat sub-sector is mostly affected with a fall of 1.17% output (Table 38).

Table 38. Change in Output of Viet Nam's Livestock Sector (% change)

	Scenario					
	a	**b**	**c**	**d**	**e**	**f**
Live bovine	0.00	0.00	0.00	0.00	0.00	0.00
Live swine	0.00	0.00	0.00	0.00	0.00	0.00
Live poultry	0.00	0.00	0.00	0.00	0.00	0.00
Bovine meat	-0.38	-0.38	-0.38	0.00	0.00	-0.38
Swine meat	-0.05	-0.05	-0.05	0.00	0.00	-0.05
Poultry meat	-1.17	-1.18	-1.18	0.00	0.00	-1.18
Raw milk	1.73	1.78	1.77	0.21	0.27	1.77
Milk powder	2.13	2.16	2.16	0.03	0.09	2.16
Other dairy products	3.94	3.96	3.96	0.46	0.49	3.98

Source: Authors' simulations

Inversely, the output milk and dairy products group might increase by 1.73-3.98% after TPP, depending on each subsector and each scenario; and increase by 0.03-0.49% in the case of AEC. This is completely consistent with the increase in export value of this sub-sector as well as the gain of exporter due to trade liberalization.

Sensitivity analysis

Sensitivity analysis of welfare aims to indicate that the total welfare of livestock sector is not sensitive to the choice of elasticity of substitution values. Table 39 compares the results of economic welfare in scenario b between two values of elasticity of substitution, respectively 5 and 7.5.

Table 39. Sensitivity Analysis Results (scenario b, million USD)

	$E_b = 5$				$E_b = 7.5$			
	X	***Y***	***Z***	***W***	***X***	***Y***	***Z***	***W***
Live bovine	0.00	2.12	-2.56	-0.44	0.00	2.20	-2.56	-0.37
Live swine	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Live poultry	0.00	-0.28	-0.16	-0.44	0.00	-0.29	-0.16	-0.45
Bovine meat	-2.36	4.29	-2.92	-0.99	-3.66	5.54	-2.89	-1.01
Swine meat	-0.85	1.51	-0.94	-0.28	-1.39	2.04	-0.94	-0.29
Poultry meat	-11.46	20.93	-9.25	0.22	-18.33	27.99	-9.14	0.53
Raw milk	0.02	0.54	-0.62	-0.07	0.03	0.50	-0.63	-0.10

Milk powder	0.00	-7.27	-13.03	-20.29	0.00	-7.08	-13.03	-20.11
Other dairy products	0.10	-2.77	-6.21	-8.88	0.13	-2.50	-6.23	-8.60
Total	*-14.54*	*19.07*	*-35.70*	*-31.17*	*-23.21*	*28.39*	*-35.56*	*-30.38*

Source: Authors' simulations

In this study, we only do sensitivity analysis for scenario b. In this case, there is a very small change in total welfare, less than 3% of total welfare, when E_b increases from 5 to 7.5. A higher elasticity of substitution implies that goods become easily interchangeable among countries, and trade flows become more fluctuating. The gains of producers/exporters tend to significantly reduce and shift to the consumers/importers. Thus, the changes in total welfare are insignificant in either case of sensitivity analyses.

As E_b increased from 5 to 7.5, Viet Nam's producers/exporters surplus fell from -14.54 to -23.21 million USD, while surplus of consumers/importers increased from 19.07 to 28.39 million USD. Thus, the total welfare of Viet Nam's livestock sector increased slightly by 0.79 million USD.

Therefore, a higher value of elasticity of substitution causes a shift of gain from producers/exporters to consumers/importers. Especially, due to Vietnamese consumers preference to warm meat cannot change in the short-term, frozen meat from other countries will find it difficult to enter Viet Nam's market. That means the elasticity of substitution is quite low in Viet Nam. It implies that the meat industries will not suffer by TPP in the short-term. However, as consumer habits change gradually, shifting toward frozen meat, which means a higher elasticity of substitution, the surplus will gradually shift from domestic producers to consumers. Table 40 describes the welfare of domestic producers and consumers in two cases, the current habits (E_b = ***1.5)*** and the habits are changed (E_b = ***5).***

Table 40. Welfare by Meat Sub-sectors: Changes in Elasticity of Substitution

	E_b = 1.5				E_b = 5			
	X	***Y***	***Z***	***W***	***X***	***Y***	***Z***	***W***
Bovine meat	-0.11	2.03	-3.0	-1.06	-2.36	4.29	-2.92	-0.99
Swine meat	-0.02	0.68	-0.94	-0.28	-0.85	1.51	-0.94	-0.28
Poultry meat	-0.81	10.09	-9.25	-0.03	-11.46	20.93	-9.25	0.22

Source: Authors' simulations

The analysis of the results obtained from GSIM model shows us the followings.

In those scenarios assessing the impacts of trade liberalization on Viet Nam's livestock sector, the impact of Viet Nam participation in AEC is almost negligible. Meanwhile, TPP has clear impacts on the livestock sector through welfare, imports and domestic production. Considering the overall livestock sector, consumers/importers will have access to cheaper

products, while producers/exporters which largely affected for not being able to compete with the influx of products from other countries such as bovine from Australia and poultry and swine meat from the US. Along with that, the reduction in welfare due to the loss of import tariff revenue causes the welfare of the livestock sector to decline after TPP effect.

Trade liberalization aims for complete removal of tariff barriers and partial removal of non-tariff barriers, which leads to a change in trade flows between countries. The results show that trade flows tend to re-direct from countries with low levels of tariff reduction to countries with greater reductions. By sub-sector, Viet Nam reduce its import of milk powder and dairy products from the US and shifts to import from New Zealand. It also increases the import of live bovine from Australia and meat products from the United States.

Changes in export prices lead to a new equilibrium prices in the market including manufacturer's prices and consumer prices. In the case of Viet Nam, meat products from abroad will flood the domestic market, causing negative impacts on the welfare and output value of domestic producers. On the other hand, the consumers will benefit from more competitive markets which leads to reduced prices.

Regarding the sub-sectors, except for poultry meat group, in all live animals and other meat sub-sectors consumers/importers and producers/exporters are slightly affected. Meanwhile, poultry meat sub-sector is significantly affected because of the higher current applied tariffs and larger import volumes than other sub-sectors. Therefore, after TPP, this sub-sector will be most strongly affected, however the welfare of this sub-sector is still balance as the benefits of consumers/importers could compensate for the losses of tariff revenue and producers/exporters.

A remarkable point is that for milk powder and dairy products (except for raw milk), changes in trade flows causes Viet Nam’s consumers/importers to suffer due to the reduction in supplies after TPP. Reduction in tax revenues of this sub-sector is also the main cause leading to the losses of total welfare of Viet Nam’s livestock sector.

The sensitivity analysis results show that the assumptions of elasticity have no major influence on the outcome of the overall welfare. It only redistributes the benefits of different factors involved in the livestock sector, producer surplus will gradually shift to consumer when substitution elasticity increases. In the short term, as consumer habits cannot change quickly, the impacts of trade liberalization on domestic producers are not as severe. However, in the mid and long term, as frozen meat will be more widely accepted, domestic production will face more difficulties in competing with meat products from TPP countries.

CONCLUSIONS AND POLICY DISCUSSION

Conclusions

This study, after reviewing the main features and trends of TPP and AEC, makes a quantitative evaluation of potential economic impacts of liberalizing trade in goods and services under TPP and AEC on Viet Nam in relation to its trading partners. Detailed discussions on the macroeconomic impacts as well as those on the livestock sectors are provided. Based on the recently published Global Trade Analysis Project (GTAP) Data Base version 9, we conduct a set of numerical experiments to simulate the economic effects arising from the establishing TPP and AEC on both the macroeconomy and the livestock sector of Viet Nam. Also, with the ambition to measure the diverse results across livestock sub-sectors (which GE models tend not sufficient to cover details), we use a PE model at the same time. Based on the data from UN Comtrade, we run similar simulation exercises using the Global Simulation Analysis of Industry-level Trade Policy (GSIM) for our PE analysis of the livestock sector.

For the economy as the whole, in almost all simulation scenarios, Viet Nam is shown to be the member achieving largest GDP change in percentage term. However, the economic impact of AEC is insignificant compared to that of TPP. When decomposing the GDP change, it is observed that the increase in GDP, thanks to trade liberalization, comes primarily from increases in consumption and investment, surpassing the surge in import after tariff cut. Moreover, Viet Nam also gains the most in economic welfare in percentage change.

Regarding investment, the gain for Viet Nam is the most outstanding among member countries, approximate to Japan and almost double that of Australia, Malaysia and the US (in scenarios without spillover effect of trade facilitation to non-TPP economies). Concerning the sectoral change thanks to the TPP, we observe an adjustment in Viet Nam's production and labor away from industries without comparative advantage or with eroding comparative advantage (such as MProc, OthMnfc and agricultural sectors) and towards the comparatively advantaged ones or those with negligible trade (especially Apparel, Leather Manufacturing and Utility Services & Construction). At the same time, we observe a significant movement of production resources from shrinking sectors to expanding ones.

Examining the scenarios assessing TPP's impacts, results show that Viet Nam's trade with other TPP countries increases in all case. Meanwhile, Viet Nam increases imports and slightly decreases exports with non-TPP economies. Exports in textiles, apparel, leather and footwear from Viet Nam to the US surge impressively while Viet Nam's total exports slightly declines. The possible reasons for this decrease include the contraction of a number of domestic industries due to the competition from other countries, the competition (and constraints) in primary factors and

the change in trade directions from outside TPP to TPP. In particular, once the condition of fixed endowment of labor is relaxed, exports turn to increase because of labor supply increase and more resources are employed. Unavoidable weaknesses of the model, the static nature and the fixed endowment assumption in particular, also cause bias in the results.

For Viet Nam's livestock sector, the study provides in-depth analysis of the trends in consumption, production, and trade as well as markets structure in the livestock sector. Viet Nam's livestock sector has low competiveness, featuring mostly small scale farming and production, heavy dependence on imported breeds and feeds, common disease-stricken problems, limited slaughter hygiene and food safety and environmental pollution. These features are prominent across all livestock sub-sectors such as swine, poultry, cattle, milk and diary. They cause low productivity, production output and the increasing need for imports from TPP countries, especially the US, Australia, New Zealand, Canada, and some AEC countries such as Thailand. Livestock domestic production will face further and fiercer competition when Viet Nam integrate deeper into the regional and world economies and specifically when TPP is expected to come into effects in 2016.

The simulation results reveal that in both free trade blocs, output will decline in almost all livestock industries, except for other animal products (mainly live swine and poultry). In particular, the output of other meat (swine meat, poultry meat, offal and fat) will fall most remarkably in terms of absolute value and percentage change. Moreover, the declining output also leads to a drop in the labor demand (both skilled and unskilled) in the livestock sector. We observe the narrowing down of the whole sector after TPP and to a smaller degree AEC. Given the low productivity and competitiveness of the sector, poultry (and to a lesser extent swine meat) producers will suffer the most in terms of output and welfare though the current consumption habit of Vietnamese people most of whom prefer fresh/warm meat than frozen one may slow down the impacts. On the other hand milk and beef producers have better chance of survival. The sector needs quick restructuring efforts to improve efficiency in facing foreign competitors.

In those scenarios assessing the impacts of trade liberalization on Viet Nam's livestock sector, the impact of Viet Nam participation in AEC is almost negligible. Meanwhile, TPP has clear impacts on the livestock sector through welfare, imports and domestic production. Considering the overall livestock sector, consumers/importers will have access to cheaper products, while producers/exporters which largely affected for not being able to compete with the influx of products from other countries such as bovine from Australia and poultry and swine meat from the US. Along with that, the reduction in welfare due to the loss of import tariff revenue causes the welfare of the livestock sector to decline after TPP effect.

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Policy discussions

The research findings above provide the foundation and evidences for our policy discussion. The discussion is divided into two main parts. The first part focuses on the macroeconomic level, arguing for or against certain policies that have broad impacts on the economy as a whole. On the other hand, the second part goes into detailed discussion on the implications for sectoral policies that address specific issues of the livestock sector.

The desk study and the field trips show that at sectoral level, businesses, suppliers, farmers,… are not aware of the contents and expected impacts and implications of TPP and AEC even though they wish to be more involved. In the case of TPP, where talk contents are still secretive in many aspects, understanding and awareness are even lower. Thus, raising awareness, understanding and involvement of stakeholders regarding the contents and implications of each FTA, particularly TPP and AEC, is essential. Thus the measures to raise awareness and involvement of the public, the policy makers, the businesses, labors, farmers… need to be paid due attention from the beginning and throughout all trade talks.

In addition, the government also needs to orient particular policy measures to support comparatively advantageous industries, create new comparative advantages, to facilitate the restructuring of affected industries and the smooth transition of sufferers/losers during trade liberalization process. In particular, the followings should be considered.

At macroeconomic level

First, this study again confirms the need of institutional reforms and liberalization of primary inputs such as labor, capital and land. Integration without those reforms will not only hinder Viet Nam from taking advantage of the opportunities, but also create negative impacts on its export and economic growth. Sooner than later, Viet Nam will not be able to sustain the advantage of cheap labor due to the increase in demand for skilled labor in particular and economic growth in general like what is happening in China. Free movement of labor, not only within but also across border, assistance in training and re-training programs and ultimately investment in education will help facilitate the restructuring of the economy as the results of trade liberalization. Skilled labors are much needed not only to take advantage of the current comparative advantages but also help to create more and/or alternative comparative advantages.

Second, once TPP and AEC are implemented, resulting in reduction in tax revenue from tariffs, the government may try to offset the budget deficit by other sources. These may include increasing other taxes and borrowings or cutting current expenditures, subsidies and/or public investment in order to maintain budget balance. However, some of these policies may hinder the recovering efforts of the economy, increasing the risk of macroeconomic instabilities. Policies to improve the budget balance need to be put into thorough consideration to achieve macroeconomic stability, promote production and consumption, and avoid conflicts with other policies. These policies should focus on cutting current expenditures.

Third, Viet Nam needs to implement policies to foster sectoral restructuring in order to enhance the productivity. For expanding industries, the most important factor is to ensure mobility of production resources such as labor, capital, land and other resources to these industries. For

disadvantaged industries, restructuring is important to increase efficiency. Besides, reasonable supports should be directed to industries with comparative advantage to improve competitiveness of domestic products and encourage exports, advancing Viet Nam's position in global value chains.

Fourth, FTAs nowadays do not only require the tariff removal but also concern about the non-tariff barriers such as transportation costs and customs procedures. AEC aims to establish a single market with the aim to attract investment from outside of the community. TPP, on the other hand, has a strategic role in redesigning the world's trade and investment structure and direction. Participating in these blocks, thus, requires Viet Nam to adj ust non-trade issues such as labor, intellectual property rights, etc. Therefore, the implementation of the related commitments requires thorough reforms in domestic policies and legal system.

Fifth, it is necessary to promote research, training, and implementation of suitable technical standards in order protect domestic producers in line with supporting Vietnamese exporters in satisfying the demand of trade partners. All FTAs, including TPP and AEC aim to reduce and ultimately remove tariff barriers for almost all commodity groups. As a result of this, member countries are trying to increase non-tariff barriers to protect their domestic industries. Currently, Viet Nam's knowledge and technologies involving technical standards are very limited. Thus, these standards are not effectively used in Viet Nam. On the other hand, our export products are facing high level of technical standards and sometimes even returned for not meeting technical requirements. To address these issues, the Government should not only assist in training exporters on technical standards to help their products penetrate difficult markets but also consider investing in appropriate technical standards to assist domestic producers during the transition process under the pressure of international integration.

Finally, with the implementation of TPP and AEC, Viet Nam's investment (including domestic and foreign investment) will increase significantly due to increases in trade and investment from within and outside these blocks. This is an opportunity and a challenge at the same time in attracting and utilizing the FDI inflows. Therefore, Viet Nam needs to implement administrative reforms, effective investment policies and accelerate the development of supporting industries (such as infrastructures, services, intermediate goods, processing manufacturing) to benefit from the TPP.

As a result of TPP, the model simulation results clearly demonstrate that Viet Nam will gain in consumption and investment, particularly because such industries as apparel, textile, and light manufacturing will increase output and export. However, such industries require inexpensive labor to attract investment. Once wage rates in Viet Nam increase continuously, such relatively "foot-loose" foreign investors may look for and choose different countries as investment

destinations. Thus, Viet Nam should not rest on the one time benefits which TPP brings and rather continue and accelerate its rigorous efforts in the area mentioned above.

At sectoral level

Decision number 210 (210/2013/NĐ-CP) issued by the Government and its accompanying Circular number 05/2014/TT-BKHĐT issued by Ministry of Planning and Investment together with a number of decisions on cooperatives, household farming, high-tech agriculture…are the most important legal documents that specify the policies to encourage investment in agriculture and rural areas in general and the livestock sector in particular. Together with the Restructuring Scheme and its Action Plans, these are expected to re-shape Viet Nam's agriculture and specifically livestock sector with the aim to improve productivity, added values and competitiveness, especially in the context of further integration. These recent efforts of Viet Nam should be noted. However, these policies need to be clearer, more specific and should be accompanied by detailed sets of criteria for implementation, evaluation and financial resources. Also, many problems arise during the implementation process which are considered as slow and unclear.

On the whole livestock sector

The research results confirm that livestock is not one of the sectors that Viet Nam currently has comparative advantage. More competition from imported products will force the sector to restructure to be more efficient in order to survive. Inefficient households, farms and firms, for example those in swine and poultry meat subsectors, will exit the market while surviving ones will need to restructure to be able to compete. In the meantime, policies toward restructuring the livestock sector are needed to satisfy the need for increasing food consumption, to assist the smooth change for those who are require to change their jobs and to ease the losses suffered by those who are forced to moved out of the sector. The recent scheme on "livestock sector restructuring towards raising added values and sustainable development" and its accompanying action plans are heading in this direction with proposed changes in production regions, livestock types, production methods and value chains. However, the plans need more details with more specific targets and the implementation process is slow. The Government needs to consider policies that can further support research and development activities to improve added values to Vietnamese products.

During integration process, temporary measures such as optimal tariff reduction schedule, and the use of non-tariff barriers might be considered to protect priority subsectors and assist in the transition of resources from disadvantageous subsectors to other priority subsectors or even to other advantageous sectors of the economy such as textile and apparels… However, these

protective measures should not be sustained for more than a few years as they go against the rules of free trade.

Restructuring schemes and action plans should also give priority to subsectors that are and will not be under fierce competition from abroad due to: consumption habits, natural trade barriers (fresh milk, eggs) or specialized Vietnamese products such as certain kinds of chickens (happy/free roaming chickens), *lon man*, *lon cap nach* (special kinds of swine)… It should be noticed that the consumption habit will change gradually over time. Also, the livestock sub-sectors benefiting from the natural barriers mentioned above have low productivity and/or are insufficient for domestic demand. For these specialized products, potential expansion is limited due to the constraints in domestic demand and export opportunities, thus restructuring should aim at improving productivity and sanitary/phytosanitary standards.

Tax policies for the livestock sector also need to encourage new models of development such as high-tech farms, modern collective farms or large scale farms with closed linkages to households and distributors. Tax and fee structure for livestock products also need to be restructured. Current taxes and fees are high and/or complicated in certain cases such as the case of eggs and chickens which are carrying 14 to 17 different kinds of taxes and fees from import tariffs for feed, pesticide, and veterinary medicines to VAT or fees for SPS (sanitary and phytosanitary) controls. In addition, many taxes and fees for agricultural products are overlapping and unreasonable, increasing costs for farmers and businesses. Measures to minimize these problems are still ad-hoc rather than systematic and thorough.

On primary factors: land, labor, capital

As discussed above, restructuring needs to be accompanied by liberalizing the markets for primary factors. This applies to livestock as well. Liberalization of these markets improves credit accessibility, labor transition from one place to another, one (sub) sector to another during restructuring, and land to be changed to other purposes.

The issues of land, for example, are quite intriguing. Our review of agricultural land shows that although the areas devoted to rice to ensure food security has been reduced, the areas for livestock sector are still very limited. Where possible, especially around large scale farms, land has been converted to more profitable planting of animal feed crops. Also, according to IPSARD (2012), even in the worst case scenario where the loss during and after harvest is unchanged at 10%, higher than expected climate change impacts, low average productivity (only 5.8 ton/ha), slow reduction in rice consumption (still at 120kg/person/year in 2030), with only 3.0 million ha of rice land Viet Nam can still guarantee domestic food security and have excess for export. Thus,

we propose to continue to cut down on rice land and increase land for animal feed crops in suitable areas.

Agricultural land conversion is governed mainly by Article 11, Circular number 02/2015/TT-BTNMT which provides guidance for implementing certain articles in Decision number 43/2014/NĐ-CP together with Decision number 44/2014/NĐ-CP and by Article 8 of Decision number 210/2013/NĐ-CP. Though certain suitable farm land can now be converted from rice cultivation to other crops including animal feed crops such as grass, corns, cassava or soya…, converting rice land or other crop land into husbandry land is not simple. Problems arise during this process especially for large scale livestock farms and those using high-tech machineries for planting, harvesting and processing animal feed crops. These includes delays in the conversion process due to the need to negotiate with individual land users/owners, higher than expected land compensation costs, more than planned local labor needed to be absorbed into new modern farms (even in the case of converting land of old cooperative farms)… These issues raise the production costs of these new modern farms, delaying break-even point and in general discourage new investors. Incentives given for this conversion are limited to reduction or exemption of land use tax and only for priority projects which themselves are complicated to be categorized and approved. Clearer and more transparent guidelines and procedures for land conversion and incentive approval will help investors estimate better the costs and reduce implementation time.

On production chains

Viet Nam already has policies that encourage linkages along production chains in but in practice, linkages are weak with many intermediaries from lower to upper stream, increasing costs incurred by farmers (costs on animal feed, medicines, lodges, environmental protection…) for large scale enterprises, there are the difficulties in ensuring the market for their outputs.

The Restructuring Scheme for the livestock sector, its accompanying action plans and Decision 210 all pay attention to creating the incentives to build both horizontal and vertical linkages to help reduce transaction costs and improve efficiency of the sector. Ideally, horizontal linkages create large scale and leading enterprises that can attract smaller scale households and firms as satellites to form separate areas for animal feed crops, for livestock supporting industries and for farm groups away from residential areas. On the other hand, vertical linkages promotes cooperation within closed production chains, “from breeds to table food.” A large scale firm that manage all of the production chain from inputs, to production, processing, to distribution and retailing will be able to self-supply or outsource with competitive prices.

Such linkages not only help reduce intermediary costs, stabilize both input and output market, utilize economies of scales but also help reduce pollution through building waste plants and recycling animal wastes for feed, fertilizers and even generating electricity.

In the current context of Viet Nam where most firms are small scale, a feasible option is to set up separate areas for livestock, concentrating areas for animal feed crops and factories, lodges, slaughterhouses, processing plants, combining with developing distribution network, long-term and efficient retail contracts to reduce transport costs and transit losses. However, though husbandry activities are being relocated away from residential areas, the process is very slow, and the lack of infrastructure in those areas are hindering all the stages in the production chains.

On large scale production

According to Article 11, Decision 210/2013/NĐ-CP, large scale projects in livestock sector receive partial financing for infrastructure construction for electricity, water, storage, waste processing, for the purchase of machineries, the import of high yield breed and milk cows from advanced countries. These investment projects have to be in the approved list by relevant authorities or approved by provincial People's Committee. At the same time, these projects are required to ensure sanitary conditions, disease precaution measures, food safety, and environmental protection and use at least 30% of local labor. However, the fact is both firms and households find it hard to access these incentives due to a variety of reasons such as application process is complicated, slow and unclear, approval and supervisory authorities are not clearly known,...

According to Article 10, Decision 210/2013/NĐ-CP, investment projects in large scale (industrial) slaughterhouses are financially supported for infrastructure construction for electricity, water, storage, waste processing, and for the purchase of machineries. Similarly, these are required to ensure sanitary conditions, disease precaution measures, food safety, and environmental protection and use at least 30% of local labor.

The purpose of these incentives is to encourage the planning of slaughtering and processing activities, i.e. moving from small and scattered grassroots slaughterhouses to large scale/industrial ones. Large scale/industrial slaughterhouses are to be set up in suburban areas, serving neighboring wholesale market or in big cities and concentrated husbandry areas. At the same time, supervision to minimize unlicensed slaughtering activities, regulations on import of live animals, environmentally friendly and humane slaughtering methods, controls on animal transport at border and gateway to large urban areas are necessary.

However, in practice, though some firms/investors can meet the high standards of concentrated (industrial) slaughterhouses, they are not keen on joining this market. The main

reason is the problem with distribution of outputs. Outputs from these slaughterhouses have higher quality, meet the high standards of food safety and environment protection and thus more costly than small household slaughterhouses. Industrial slaughterhouses also need more advanced distribution systems which comprises of cooling vehicles and refrigerated display stalls… The sale of large daily volumes requires close and efficient relationship between slaughterhouses and big retailers (such as supermarkets). Furthermore, the habit of buying meat from open market by the majority of the population though the quality and safety of these sources are questionable. In the future, together with urbanization and the expansion of the middle class in Viet Nam, consumer habits will gradually change. In the near future, to encourage and increase the compatibility of these concentrated slaughterhouses, short term reduction of VAT for them should be considered.

On the market

As analyzed above, the problems related to the markets for products from large scale farms and slaughterhouses are some of the most serious difficulties for the livestock sector. Developing the market and improving customers' trust are the firms' responsibilities. High quality and safe products will gain consumers' trust and thus increase consumption. Only then, the demand for the products can be guaranteed which in turn become the guarantee for firms to invest to utilize economies of scale, reducing costs and improving the competitiveness of domestic products.

However, at present, small scale businesses still dominate and due to the need for large investment in infrastructure, technology, plants and machineries, large scale ones still have to face high costs and difficulties in selling their products. As a result, potential investors are not keen on joining the market. Small scale with low tech but fast sale models are still more appealing. None the less, when join FTAs, the products of firms and households using these models will not be able to compete with imported ones and may have to leave the market.

Thus, measures to increase sales of firms need to match with national programs on encouraging domestic goods consumption, especially with safe and high quality products. The Government and relevant authorities need to provide more detailed guidelines and regulations on brand development and registration, ensure clear and timely market information so domestic firms and households in the livestock sector can prepare for integration.

At present, the problems of lack of transparent market information and commercial frauds are also a great hindrance for firms as well as consumers. The ability of consumers to differentiate authentic and quality products from fakes and low quality ones is also hindered by the lack of information about the producers in the market and on product labels. The current regulations on product traceability such as Circular 03/2011/TT-BNNPTNT or Circular 74/2011/TT-BNNPTNT are neither systematic nor complete, ad-hoc and suggestive rather than required. It is necessary to

quickly complete the set of required standards on product traceability for livestock products making it possible to identify the ingredients, production date and region, breed source... throughout all stages of from production to distribution. Such required standards will help protect the consumers, assist firms in managing and controlling their production and distribution processes and facilitated dispute settlement.

Take liquid milk market as an example. Viet Nam is one of a few countries currently still using reconstituted milk (i.e. liquid milk made from mixing imported powder milk with water). The main bases for this practice are (i) Viet Nam's fresh milk production has not been able to meet with growing demand for milk consumption and (ii) reconstituted milk can be made with lower costs and thus can be supplied at lower price to the poor. However, the facts that should be noted are that reconstituted liquid milk offers only 70-80% of the nutrition level compared to fresh milk and that the market price of the former is not much lower than the latter.

Current policy, TCVN 7029:2002 explaining that Decision 178/1999QĐ-CP requires reconstituted milk to be labeled "reconstituted". However, TCVN is not compulsory while the Circular explaining Decision 178/1999QĐ-CP only provides general guidelines for labeling ingredients of food and drink without specific wordings. Also there have not any specifications for liquid milk that is made partly from powder and partly from fresh milk. Thus, the fact is that it is not easy for consumers to tell the difference between fresh milk and reconstituted or partly reconstituted milk.

Ministry of Industry and Trade in cooperation with Ministry of Health need to consider adding the following information on the label of commercial liquid milk

1. Specify the ***percentage of most important ingredients*** in liquid milk and yogurt i.e. the percentage of fresh milk and of powder milk if any.
2. Specify which ***farm the fresh milk come from***.

Our policy suggestion provides 3-fold benefits. Specifying correct and clearer information on the milk label is essential in improving the transparency of the market, protecting consumer rights and raising awareness of consumers regarding the milk we consume. At the same time, this policy will help bring the prices of fresh milk and reconstituted milk back to their levels, enabling the poor to have access to more reasonably priced milk. Also, domestic milk producers will be encouraged to invest and thus increase milk production and reduce the need to rely on imported milk.

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APPENDICES

Appendix 1. Main contents of TPP

	Chapter	Negotiation almost completes by May 2015	Mainly behind border issue ?	Content	Controversies
				A. Traditional Issues	
1	**Opening and General Definitions**	×	No	General definitions in trade	Uncontroversial
2	**Market access for goods**		No	Provide for ambitious, balanced, and transparent improvements in market access; eliminate tariff and nontariff barriers; specify customs valuation methodology; establish oversight committees; provide for exceptions and. special treatment of sensitive products.	Difficult negotiations lie ahead on exclusion lists and time path of liberalization; advanced countries may resist reducing barriers on labor-intensive goods.
3	**Customs**	×	No	Establish customs procedures that are predictable, transparent, and fast, with explicit goal of supporting regional production networks and supply chains,	High priority for most economies but emerging-market economies are concerned about implementation costs and schedules; technical assistance may be helpful (see "Cooperation and capacity building")
4	**Cross-border Services**	×	Yes	Secure fair, open, and transparent markets for services; require national and most favored nation (MFN) treatment; bar performance requirements;	Controversial; the diversity of services and limited prior multilateral liberalization make the negotiations difficult, Advanced economies seek broad and strict disciplines;

			require regulations to be transparent and not unduly burdensome; ensure transfers and payments; address licenses and certifications obtained abroad; negotiate comprehensive market access subject only to exceptions on a "negative list “of nonconforming measures.	emerging-market economies seek exclusions and slow implementation.
5	**Technical Barriers to Trade (TBT)**	Yes	Build on WTO Agreement on Technical Barriers to Trade to facilitate trade and protect health, safety, and the environment; commit to compliance periods, conformity assessment	Advanced economies seek WTO-t- features. Developing economies want to avoid ambitious TBT measures and/or disguised protectionist policies and may require technical assistance to implement new provisions.
6	**Competition/ SOEs**	Yes	Traditionally a limited chapter that requires parties to maintain competition laws and to ensure that designated monopolies do not impede competition. The United States has proposed substantially expanded disciplines to ensure "competitive neutrality" in the treatment of state-owned enterprises, including provisions on transparency, consumer protection, and private rights of action.	Economies having unclear competition policies and/or a significant state-owned sector could face significant reform requirements. Disclosure and enforcement requirements are controversial.
7	**Intellectual property rights**	Yes	Require accession to international treaties, require effective enforcement of criminal and civil penalties in case of knowing violations; require destruction of pirated or counterfeit goods.	Highly controversial, involves pharmaceuticals, copyright-based industries, and online services. Exporters seek provisions beyond the TRIPS agreement, such as accession to WIPO treaties. Stricter provisions face strong opposition from importers, competitive producers, national health systems, online service providers, and nongovernmental organizations (NGOs). Developing countries might want to control the bio-prospecting.

8	**Investment**		Yes	Require national and MFN treatment and adherence to minimum standards of treatment under international law; bar performance requirements; require reasonable compensation in case of expropriation; ensure free and timely transfers; establish procedures for investor-state arbitration by international tribunals	High priority for all TPP economies and multinational companies, but differences exist on sectoral coverage and ownership limits. Investor-state arbitration provisions are strongly opposed by NGOs and some governments, especially as they might affect public health and capital account regulations.
9	**Government procurement**	×	Yes	Require transparency, national treatment, and nondiscrimination consistent with the World Trade Organization's (WTO) Government Procurement Agreement (GPA); specify rules of origin; establish standards for transparency: provide for supplier challenges; allow for transitional measures in developing economies. Requires negotiation of list of covered entities.	Only two TPP economies have acceded to WTQ accords; three others are observers. Members will push for strong provisions and observers will likely follow, but nonmembers will seek high de minimis rules. Transitional measures could be controversial
10	**Sanitary and phytosanitary standards (SPS)**	×	Yes	Ensure protection of human, animal, and plant health; reinforce and build on existing rights and obligations under the WTO; include new commitments on science, transparency, regionalization, cooperation, and equivalence; adopt bilateral and multilateral cooperative proposals on import checks and verification	Will need to address complicated details, Less advanced economies will seek de minimis rules, assurances against hidden protectionism, and technical assistance. An important issue is whether national SPS standards will be subject to international dispute settlement
11	**Institutions – Dispute Settlement**		No	Define rules for administration of the agreement; address issues related to government-to-government dispute settlement and create procedures for convening panels; authorize monetary penalties and suspension of benefits	Not really controversial

				when dispute resolution fails; permit some exceptions from obligations and transparency requirements	
12	**Rules of origin**		No	Establish rules for determining when a product originates in a free trade agreement. Set de minimis standards, establish accumulation rules, list exception; provide for verification, documentation and consultation.	Negotiations involves product-by-product detail. Liberal rules are supported by most countries, but there is strong special-interest opposition to such rules in textiles, footwear and autos – critical industries for some exporting countries. Establishing common rules with accumulation will be an important test of the TPP's ability to consolidate the "noodle bow"
13	**Trade remedies**		No	Build on WTO rights and obligations in the areas of transparency and due process; provide temporary and bilateral safeguards in case of (potential) incidents for domestic industries, and even include proposals on transitional regional safeguards; limit the scale and duration of safeguard actions	While the application of trade remedies is often controversial, the proposals do not now call for international review, as provided, for example, chapter 19 of NAFTA
14	**Temporary entry**	×	No	Provide for short-term entry of businesspersons on an expedited basis: enhance technical cooperation between TPP authorities; prescribe obligations on specific categories of businessperson.	Issues arise on qualifications of service providers; developing countries wish to facilitate liberal access; politically controversial in some developed economies
15	**Textiles and apparel, Footwear and Leather**		No	Provide additional rules beyond those required under market access for goods relating to customs cooperation, enforcement procedures, rules of origin, and possibly special safeguards.	This is a critical sector for developing economies and is controversial in light of high unemployment in developed economies. The most difficult negotiations focus on defining rules of origin.
	B. Issues with less precedents				

16	**Competitiveness and business facilitation**	×	Yes	Provide for cooperation in trade and investment promotion. customs clearance, inspections, and quarantine; create joint working groups	Relatively uncontroversial; opportunity to support capacity building in low-income economies
17	**Cooperation and capacity building**	×	Yes	Enhance ability of developing-country members to participate in negotiations and implement the agreement; create demand-driven and flexible institutional mechanisms to facilitate cooperation and capacity building	Uncontroversial in principle but extent of support remains to be negotiated; Bring opportunities to raise capacity in lower income economies.
18	**Financial services**		Yes	Ensure protection of investments, nondiscrimination, and transparency of regulation; limit caps on institutions and transactions; establish consultations and dispute resolution including investor-state arbitration; possibly specific disciplines for postal entities	Controversial, particularly in light of global financial crises: some advanced countries seek comprehensive services sector access. This chapter is often the blockage for negotiations among diverse economies.
19	**E-commerce**		Yes	Ensure free flow of information across borders; prohibit tariffs on e-commerce; facilitate cross-border supply of services and authentication of e-transactions; protect confidentiality of information. May include additional accords on information flows and treatment of digital products.	Issues involving the regulation of information flow are of concern to some economies
20	**Telecommunications**	×	Yes	Ensure interconnection and nondiscriminatory access to telecommunication networks; eliminate investment limits; assure technology neutrality; promote mutual recognition in testing and certification; require transparency in regulatory and rights of appeal processes	Principles uncontroversial, but some economies will want to maintain limitations on investment and competition and the development of standards.

21	**Agriculture**		No	Regulate tariffs and tariff quotas; prohibit exporting subsidies; provide agreement on tariffs and exporting limitations, limit protection for MFN countries; provide consultation to improve market access for some specific products.	Controversial for a number of products such as sugar and dairy. Many TPP economies are trade deficit countries in sugar but some other want exceptions. Compromise will have implications for countries such as Canada and Japan.
22	**Labor**	×	Yes	Incorporate the International Labor Organization [ILO) Declaration; adopt mechanisms to ensure cooperation, coordination, and dialogue on issues of mutual concern; require domestic laws to be consistent with international standards; may require enforcement; authorize joint oversight committees	Controversial; some developed countries seek labor practices that may be difficult to adopt and may impede competitiveness in low-income countries; enforcement could be seen as a sovereignty issue. Compromise is needed.
23	**Environment**		No	Require laws for environmental protection and effective remedies for violations; require adherence to multilateral agreements; ensure public participation; encourage technological cooperation; authorize joint committees; proposals on new issues, such as conservation, biodiversity, invasive alien species, climate change, and environmental goods and services,	Some economies seek higher environmental standards than others; developing economies want safeguards against "environmental protectionism."
24	**Safety Standards**		Yes	Require management on goods and services to ensure safety	Developed countries are fighting for “best practices”, while developing countries are seeking for the de minimus rules
25	**Regulatory coherence**	×	Yes	Require regulations to be developed in an open, transparent; process; require national treatment, cost-benefit analysis and centralized review for agreed sectors	Objectives are relatively uncontroversial, but implementation has little precedent. Some economies prefer a nonbinding approach.

26	**Small and medium enterprises (SMEs)**	×	Yes	Promote joint strategies to support SMEs; facilitate capacity building and the dissemination of information.	Relatively uncontroversial; opportunity to support capacity building in low-income economies
27	**Development**	×	Yes	Support development by promoting market liberalization, effective institutions and governance mechanisms; assist countries in implementing the agreement to fully realize benefits and sustainable development following their own path.	Uncontroversial in principle but extent of support remains to be negotiated
28	**Institutions - Exceptions**		No	Provide exceptions in trade	Controversial due to opposite interests between the export countries and the protectionist ones who try to protect domestic industries by putting sensitive products into exception list.
29	**Institutions – Living agreement**	×	No	Provide provision on negotiation process of newcomers. Ensure that every provisions will be discussed in details and nothing is agreed until everything is agreed	Not really controversial. However, it is undecided whether the negotiation has to start over whenever a country want to join

Source: Authors' summary from Petri, Plummer and Zhai (2011, p.9–11), Ministry of International Trade and Industry of Malaysia (2013), Wallach (2012) and other sources

Appendix 2. Viet Nam's Trade with TPP countries, 2007-2014

	Value (million USD)		*Composition (%)*	
	2007	**2014**	**2007**	**2014**
A. Exports				
Total export value	48561	150186	100.00	100.00
Exports to the TPP	24816	58407	51.10	38.89
Of which:				
The US	10105	28656	20.81	19.08
Canada	539	2081	1.11	1.39
Mexico	360	1037	0.74	0.69
Chile	47	522	0.10	0.35
Peru	17	187	0.03	0.12
New Zealand	68	316	0.14	0.21
Australia	3802	3990	7.83	2.66
Japan	6090	14704	12.54	9.79
Malaysia	1555	3931	3.20	2.62
Singapore	2234	2933	4.60	1.95
Brunei	-	50	-	0.03
B. Imports				
Total import value	62765	148049	100.00	100.00
Imports from TPP	19603	33985	31.23	22.96
Of which:				
The US	1701	6284	2.71	4.24
Canada	287	387	0.46	0.26
Mexico	59	265	0.09	0.18
Chile	110	368	0.18	0.25
Peru	48	98	0.08	0.07
New Zealand	246	478	0.39	0.32
Australia	1059	2058	1.69	1.39
Japan	6189	12909	9.86	8.72
Malaysia	2290	4193	3.65	2.83
Singapore	7614	6827	12.13	4.61
Brunei	-	118	-	0.08

Source: GSO (2015)

Appendix 2a. Composition of Viet Nam's Exports to the TPP members by HS 2-digit code, 2013 (%)

HS code	Malaysia	Singapore	Brunei	Japan	USA	Canada	Chile	Peru	Mexico	New Zealand	Australia	TPP countries	
												%	million USD
HS 85	23.28	8.49	0.01	30.52	24.99	1.93	0.12	0.20	2.15	1.29	7.03	100.00	7915.41
HS 61	0.24	0.28	0.00	14.19	80.70	3.30	0.16	0.04	0.56	0.08	0.46	100.00	6353.13
HS 27	18.15	6.86	0.01	37.66	9.02	0.00	0.00	0.00	0.00	0.00	28.30	100.00	5736.86
HS 62	0.37	0.38	0.00	24.64	68.42	3.48	0.42	0.08	0.95	0.14	1.12	100.00	5032.09
HS 64	0.97	0.88	0.00	10.55	70.80	4.29	2.09	0.93	6.11	0.48	2.90	100.00	3753.81
HS 84	3.76	10.73	0.03	18.17	51.49	5.31	0.44	0.36	3.13	0.80	5.78	100.00	3052.57
HS 94	0.48	0.96	0.03	17.44	70.79	4.07	0.06	0.06	0.15	0.79	5.16	100.00	2893.95
HS 03	2.47	3.66	0.06	34.66	42.56	6.34	0.25	0.32	4.79	0.55	4.35	100.00	2194.74
HS 16	0.67	1.63	0.00	33.65	50.54	3.89	0.01	0.00	0.05	0.59	8.98	100.00	1045.02
HS 42	0.51	0.69	0.00	19.28	73.09	3.02	0.31	0.10	0.71	0.34	1.95	100.00	1026.25

Source: Authors' calculation based on UN Comtrade Database

Appendix 2b. Composition of Viet Nam's Imports to the TPP members by HS 2-digit code, 2013 (%)

HS code	Malaysia	Singapore	Brunei	Japan	Canada	USA	Chile	Peru	Mexico	New Zealand	Australia	TPP countries	
												%	million USD
HS 85	16.55	32.20	0.00	38.57	11.63	0.26	0.00	0.00	0.55	0.04	0.19	100.00	6180.06
HS 27	19.85	58.59	16.80	2.01	0.48	0.02	0.00	0.00	0.00	0.00	2.25	100.00	3569.44
HS 84	9.82	6.80	0.01	66.30	14.92	0.55	0.01	0.00	0.51	0.24	0.85	100.00	3413.42
HS 72	2.36	1.57	0.00	75.00	8.62	1.34	1.34	0.00	0.12	0.93	8.73	100.00	2436.53
HS 39	18.37	15.15	0.00	50.88	14.59	0.50	0.00	0.00	0.06	0.07	0.38	100.00	1869.39
HS 90	6.19	4.46	0.00	48.97	36.22	1.95	0.00	0.00	0.98	0.12	1.10	100.00	751.30
HS 52	4.15	0.04	0.00	15.27	67.46	0.00	0.02	0.00	0.78	0.01	12.26	100.00	684.11
HS 73	5.95	7.47	0.00	73.43	11.23	0.41	0.01	0.00	0.20	0.02	1.28	100.00	649.50
HS 23	4.63	2.69	0.08	0.36	77.72	3.22	0.28	5.75	0.34	0.16	4.76	100.00	552.61
HS 10	0.02	0.00	0.00	0.01	8.53	8.78	0.00	0.00	0.00	0.00	82.67	100.00	535.20

Source: Authors' calculation based on UN Comtrade Database

Appendix 2c. Composition of Viet Nam's Exports to the AEC members by HS 2-digit code, 2013 (%)

HS code	Brunei	Cambodia	Indonesia	Laos	Malaysia	Philippines	Singapore	Thailand	Myanmar	AEC countries	
										%	million USD
HS 85	0.02	1.94	16.21	0.54	38.58	8.31	14.07	20.02	0.31	100.00	4774.84
HS 27	0.01	27.90	4.86	4.09	35.49	2.18	13.41	12.06	0.00	100.00	2934.19
HS 72	0.00	28.69	21.81	5.31	13.68	12.48	1.86	15.39	0.78	100.00	1500.41
HS 84	0.09	5.45	14.24	1.54	12.79	9.31	36.45	18.37	1.76	100.00	898.18
HS 10	0.96	0.19	12.49	0.39	31.66	31.20	22.16	0.92	0.04	100.00	731.06
HS 40	0.09	3.45	6.65	0.64	81.21	1.56	1.24	4.14	1.02	100.00	677.83
HS 39	0.05	27.00	24.68	2.54	11.04	12.68	4.84	14.72	2.44	100.00	559.68
HS 87	0.00	11.79	12.04	7.46	11.12	9.65	0.88	45.69	1.36	100.00	511.36
HS 70	0.00	0.91	1.47	0.21	31.77	3.38	60.64	1.28	0.34	100.00	317.65
HS 25	0.59	8.17	41.57	5.57	17.08	18.39	4.29	1.45	2.88	100.00	308.88

Source: Authors' calculation based on UN Comtrade Database

Appendix 2d. Composition of Viet Nam's Imports to the AEC members by HS 2-digit code, 2013 (%)

HS code	Brunei	Cambodia	Indonesia	Laos	Malaysia	Philippines	Singapore	Thailand	Myanmar	AEC countries	
										%	million USD
HS 85	0.00	0.08	5.04	0.08	24.02	10.83	46.75	13.12	0.06	100.00	4256.38
HS 27	14.51	0.00	3.86	0.49	17.15	0.02	50.61	12.87	0.49	100.00	4132.06
HS 84	0.01	0.04	8.43	0.04	18.09	1.85	12.53	59.00	0.00	100.00	1851.89
HS 39	0.00	0.09	8.97	0.11	23.15	2.11	19.09	46.47	0.00	100.00	1483.68
HS 44	0.00	6.49	2.00	61.64	11.64	0.30	0.14	8.95	8.85	100.00	745.76
HS 48	0.00	0.02	40.08	0.00	7.80	1.98	19.86	30.27	0.00	100.00	676.66
HS 15	0.00	0.00	17.39	0.00	76.64	0.04	0.28	5.64	0.00	100.00	600.94
HS 29	1.10	0.00	14.81	0.05	20.43	0.04	22.52	41.04	0.00	100.00	578.70
HS 87	0.00	0.02	16.63	0.00	1.94	1.77	0.45	79.20	0.00	100.00	502.35
HS 40	0.00	22.92	5.93	5.93	7.37	1.13	2.34	54.39	0.00	100.00	491.36

Source: Authors' calculation based on UN Comtrade Database

Appendix 3. Most Favored Nation tariff (MFN) (%) of Viet Nam after WTO entry and livestock tariff commitments (%) of Viet Nam in AANZFTA

HS subhdg	MFN Applied Tariff			Viet Nam's Tariff commitments AANZFTA												HS subheading 6-digit description
	Average of AV Duties	Minimum AV Duty	Maximum AV Duty	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	end day		
010121	0	0	0	0												Pure-bred breeding horses
010129	5	5	5													Live horses (excl. pure-bred for breeding)
010130	2.5	0	5													Live asses
010190	5	5	5	5	5	5	5	5	0					2016		Live mules and hinnies
010221	0	0	0	0												Pure-bred cattle for breeding
010229	5	5	5												Live bovine	Live cattle (excl. pure-bred for breeding)
010231	0	0	0													Pure-bred buffalo for breeding
010239	5	5	5													Live buffalo (excl. pure-bred for breeding)
010290	2.5	0	5	5	5	5	5	5	0					2016		Live bovine animals (excl. cattle and buffalo)
010310	0	0	0	0												Pure-bred breeding swine
010391	5	5	5	5	5	5	5	5	0					2016	Live swine	Live pure-bred swine, weighing < 50 kg (excl. pure-bred for breeding)
010392	5	5	5	5	5	5	5	5	0					2016		Live pure-bred swine, weighing >= 50 kg (excl. pure-bred for breeding)
010410	2.5	0	5	2.5	2.5	2.5	2.5	2.5	0					2016		Live sheep
010420	2.5	0	5	2.5	2.5	2.5	2.5	2.5	0					2016		Live goats
010511	5	0	10	2.5	2.5	2.5	2.5	2.5	0					2016		Live fowls of the species Gallus domesticus, weighing <= 185 g (excl. turkeys and guinea fowls)
010512	2.5	0	5	2.5	2.5	2.5	2.5	2.5	0					2016		Live domestic turkeys, weighing <= 185 g
010513	2.5	0	5												Live poultry	Live domestic ducks, weighing <= 185 g
010514	2.5	0	5													Live domestic geese, weighing <= 185 g
010515	2.5	0	5													Live domestic guinea fowls, weighing <= 185 g
010594	3.8	0	5													Live fowls of the species Gallus domesticus, weighing > 185
010599	2.5	0	5	2.5	2.5	2.5	2.5	2.5	0					2016		Live domestic ducks, geese, turkeys and guinea fowls, weighing > 185 g
010611	5	5	5	5	5	5	5	5	0					2016		Live primates

010612	5	5	5	5	5	5	5	5	0					2016		Live whales, dolphins and porpoises (mammals of the order Cetacea); manatees and dugongs (mammals of the order Sirenia); seals, sea lions and walruses (mammals of the suborder Pinnipedia)
010613	5	5	5													Live camels and other camelids [Camelidae]
010614	5	5	5													Live rabbits and hares
010619	5	5	5	5	5	5	5	5	0					2016		Live mammals (excl. primates, whales, dolphins and porpoises, manatees and dugongs, seals, sea lions and walruses, camels and other camelids, rabbits and hares, horses, asses, mules, hinnies, bovines, pigs, sheep and goats)
010620	5	5	5	5	5	5	5	5	0					2016	Other live animal	Live reptiles "e.g. snakes, turtles, alligators, caymans, iguanas, gavials and lizards"
010631	5	5	5	5	5	5	5	5	0					2016		Live birds of prey
010632	5	5	5	5	5	5	5	5	0					2016		Live psittaciformes "incl. parrots, parrakeets, macaws and cockatoos"
010633	5	5	5													Live ostriches, and emus [Dromaius novaehollandiae]
010639	5	5	5	5	5	5	5	5	0					2016		Live birds (excl. birds of prey, psittaciformes, parrots, parrakeets, macaws, cockatoos, ostriches and emus)
010641	5	5	5													Live bees
010649	5	5	5													Live insects (excl. bees)
010690	5	5	5	5	5	5	5	5	0					2016		Live animals (excl. mammals, reptiles, birds, insects, fish, crustaceans, molluscs and other aquatic invertebrates and cultures of micro-organisms, etc.)
020110	30	30	30	15	10	10	7	7	5	5	0			2018		Carcasses or half-carcasses of bovine animals, fresh or chilled
020120	20	20	20	15	10	10	7	7	5	5	0			2018		Fresh or chilled bovine cuts, with bone in (excl. carcasses and 1/2 carcasses)
020130	14	14	14	15	10	10	7	7	5	5	0			2018	Bovine meat	Fresh or chilled bovine meat, boneless
020210	20	20	20	15	10	10	7	7	5	5	0			2018		Frozen bovine carcasses and half-carcasses
020220	20	20	20	15	10	10	7	7	5	5	0			2018		Frozen bovine cuts, with bone in (excl. carcasses and half-carcasses)
020230	14	14	14	15	10	10	7	7	5	5	0			2018		Frozen, boneless meat of bovine animals
020311	25	25	25	25	20	20	15	10	7	5	5	3	0	2020		Fresh or chilled carcasses and half-carcasses of swine
020312	25	25	25	25	20	20	15	10	7	5	5	3	0	2020		Fresh or chilled hams, shoulders and cuts thereof of swine, with bone in
020319	25	25	25	25	20	20	15	10	7	5	5	3	0	2020	Swine meat	Fresh or chilled meat of swine (excl. carcasses and half-carcasses, and hams, shoulders and cuts thereof, with bone in)
020321	15	15	15	25	20	20	15	10	7	5	5	3	0	2020		Frozen carcasses and half-carcasses of swine
020322	15	15	15	25	20	20	15	10	7	5	5	3	0	2020		Frozen hams, shoulders and cuts thereof of swine, with bone in
020329	15	15	15	25	20	20	15	10	7	5	5	3	0	2020		Frozen meat of swine (excl. carcasses and half-carcasses, and hams, shoulders and cuts thereof, with bone in)

020410	7	7	7	10	7	5	5	5	0					2016		Fresh or chilled lamb carcasses and half-carcasses
020421	7	7	7	10	7	5	5	5	0					2016		Fresh or chilled sheep carcasses and half-carcasses (excl. lambs)
020422	7	7	7	10	7	5	5	5	0					2016		Fresh or chilled cuts of sheep, with bone in (excl. carcasses and half-carcasses)
020423	7	7	7	10	7	5	5	5	0					2016		Fresh or chilled boneless cuts of sheep
020430	7	7	7	10	7	5	5	5	0					2016	Other meat	Frozen lamb carcasses and half-carcasses
020441	7	7	7	10	7	5	5	5	0					2016		Frozen sheep carcasses and half-carcasses (excl. lambs)
020442	7	7	7	10	7	5	5	5	0					2016		Frozen cuts of sheep, with bone in (excl. carcasses and half-carcasses)
020443	7	7	7	10	7	5	5	5	0					2016		Frozen boneless cuts of sheep
020450	7	7	7	10	7	5	5	5	0					2016		Fresh, chilled or frozen meat of goats
020500	10	10	10	15	10	10	7	7	5	0				2017		Meat of horses, asses, mules or hinnies, fresh, chilled or frozen
020610	8	8	8	10	10	10	7	5	5	5	0			2018		Fresh or chilled edible offal of bovine animals
020621	8	8	8	10	10	10	7	5	5	5	5	0		2019		Frozen edible bovine tongues
020622	8	8	8	10	10	10	7	5	5	5	5	0		2019		Frozen edible bovine livers
020629	8	8	8	10	10	10	7	5	5	5	0			2018		Frozen edible bovine offal (excl. tongues and livers)
020630	8	8	8	10	10	7	7	5	0					2016		Fresh or chilled edible offal of swine
020641	8	8	8	10	10	7	7	5	0					2016		Frozen edible livers of swine
020649	8	8	8	10	10	7	7	5	0					2016		Edible offal of swine, frozen (excl. livers)
020680	10	10	10	10	7	5	5	5	0					2016		Fresh or chilled edible offal of sheep, goats, horses, asses, mules and hinnies
020690	10	10	10	10	7	5	5	5	5	5	4	0		2019	Animal by-product	Frozen edible offal of sheep, goats, horses, asses, mules and hinnies
020711	40	40	40	20	20	20	20	20	20	20	20	20	20	N/A		Fresh or chilled fowls of the species Gallus domesticus, not cut in pieces
020712	40	40	40	20	20	20	20	20	20	20	20	20	20	N/A		Frozen fowls of the species Gallus domesticus, not cut in pieces
020713	40	40	40	20	20	20	20	20	20	20	20	20	20	N/A		Fresh or chilled cuts and edible offal of fowls of the species Gallus domesticus
020714	20	20	20	19	17.5	17.5	16.8	16.8	16	16	16	16	15	N/A		Frozen cuts and edible offal of fowls of the species Gallus domesticus
020724	40	40	40	20	20	20	20	20	20	20	20	20	20	N/A		Fresh or chilled turkeys of the species domesticus, not cut in pieces
020725	40	40	40	20	20	20	20	20	20	20	20	20	20	N/A		Frozen turkeys of the species domesticus, not cut into pieces
020726	40	40	40	20	20	20	20	20	20	20	20	15	10	N/A		Fresh or chilled cuts and edible offal of turkeys of the species domesticus
020727	20	20	20	18	15	15	13.5	13.5	13	13	13	12	10	N/A		Frozen cuts and edible offal of turkeys of the species domesticus

020741	40	40	40										Fresh or chilled domestic ducks, not cut in pieces
020742	40	40	40										Frozen domestic ducks, not cut in pieces
020743	15	15	15										Fatty livers of domestic ducks, fresh or chilled
020744	15	15	15										Fresh or chilled cuts and edible offal of domestic ducks (excl. fatty livers)
020745	15	15	15										Frozen cuts and edible offal of domestic ducks
020751	40	40	40										Fresh or chilled domestic geese, not cut in pieces
020752	40	40	40										Frozen domestic geese, not cut in pieces
020753	15	15	15										Fatty livers of domestic geese, fresh or chilled
020754	15	15	15										Fresh or chilled cuts and edible offal of domestic geese (excl. fatty livers)
020755	15	15	15										Frozen cuts and edible offal of domestic geese
020760	40	40	40										Meat and edible offal of domestic guinea fowls, fresh, chilled or frozen
020810	10	10	10	10	7	5	5	5	0			2016		Fresh, chilled or frozen meat and edible offal of rabbits or hares
020830	10	10	10	10	7	5	5	5	0			2016		Fresh, chilled or frozen meat and edible offal of primates
020840	7.5	5	10	10	7	5	5	5	0			2016		Fresh, chilled or frozen meat and edible offal of whales, dolphins and porpoises (mammals of the order Cetacea), of manatees and dugongs (mammals of the order Sirenia) and of seals, sea lions and walruses (mammals of the suborder Pinnipedia)
020850	10	10	10	10	7	5	5	5	0			2016		Fresh, chilled or frozen meat and edible offal of reptiles "e.g. snakes, turtles, crocodiles"
020860	5	5	5											Fresh, chilled or frozen meat and edible offal of camels and other camelids [Camelidae]
020890	7.5	5	10	10	7	5	5	5	0			2016		Fresh, chilled or frozen meat and edible offal of pigeons, game, reindeer and other animals (excl. bovine animals, swine, sheep, goats, horses, asses, mules, hinnies, poultry "fowls of the species Gallus domesticus, ducks, geese, turkeys, guinea fowl", rabbits, hares, primates, whales, dolphins and porpoises "mammals of the order Cetacea", manatees and dugongs "mammals of the order Sirenia", seals, sea lions and walruses "mammals of the suborder Pinnipedia" and reptiles)
020910	10	10	10	15	10	10	7	7	5	0		2016		Pig fat, free of lean meat, not rendered or otherwise extracted, fresh, chilled, frozen, salted, in brine, dried or smoked
020990	10	10	10	15	10	10	7	7	5	0		2016		Poultry fat, not rendered or otherwise extracted, fresh, chilled, frozen, salted, in brine, dried or smoked
021011	10	10	10	15	10	10	7	7	5	0		2016	Processed meat	Hams, shoulders and cuts thereof of swine, salted, in brine, dried or smoked, with bone in
021012	10	10	10	15	10	10	7	7	5	0		2016		Bellies "streaky" and cuts thereof of swine, salted, in brine, dried or smoked

021019	10	10	10	15	10	10	7	7	5	0				2016		Meat of swine, salted, in brine, dried or smoked (excl. hams, shoulders and cuts thereof, with bone in, and bellies and cuts thereof)
021020	15	15	15	15	10	10	7	7	5	0				2016		Meat of bovine animals, salted, in brine, dried or smoked
021091	20	20	20	15	10	10	7	7	5	0				2016		Meat and edible offal, salted, in brine, dried or smoked, and edible flours and meals of meat and meat offal, of primates
021092	20	20	20	15	10	10	7	7	5	0				2016		Meat and edible offal, salted, in brine, dried or smoked, and edible flours and meals of meat or meat offal, of whales, dolphins and porpoises (mammals of the order Cetacea), manatees and dugongs (mammals of the order Sirenia) and seals, sea lions and walruses (mammals of the suborder Pinnipedia)
021093	20	20	20	15	10	10	7	7	5	0				2016		Meat and edible offal, salted, in brine, dried or smoked, and edible flours and meals of meat and meat offal, of reptiles "e.g. snakes, turtles, alligators"
021099	20	20	20	15	10	10	7	7	5	0				2016		Meat and edible offal, salted, in brine, dried or smoked, and edible flours and meals of meat and meat offal (excl. meat of bovine animals and swine and meat and edible offal of primates, whales, dolphins and porpoises "mammals of the order Cetacea", manatees and dugongs "mammals of the order Sirenia", seals, sea lions and walruses "mammals of the suborder Pinnipedia" and reptiles)
040110	15	15	15	15	10	10	7	7	5	5	5	0		2019		Milk and cream of a fat content by weight of <= 1%, not concentrated nor containing added sugar or other sweetening matter
040120	15	15	15	15	10	10	7	7	5	0				2017	Raw milk	Milk and cream of a fat content by weight of > 1% but <= 6%, not concentrated nor containing added sugar or other sweetening matter
040130	15	15	15	15	10	10	7	7	5	0				2017		Milk and cream, not concentrated, not containing added sugar or other sweetening matter, of a fat content exceeding 6% (by weight): Of a fat content, by weight, exceeding 6%
040150	15	15	15													Milk and cream of a fat content by weight of > 10%, not concentrated nor containing added sugar or other sweetening matter
040210	4	3	5											2020		Milk and cream in solid forms, of a fat content by weight of <= 1,5%
040221	3	3	3												Milk powder	Milk and cream in solid forms, of a fat content by weight of > 1,5%, unsweetened
040229	5	5	5	25	20	20	15	10	7	5	5	1.5	0	2020		Milk and cream in solid forms, of a fat content by weight of > 1,5%, sweetened
040291	10	10	10	10	10	10	7	5	5	5	5	0		2019		Milk and cream, concentrated but unsweetened (excl. in solid forms)
040299	20	20	20	25	20	20	15	10	7	5	5	0		2019		Milk and cream, concentrated and sweetened (excl. in solid forms)
040310	7	7	7	25	20	20	15	10	7	0				2017	Other dairy product	Yogurt, whether or not flavored or containing added sugar or other sweetening matter, fruits, nuts or cocoa
040390	5	3	7	25	20	20	15	10	7	5	5	0		2019		Buttermilk, curdled milk and cream, kephir and other fermented or acidified milk and cream, whether or not concentrated or flavored or containing added sugar or other sweetening matter, fruits, nuts or cocoa (excl. yogurt)

040410	0	0	0	20	15.5	15.5	11	8.5	6	2.5	0			2018	Whey and modified whey, whether or not concentrated or containing added sugar or other sweetening matter
040490	0	0	0	25	20	20	15	10	7	5	5	0		2019	Products consisting of natural milk constituents, whether or not sweetened, n.e.s.
040510	13	13	13	15	10	10	7	7	5	0				2017	Butter (excl. dehydrated butter and ghee)
040520	15	15	15	15	10	10	7	7	5	5	5	0		2019	Dairy spreads of a fat content, by weight, of >= 39% but < 80%
040590	10	5	15	10	10	10	6	6	3.8	3.8	3.5	2.3	0	2020	Fats and oils derived from milk, and dehydrated butter and ghee (excl. natural butter, recombined butter and whey butter)
040610	10	10	10	10	7	5	5	5	5	5	4	0		2019	Fresh cheese "unripened or uncured cheese", incl. whey cheese, and curd
040620	10	10	10	10	7	5	5	5	2.5	0				2017	Grated or powdered cheese
040630	10	10	10	10	7	5	5	5	5	0				2017	Processed cheese, not grated or powdered
040640	10	10	10	10	7	5	5	5	5	5	4	3	0	2020	Blue-veined cheese and other cheese containing veins produced by "Penicillium roqueforti"
040690	10	10	10	10	7	5	5	5	5	0				2017	Cheese (excl. fresh cheese, incl. whey cheese, curd, processed cheese, blue-veined cheese and other cheese containing veins produced by "Penicillium roqueforti", and grated or powdered cheese)

Appendix 4a. Regional Aggregation

No.	Regions	GTAP 140 regions
1	Viet Nam	Viet Nam.
2	Australia	Australia.
3	NewZealand	New Zealand.
4	Japan	Japan.
5	Brunei	Brunei Darassalam.
6	Malaysia	Malaysia.
7	Singapore	Singapore.
8	Canada	Canada.
9	US	United States of America.
10	Mexico	Mexico.
11	Chile	Chile.
12	Peru	Peru.
13	Cambodia	Cambodia.
14	Indonesia	Indonesia.
15	Laos	Lao People's Democratic Republic.
16	Philippines	Philippines.
17	Thailand	Thailand.
18	RoSEAsia	Rest of Southeast Asia.
19	China	China; Hong Kong.
20	Korea	Korea.
21	India	India.
22	EU_25	Austria; Belgium; Cyprus; Czech Republic; Denmark; Estonia; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Latvia; Lithuania; Luxembourg; Malta; Netherlands; Poland; Portugal; Slovakia; Slovenia; Spain; Sweden; United Kingdom.
23	RestofWorld	Rest of Oceania; Mongolia; Taiwan; Rest of East Asia; Bangladesh; Nepal; Pakistan; Sri Lanka; Rest of South Asia; Rest of North America; Argentina; Bolivia; Brazil; Colombia; Ecuador; Paraguay; Uruguay; Venezuela; Rest of South America; Costa Rica; Guatemala; Honduras; Nicaragua; Panama; El Salvador; Rest of Central America; Dominican Republic; Jamaica; Puerto Rico; Trinidad and Tobago; Caribbean; Switzerland; Norway; Rest of EFTA; Albania; Bulgaria; Belarus; Croatia; Romania; Russian Federation; Ukraine; Rest of Eastern Europe; Rest of Europe; Kazakhstan; Kyrgyztan; Rest of Former Soviet Union; Armenia; Azerbaijan; Georgia; Bahrain; Iran Islamic Republic of; Israel; Jordhan; Kuwait; Oman; Qatar; Saudi Arabia; Turkey; United Arab Emirates; Rest of Western Asia; Egypt; Morocco; Tunisia; Rest of North Africa; Benin; Burkina Faso; Cameroon; Cote d'Ivoire; Ghana; Guinea; Nigeria; Senegal; Togo; Rest of Western Africa; Central Africa; South Central Africa; Ethiopia; Kenya; Madagascar; Malawi; Mauritius; Mozambique; Rwanda; Tanzania; Uganda; Zambia; Zimbabwe; Rest of Eastern Africa; Botswana; Namibia; South Africa; Rest of South African Customs ; Rest of the World.

Source: GTAP Database version 9

Appendix 4b. Sector Aggregation

No.	Sectors	GTAP 57 Sectors
1	Rice	Paddy rice; Processed rice.
2	OthCrops	Wheat; Cereal grains n.e.c.; Vegetables, fruit, nuts; Oil seeds; Sugar cane, sugar beet; Plant-based fibers; Crops n.e.c.
3	Cattle	Cattle, sheep, goats, horses.
4	OAP	Animal products n.e.c.
5	CMT	Meat: cattle, sheep, goats, horse.
6	OMT	Meat products n.e.c.
7	RawMilk	Raw milk.
8	Dairy	Dairy products.
9	Forestry	Forestry.
10	Fishing	Fishing.
11	CMOG	Coal; Oil; Gas; Minerals n.e.c.
12	ProcFood	Vegetable oils and fats; Sugar; Food products n.e.c; Beverages and tobacco products.
13	Textiles	Textiles.
14	Apparel	Wearing apparel.
15	LSMnfc	Wool, silk-worm cocoons; Leather products.
16	WoodProducts	Wood products; Paper products, publishing.
17	MProc	Petroleum, coal products; Chemical, rubber, plastic prods; Mineral products n.e.c; Ferrous metals; Metals n.e.c; Metal products.
18	ElecEquip	Electronic equipment.
19	OthMnfc	Motor vehicles and parts; Transport equipment n.e.c; Machinery and equipment n.e.c; Manufactures n.e.c.
20	Util_Cons	Electricity; Gas manufacture, distribution; Water; Construction.
21	TransComm	Trade; Transport n.e.c; Sea transport; Air transport; Communication.
22	OthServices	Financial services n.e.c; Insurance; Business services n.e.c; Recreation and other services; PubAdmin/Defence/Health/Educat; Dwellings.

Source: GTAP Database version 9

Appendix 5: Nominal GDP and its Expenditure Components for the TPP member countries in 2011 (US$, billion, share in %)

	GDP (US$, billion)	share (%) in GDP				
		C	I	G	EXP	IMP
Viet Nam	136	80	31	7	72	-90
Australia	1387	54	27	18	20	-19
NewZealand	164	59	19	20	29	-27
Japan	5906	60	20	20	16	-16
Brunei	17	28	20	26	57	-30
Malaysia	289	51	24	14	85	-75
Singapore	274	39	27	10	119	-96
Canada	1779	55	23	21	27	-27
US	15534	70	19	17	12	-17
Mexico	1170	65	21	11	30	-28
Chile	251	61	22	12	37	-32
Peru	171	60	24	10	29	-23
Cambodia	13	85	16	6	76	-83
Indonesia	846	58	32	9	24	-24
Laos	8	72	27	10	38	-48
Philippines	224	78	20	10	31	-39
Thailand	346	57	27	14	73	-71
RoSEAsia	56	63	30	13	16	-22
China	7570	37	45	13	28	-24
Korea	1202	53	31	14	51	-49
India	1880	62	34	12	20	-28
EU_25	17369	60	19	22	39	-40
RestofWorld	14886	58	22	16	33	-28

Source: Authors' calculation from GTAP Database version 9

Appendix 6. Average applied tariffs

	Viet Nam	Aus tralia	New Zealand	Japan	Brunei	Malay sia	Singa pore	Canada	US	Mexico	Chile	Peru	Cam bodia	Indo nesia	Laos	Philip pines	Thai land	RoSE Asia	China	Korea	India	EU_25	Rest of World
Viet Nam	..	0.1	2.5	0.8	0.3	7.2	0.0	6.3	7.0	18.2	5.4	5.1	11.9	2.8	2.8	14.0	8.8	2.8	1.2	8.9	12.0	4.0	7.7
Australia	3.6	..	0.0	2.6	1.5	1.8	0.0	0.4	0.5	2.1	5.1	0.5	9.2	4.3	7.8	1.3	2.8	1.4	1.5	4.0	4.8	1.5	3.4
NewZealand	4.4	0.0	..	8.5	1.0	2.4	0.0	15.8	2.1	19.1	0.7	0.3	11.6	4.1	5.9	0.8	8.3	3.0	2.6	16.8	7.9	14.6	11.4
Japan	5.4	10.5	4.1	..	7.8	8.4	0.0	2.5	1.1	3.1	0.4	2.1	10.2	7.3	17.5	2.0	8.5	9.9	6.1	4.6	7.2	2.6	5.8
Brunei	0.3	0.0	0.0	0.0	..	1.1	0.0	0.1	0.5	0.2	0.0	0.1	10.3	0.0	0.0	0.0	0.0	0.6	0.0	2.3	0.0	0.0	0.2
Malaysia	2.6	0.2	1.0	0.4	2.8	..	0.0	1.0	0.8	4.6	4.1	2.3	11.1	0.4	3.3	0.1	6.0	1.8	1.7	1.8	19.7	0.6	6.5
Singapore	7.1	0.0	0.0	0.0	12.7	1.9	..	0.2	0.0	3.2	1.2	0.2	14.1	3.2	16.7	1.8	7.0	4.5	2.0	1.7	3.8	0.0	6.6
Canada	2.7	1.5	0.1	7.6	0.6	1.1	0.0	..	0.1	0.4	0.5	1.4	4.0	3.2	4.4	6.4	4.8	0.7	2.2	3.7	10.7	1.0	4.0
US	4.5	0.7	1.3	4.1	3.4	2.9	0.0	1.0	..	0.2	0.1	1.1	11.4	3.4	7.2	3.1	4.1	1.4	4.3	21.7	5.5	1.3	4.1
Mexico	3.3	4.0	1.9	6.5	2.3	3.4	0.2	0.1	0.0	..	0.0	2.4	2.2	2.4	0.3	2.1	6.3	1.9	3.4	3.2	2.3	0.1	2.9
Chile	4.0	0.0	0.1	1.6	0.0	1.7	0.0	1.0	0.5	1.1	..	0.2	8.4	1.9	7.8	3.0	2.6	1.1	0.2	1.6	2.2	0.9	1.7
Peru	1.7	0.7	0.8	0.3	0.0	1.4	0.0	0.0	0.1	3.5	0.4	..	1.5	3.8	0.0	2.8	1.4	0.6	0.5	1.2	3.2	0.1	0.6
Cambodia	3.6	0.0	0.0	0.2	0.1	5.6	0.0	0.0	11.8	23.3	4.7	8.9	..	0.0	21.9	0.0	13.5	0.5	1.3	4.2	17.8	0.0	6.1
Indonesia	3.6	1.7	1.7	0.3	5.1	1.5	0.0	3.3	4.2	10.9	5.4	3.7	7.4	..	4.1	0.0	7.8	2.1	1.2	1.7	33.7	2.3	6.2
Laos	0.6	0.0	0.0	0.5	0.0	0.0	0.0	0.0	3.2	2.4	0.0	2.5	12.6	0.0	..	0.0	4.0	1.8	0.3	1.8	0.1	0.0	1.0
Philippines	3.2	0.1	0.9	1.4	3.3	2.9	0.0	2.1	2.3	4.5	4.7	2.2	8.0	0.4	2.8	..	11.0	1.7	0.2	4.4	4.9	0.8	2.4
Thailand	4.0	0.0	1.2	4.3	4.8	1.6	0.0	2.6	1.4	8.6	5.4	1.5	14.2	1.3	6.6	1.5	..	3.7	1.7	7.2	7.7	2.4	7.2
RoSEAsia	0.7	0.0	0.0	1.0	2.1	0.3	0.0	0.7	0.5	16.5	3.1	3.7	6.1	0.3	5.1	3.6	0.5	3.1	1.0	17.3	9.1	4.9	5.6
China	7.4	3.1	3.5	2.7	3.4	3.8	0.0	3.3	2.8	6.4	1.6	3.3	10.1	1.2	10.8	1.0	7.0	4.4	..	5.6	6.7	3.4	8.6
Korea	7.6	9.7	2.8	1.5	1.8	6.8	0.0	2.2	1.0	7.7	0.9	2.5	11.3	1.3	26.0	1.6	5.6	4.0	5.0	..	6.9	0.9	8.6
India	7.9	3.3	1.9	0.7	3.4	3.7	0.0	2.4	1.4	10.4	4.4	3.4	7.4	3.5	6.9	6.1	7.7	3.0	1.5	8.3	..	1.5	6.1
EU_25	4.2	4.3	1.8	2.5	2.2	4.0	0.0	1.9	0.9	0.3	0.0	1.1	5.2	3.3	7.1	3.0	4.8	1.5	6.3	4.9	6.5	0.0	4.0
RestofWorld	5.1	1.2	0.7	0.4	0.7	3.9	0.0	1.2	0.7	4.1	1.3	0.6	7.4	2.6	4.2	1.6	1.5	2.2	2.0	4.5	3.4	0.5	3.4

Source: Authors' calculation from GTAP Database version 9

Appendix 7a. Change in Export from Viet Nam by region and commodity, scenario b

	Aus tralia	New Zealand	Japan	Brunei	Malay sia	Singa pore	Canada	US	Mexico	Chile	Peru	Cam bodia	Indo nesia	Laos	Philip pines	Thai land	RoSE Asia	China	Korea	India	EU25	Rest of World
Rice	-1.4	-0.2	-1.3	-2.9	395.0	-4.6	-0.5	-1.1	-0.1	0.0	0.0	-0.4	-173.5	-0.4	-84.3	-0.1	0.0	-30.9	-2.2	-0.1	-10.2	-289.7
OthCrops	-8.1	-0.8	-57.6	0.0	-17.0	-1.3	-6.0	-78.7	23.0	1.3	0.0	-1.0	-7.8	-1.1	-6.9	-8.1	0.0	-83.8	-9.5	-12.4	-185.0	-87.9
Cattle	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	-0.4	-0.2
OAP	0.0	0.0	-2.1	0.0	0.0	-0.2	-0.2	-1.7	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	-0.4	0.0	-0.8	-0.1	-0.1	-2.0	-4.0
CMT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1
OMT	0.0	0.0	-0.1	0.0	-0.3	0.0	-1.3	0.0	0.0	0.0	0.0	-0.5	-0.1	0.0	-0.2	-0.2	0.0	-22.6	-0.8	0.0	-1.8	-4.5
RawMilk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dairy	-0.1	0.0	-0.2	0.0	0.0	-0.1	10.4	-0.2	0.0	0.0	0.0	-3.2	0.0	0.0	-0.2	0.0	0.0	-1.8	-0.1	0.0	-0.7	-10.8
Forestry	0.0	0.0	-0.2	0.0	-0.1	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	-0.2	0.0	-7.7	-0.5	-1.1	-0.2	-1.0
Fishing	-0.1	0.0	-2.3	0.0	-0.2	-0.8	-0.2	-6.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.4	0.0	-3.1	-0.4	-0.1	-2.4	-1.7
CMOG	-105.1	-1.6	-102.4	0.0	117.5	-107.9	0.0	-26.8	0.0	0.0	0.0	0.0	-4.0	-0.4	-1.4	-18.6	0.0	-163.1	-70.1	-6.1	-2.7	-4.6
ProcFood	-29.8	-2.0	-142.3	-1.6	8.3	-11.6	-45.6	-147.5	70.7	0.5	-1.1	-26.8	-8.8	-2.2	-14.3	-35.7	-0.5	-91.6	-105.4	-5.8	-269.1	-234.2
Textiles	-3.5	1.4	-113.9	0.0	-12.1	-1.0	112.1	1466.0	64.4	1.7	0.7	-29.3	-36.6	-2.5	-11.1	-30.4	-1.3	-145.6	-119.7	-11.0	-142.1	-214.6
Apparel	5.8	6.1	-173.9	0.0	-2.6	-1.6	328.5	5253.5	358.8	5.6	6.6	-0.2	-1.0	-0.2	-0.9	-1.4	0.0	-21.0	-107.4	-0.4	-337.4	-89.7
LSMnfc	-17.5	7.9	143.5	0.0	-6.8	-8.2	134.6	3319.2	657.9	16.9	19.5	-8.6	-25.3	-0.3	-4.5	-6.7	0.0	-94.9	-44.4	-7.6	-858.6	-284.8
Wood Products	-33.8	-0.7	-190.5	0.0	-13.6	-6.1	-4.4	-547.7	10.9	0.3	0.1	-6.4	-3.2	-1.7	-3.5	-3.6	-0.2	-144.4	-57.6	-9.2	-273.2	-82.8
MProc	-28.8	-0.6	-228.7	-0.4	-171.1	-23.3	-14.8	-132.1	12.7	1.9	-3.1	-176.7	-89.1	-19.7	-46.8	-94.8	-11.5	-215.5	-102.9	-95.5	-329.5	-350.8
ElecEquip	-40.3	-3.0	-64.2	0.0	-38.0	-3.2	-3.3	-87.5	-2.2	1.2	-0.4	-8.7	-36.2	-0.2	-29.8	-54.5	-0.6	-278.7	-34.8	-83.5	-614.8	-317.4
OthMnfc	-61.6	-1.2	-497.0	-0.3	-46.1	-25.1	-15.3	-247.0	44.5	3.4	0.3	-22.5	-41.0	-8.2	-58.8	-85.6	-2.0	-244.0	-83.3	-43.7	-326.5	-346.4
Util_Cons	-0.2	-0.1	-7.7	-0.1	-1.4	-0.7	-1.7	-3.5	-0.1	-0.1	-0.1	-0.2	-0.8	-0.1	0.0	-2.0	0.0	-6.1	-2.3	-1.6	-48.9	-43.2
TransComm	-5.8	-1.3	-16.5	-0.2	-2.1	-9.6	-9.1	-48.4	-1.8	-1.6	-0.3	-0.1	-3.4	0.0	-0.7	-4.3	0.0	-27.1	-15.7	-6.8	-220.1	-82.2
OthServices	-8.6	-1.9	-27.7	-0.5	-7.0	-15.6	-25.5	-182.6	-4.7	-1.6	-0.8	-0.1	-5.3	-0.1	-1.4	-7.0	-0.4	-32.8	-15.7	-20.6	-435.6	-189.8

Source: Authors' calculation from GTAP Database version 9

Appendix 7b. Change in Import to Viet Nam by region and commodity, scenario b

	Aus tralia	New Zealand	Japan	Brunei	Malay sia	Singa pore	Canada	US	Mexico	Chile	Peru	Cam bodia	Indo nesia	Laos	Philip pines	Thai land	RoSE Asia	China	Korea	India	EU 25	Rest ofWorld
Rice	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.2	0.0	0.1	0.1	0.8	0.0	7.3	0.0	1.3	0.0	0.1
OthCrops	35.2	2.9	2.6	0.0	0.8	-0.6	2.7	33.4	0.0	4.7	3.3	6.5	2.3	1.5	0.3	8.6	1.3	26.0	0.1	18.4	1.2	31.5
Cattle	0.2	1.6	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1
OAP	0.1	0.1	2.1	0.0	0.3	0.0	0.5	4.6	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.5	0.1	2.1	1.8	0.0	1.0	2.7
CMT	13.7	2.2	0.1	0.0	0.1	0.1	3.0	11.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-65.2	-1.0	-1.2
OMT	-3.5	-0.8	1.6	0.0	0.4	0.2	29.7	182.7	0.4	-1.0	0.5	0.0	-0.1	0.0	0.0	-1.4	0.0	-2.4	-4.9	-2.2	-22.1	-33.3
RawMilk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Dairy	10.2	42.9	0.1	0.0	0.6	5.4	3.7	39.7	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.7	0.1
Forestry	0.0	-0.2	0.0	0.0	-2.5	0.1	0.0	-1.3	0.0	0.1	0.0	0.0	0.0	-3.4	0.0	0.0	-2.1	0.0	0.0	0.0	-0.7	-7.3
Fishing	0.9	0.0	0.3	0.0	0.0	0.1	0.0	0.3	0.0	0.0	0.0	0.0	0.6	0.0	0.1	0.2	0.0	0.2	0.0	1.4	0.0	3.4
CMOG	10.2	1.2	2.0	0.0	0.9	1.2	0.1	3.7	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	-0.1
ProcFood	247.6	10.5	122.4	0.0	139.3	232.3	25.1	251.7	6.9	63.4	-1.1	0.0	-17.8	0.0	-3.7	-13.2	-0.1	-46.4	-8.2	-38.7	-21.1	-54.0
Textiles	6.6	15.1	918.4	0.8	97.1	3.8	3.0	82.7	2.3	0.6	0.2	0.2	33.7	0.2	0.6	107.4	0.3	1132.1	408.0	35.7	47.3	394.1
Apparel	1.1	1.3	102.4	0.0	1.7	2.3	1.2	14.7	2.9	0.1	0.6	0.1	0.5	0.0	0.3	3.6	0.0	187.2	39.5	0.2	7.3	14.1
LSMnfc	9.1	0.4	42.7	0.0	5.0	7.7	0.9	85.1	0.9	0.0	0.0	0.5	7.0	0.0	0.2	36.7	0.0	104.8	51.6	23.2	49.4	149.3
WoodProducts	3.8	0.1	125.0	0.0	12.8	186.9	2.0	25.9	0.9	-0.1	0.0	-0.5	-8.9	-4.8	-0.9	-6.5	0.0	-21.0	-7.3	-0.7	-5.9	-11.4
MProc	198.6	1.6	1070.7	-0.9	199.9	1789.9	12.1	285.6	4.1	-12.6	0.3	-9.5	-24.2	-3.0	-12.5	-95.0	-0.3	-417.0	-205.6	-23.8	-81.7	-340.2
ElecEquip	2.1	0.1	25.1	0.0	83.3	-3.9	1.4	46.7	7.3	0.6	0.0	0.0	0.3	0.0	-0.4	0.4	0.0	-10.4	-14.4	0.0	-0.5	-1.3
OthMnfc	18.1	0.4	1984.0	0.0	73.7	650.0	19.4	1060.1	4.4	0.5	0.0	-0.1	-7.5	-0.1	-4.4	-44.6	0.0	-202.8	-104.4	-6.3	-113.5	-58.4
Util_Cons	0.3	0.0	27.4	0.1	4.5	2.0	1.2	16.3	2.3	0.0	0.0	0.0	0.8	0.0	0.2	0.9	0.0	47.8	15.4	1.3	75.6	21.1
TransComm	10.0	2.1	23.4	0.2	6.8	15.4	13.1	68.9	4.5	2.6	1.1	0.4	2.4	0.1	1.7	7.2	0.1	46.9	5.0	6.3	201.0	87.2
OthServices	11.7	2.0	20.3	0.3	6.4	27.1	32.3	219.1	6.3	1.6	0.8	0.2	1.0	0.0	1.4	3.0	0.1	28.2	9.2	33.7	363.5	102.8

Source: Authors' calculation from GTAP Database version

Appendix 8: List of organizations visited during field trips

1	Animal Husbandry Association of Viet Nam
2	Collective Cau Sat, Tu Tra, Don Duong, Lam Dong Province
3	Collective Tan Thong Hoi, Cu Chi, Ho Chi Minh City
4	Dairy Cow Husbandry Project of TH in Thanh Hoa
5	Dairy Vietnam Co., Ltd.
6	Dalat Milk Joint Stock Company
7	Department of Industry and Trade, Lam Dong Province
8	Department of Livestock Production (MARD)
9	Division of Livestock Production, Department of Agriculture and Rural Development, Ho Chi Minh City
10	Division of Livestock Production, Department of Agriculture and Rural Development, Lam Dong Province
11	Export-Import and Industrial Trade Promotion Division, Ho Chi Minh Industry and Trade Department
12	Hoang Anh Gia Lai Livestock Joint Stock Company
13	TH Milk Food Joint Stock Company
14	Vietnam Dairy Cow One-Member Company Ltd.
15	Vietnam Dairy Products Joint Stock Company
16	Vietnam Poultry Association
17	Vinamilk Dalat Dairy Farm, Vietnam Dairy Cow One-Member Company Ltd.,
18	VISSAN limited Company

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