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**Viet Nam: Small Scale Technical
assistance for Capacity Building of
Ministry of Finance to Support Tariff,
Industry and Subsidy Analysis for the
WTO Accession**

Lord, Montague J.

ADB, Asian Development Bank

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for Capacity Building of Ministry of Finance
to Support Tariff, Industry and Subsidy
Analysis for the WTO Accession**

Final Report

Prepared by

Asian Development Bank

Study Team:

Montague Lord

Do Trong Khanh

Nguyen Tuong Son

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Executive Summary

The present report is part of an SSTA that seeks to provide the MOF with the design and implementation of quantitative tools to carry out industry-level assessments of tariff and subsidy reforms that will both support Viet Nam's current WTO accession negotiations and provide needed capacity for analyzing alternative policy reforms.¹ To this end, the present study elaborates modeling tools for production shift analysis and the calculations of trade tax revenue effects associated with tariff reform policies. It builds on the recent ADB-assisted study on the structure of protection for various industries, which provided estimates of tariff-related costs of inputs for industries and prices of outputs for import-substituting industries, as well as calculations of their effective rates of protection (ERP). In the present study we use the ERP estimates to examine industry-level output and employment adjustments likely to take place under a variety of tariff reforms. We also address subsidy issues and their incidence in different industries. The results of the present study provide detailed product and industry-specific information on the effects of implementing changes in the structure of protection and, as such, the emphasis is on a practical, action-oriented plan, rather than an academic study.

As part of this work, the SSTA has built the database needed to produce the aforementioned output, and incorporate time-series data used to estimate the production supply and import demand equations that underlie production-shift and partial-equilibrium trade analyses. These quantitative tools are used to assess alternative tariff reforms and provide guidelines on how to mitigate potentially negative impacts from the resulting output and employment adjustments. Finally, the tools elaborated in the SSTA provide capacity building to MOF through the transfer of technologies and know-how to MOF staff members.

Sixteen industries were selected for the present study that represented 37 percent of total manufacturing activity in Viet Nam in 2000. As details of Viet Nam's market access negotiations are unavailable and because the market access negotiating position of Viet Nam are at this moment confidential, we have hypothesized different tariff reforms to measure the impact of those reforms on revenue and domestic production patterns. These reforms consist of (a) a 10 percent uniform tariff on all types of goods, (b) a 20 percent across-the-board tariff reduction on all types of goods, (c) a 25 percent reduction in tariffs for agricultural products and a 10 percent reduction for agricultural products, and (d) specific product-by-product differential tariff reductions. The impact of these alternative approaches yields considerably different outcomes.

¹ The study been undertaken under the supervision and guidance of Lingling Ding, economist in the Mekong Department of the Asian Development Bank (ADB) and Ha Huy Tuan, Deputy Director General, Cooperations Department, Ministry of Finance. The tariff-related components of the SSTA has been implemented by Montague Lord, international trade and tariff analysis expert and team leader, and Nguyen Truong Son, domestic trade and tariff analysis expert. The subsidy-related components has been undertaken by Murray Smith, international WTO/industrial issues expert, and Do Trong Khanh, domestic subsidies-related expert with expertise in the Agreement on Subsidies and Countervailing Measures (SCMs).

The results of our analysis of effective protection rates and their implications for output and employment clearly point to the benefits to be derived from the reduction or elimination of tariffs for both export-oriented industries import-substituting industries. For import-substituting industries, tariff cuts would lead to contractions for most industries, but cost reductions would substantially mitigate those declines. For instance, for the selected import-substituting industries the average nominal rate of protection (NRP) declines by 43.4 percent, but the benefits of cost-associated price declines averaging -38.3 nearly offset the price-declines. The employment effects associated with the tariff-induced adjustments in Viet Nam's industries assumes fixed labor-output coefficients in production. Using the output adjustment estimates, we calculated the percentage change in employment resulting from the tariff adjustments. We then calibrated the actual levels of employment by industry to calculate the estimated change in labor demand by sector. The employment changes are of course suggestive of the quantities involved. It is noteworthy, nevertheless, that there are tax revenue declines for some products, despite significant increases in output and employment for a number of products.

The results for the effective rates of assistance are more tenuous, given the lack of comprehensive information on the equivalent subsidy rates of that assistance. Nevertheless, the information suggests that while Viet Nam's support mechanisms have been declining as trade policies shift from import-substitution to the promotion of exports, there remains considerable scope for rationalizing assistance programs, and for that to happen, further quantification of assistance programs will be needed. Moreover, since substantial subsidies exist at both the industry output levels and for the inputs used by those industries, the appropriate methodology for evaluating that assistance is that of the effective rate of assistance or others that take into account assistance to both industry inputs and their products.

In general, the partial equilibrium approach used in the present analysis excludes consideration of feedback effects between the external and domestic sectors, and therefore fails to take into account the sectoral adjustments and indirect macroeconomic impact that would accompany trade liberalization. Moreover, one of the major issues raised by partial equilibrium analysis of trade liberalization is the small size of the estimated effects, a phenomenon that has been attributed to the very nature of the partial equilibrium calculations. These limitations suggest the need for a broader approach provided by a macroeconomic model. While integrating the same level of detail, estimates of the effects of trade liberalization in a macroeconomic framework incorporate dynamics and allow for calculations of feedback effects between import and export adjustments and the macro-economy. As a consequence, the sizes of the estimates are likely to more accurately reflect adjustments to trade liberalization associated with broad-based reforms. Data requirements for the macroeconomic model, though not considerable, would require careful data selection to ensure integrity of the underlying relationships. Together with the industry-level assessment, macroeconomic analysis of the tariff reforms would offer a more complete appreciation approximation of its potential impact on the Viet Nam economy.

1. Introduction

1.1 Background

Viet Nam's road to membership in the World Trade Organization (WTO) began in 1995 with a formal request for accession. In the following year it submitted a memorandum on its foreign trade regime that was subsequently used by WTO members of the Working Party to examine all aspects of the country's existing trade and legal regime. Substantive market access and rules negotiations began in 2002 when the Government of Viet Nam submitted its initial market access for both goods and services, and the negotiations that followed largely determined the conditions of entry into the WTO, as well as the transitional period for making legislative or structural changes to implement the commitments. During this period the Government also engaged in intensive bilateral negotiations with interested Working Party members and the results of the negotiations were consolidated into the final accession package containing the conditions of entry as generally represented in the Protocol of Accession, and the agreed upon schedules of market access commitments in goods and services.

At the Working Party Meeting in June 2004, members agreed to move forward drafting the Working Party Report of Viet Nam's accession, marking an important milestone in the process that the Government hopes to complete by 2005. In addition to multilateral and bilateral negotiations, there are several procedural steps that remain to be completed. Once the accession package is adopted at a final formal meeting of the Working Party, the documents will be presented for adoption to the General Council or the Ministerial Conference. After being approved, the Decision of the General Council and a Protocol of Accession will be annexed to the Working Party Report stating that Viet Nam accedes to the WTO Agreement and will abide by the included Schedules and the final provisions for timing of acceptance of the Protocol and full WTO membership. After the signing of the Protocol of Accession, Viet Nam will become a full member of the WTO within thirty days of the ratification procedure.

In organizational arrangements of the Government of Viet Nam for the WTO accession negotiations, the Ministry of Trade (MOT) of Viet Nam has taken the overall lead role as the coordinating agency for Viet Nam's WTO accession negotiation. As such, it has become the beneficiary of WTO-related technical assistance from the EU's Multilateral Trade Assistance Program (MUTRAP) and other bilateral trade programs. Concurrently, the Ministry of Finance (MOF) has been charged with the trade policy analysis underlying Viet Nam's tariff and subsidy negotiating strategy. As part of this process the MOF has established a WTO Division under the International Cooperation Department, which has in turn requested trade-related capacity building (TRCB) support for its designated activities.

The present Small-Scale Technical Assistance (SSTA) aims to strengthen the capacity of MOF to effectively participate in the WTO accession negotiations by building on an earlier analysis of tariffs and subsidies, and training MOF officials in the analysis of impact assessments and other revenue-related areas to help the Viet Nam WTO negotiating team and corresponding policy makers make well-founded and informed decisions; as well as enhanced capacity for the implementation of those decisions. It has four components:

- (1) To deepen the analysis of Viet Nam's tariff structure by building on the existing ADB tariff study reviewing the direction and structure of tariffs and the implication for domestic manufacturing, and to suggest how to best structure the tariff schedule to support the accession process;
- (2) To provide an overall assessment of the Government assistance program in promoting industry and agriculture development in the context of the WTO accession and make recommendations on how to address them in the WTO compatible manner, by reviewing the use of financial support and subsidies to promote industrial and agricultural sector development, lessons learned, WTO permitted and prohibited subsidies and their relevance to Viet Nam, availing experiences from other newly acceded member countries that have similar level of economic development;
- (3) In the context of the accession negotiation and tariff analysis, to assess the overall industrial structure of Viet Nam, the scope of Viet Nam's industry policy tools with a focus on examining the impact of current policies on the industrialization process, and lay out detailed recommendations consistent with Viet Nam's international obligations under the WTO and other major agreements for effectively integrating the manufacturing sector into the world trading system; and
- (4) To develop knowledge and skills transfer and capacity building for MOF staff in understanding these subjects and utilizing knowledge and techniques gained to prepare for proposals for the WTO negotiations.

The coverage of these components was further refined during the SSTA Inception Mission in Hanoi during April 2004. The objective of that mission was (i) to refine the terms of reference of the SSTA with the Ministry of Finance (MOF); (ii) to define the working arrangement for the consultants; (iii) to determine the availability of counterpart staff, services, and facilities to be provided by the Government to implement the SSTA; and (iv) to participate in the workshop on Trade Policy Reforms and Structure of Protection in Viet Nam. Following discussions with the MOF, it was agreed that work under the SSTA would focus on (i) methodologies used to analyze tariffs and subsidies; (ii) knowledge transfer and training; and (iii) the application of analytical tools. It was also agreed that the consultants would adopt an interactive approach in their work under the SSTA to ensure that staff in the MOF, in particular the WTO Division, is trained in the quantitative tools available for analyzing tariffs and subsidy issues.

The SSTA seeks to provide the MOF with the design and implementation of quantitative tools to carry out industry-level assessments of tariff and subsidy reforms that will both support the WTO accession negotiations and provide needed capacity for analyzing policy reform implications in the areas. To this end, the present study elaborates modeling tools for production shift analysis and the calculations of trade tax revenue effects associated with tariff reform policies. It builds on the recent ADB-assisted study on the structure of protection for various industries.² That study provided estimates of tariff-related costs of inputs for industries and prices of outputs for import-substituting industries, as well as calculations of their effective rates of protection (ERP).

² For details, see Athukorala, P. (2004), "Trade Policy Reforms and the Structure of Protection in Viet Nam". Study prepared for the Asian Development Bank and the Ministry of Finance, Viet Nam.

In the present study we use the ERP estimates to examine industry-level output and employment adjustments likely to take place under a variety of tariff reforms. We also address subsidy issues and their incidence in different industries. The results of the present study provide detailed product and industry-specific information on the effects of implementing changes in the structure of protection and, as such, the emphasis is on a practical, action-oriented plan, rather than an academic study.

As part of this work, the SSTA has built the database needed to produce the aforementioned output, and incorporate time-series data used to estimate the production supply and import demand equations that underlie production-shift and partial-equilibrium trade analyses. These quantitative tools are used to assess alternative tariff reforms and provide guidelines on how to mitigate potentially negative impacts from the resulting output and employment adjustments. Finally, the tools elaborated in the SSTA provide capacity building to MOF through the transfer of technologies and know-how to MOF staff members.

The study been undertaken under the supervision and guidance of Lingling Ding, economist in the Mekong Department of the Asian Development Bank (ADB) and Ha Huy Tuan, Deputy Director General, International Cooperations Department, Ministry of Finance. The tariff-related components of the SSTA has been implemented by Montague Lord, international trade and tariff analysis expert and team leader, and Nguyen Truong Son, domestic trade and tariff analysis expert, who have extended the existing tariff analysis studies available to MOF and the ADB's recently completed study on Trade Policy Reform and Structure of Protection in Viet Nam and made detailed proposals on how to best structure the tariff offer for the negotiation. The subsidy-related components has been implemented by Murray Smith, international WTO/industrial issues expert, and Do Trong Khanh, domestic subsidies-related expert with expertise in the Agreement on Subsidies and Countervailing Measures (SCMs), who have conducted a comprehensive analysis on the government assistance program, financial support, industrial policy issues, industrial performance, and industrial policy instruments in Viet Nam in relation to the requirement of joining the WTO, taking into account the special and differential treatment of developing country members. Lessons have been drawn from other countries having recently acceded to the WTO, or enjoying similar levels of development to that of Viet Nam. Training of MOF staff to prepare proposals in relation to subsidies has formed a core part of these components.

1.2 Report Structure

- Chapter 1 – provides an introduction and background of the present study;
- Chapter 2 – discusses key characteristics of the industries examined in the present study, and the structure of protection in those industries;
- Chapter 3 – Chapter 3 describes alternative modeling methodologies for analyzing the impact of tariff and subsidy reforms on both trade tax revenue and industry-specific performances, and it details the methodologies for (a) industry-shift analysis in terms of the effective rates of protection and output and employment adjustments to trade liberalization, (b) revenue-

impact analysis in terms of the direct and indirect effects of trade liberalization and the estimation procedures required for their estimates;

- Chapter 4 – presents the tariff-related empirical estimates for Viet Nam's demand for imports of the products produced by selected industries, measures of the revenue effects from tariff reforms, and measures of output and employment shifts from those reforms;
- Chapter 5 – presents the subsidy-related empirical estimates for the selected industries in terms of effective rates of assistance;
- Annex A presents the outline terms of reference for the consulting services
- Annex B contains technical background material related to derivation of the effects of trade liberalization and the derivation of the demand relationship needed to measure those effects.
- The Statistical Appendix contains data on the volume of industrial production of selected products.
- The Bibliography contains the references cited in the report.

2. Industrial Output, Trade and Market Access

2.1 Characterization of Selected Industries

Industry contributed nearly 40 percent of Viet Nam's GDP in 2002 and expanded by more than 10 percent annually during the previous ten-year period. The industrial sector is relatively well diversified and all industrial areas have expanded over the past decade, particularly steel

Table 2.1
Viet Nam: Output of Selected Industries in 2000

ISIC	Description	Value added at producers' prices (mill. US\$)	Value added share in manufacturing industry (%)
1810	Manufacture of wearing apparel, except fur apparel	376	8.6
1550	Manufacture of beverages	359	8.2
1600	Manufacture of tobacco products	228	5.2
1511	Production, processing and preserving of meats, fish, fruit and vegs	183	4.2
3590	Manufacture of transport equipment	97	2.2
3410	Manufacture of motor vehicles	96	2.2
1520	Manufacture of dairy products	83	1.9
2410	Manufacture of basic chemicals	68	1.6
2020	Manufacture of wood, cork, straw etc	46	1.1
2610	manufacture of glass and glass products	45	1.0
1911	Tanning and dressing of leather	30	0.7
2930	Manufacture of domestic appliances	15	0.3
Total Selected Industries		1626	37.1
Total Manufacturing		4379	100.0

Source: UNIDO, Supply and Demand Balances database.

products, garments, footwear, cement and vehicle assembly. Mining, mainly in the form of oil and gas, account for one-fourth of industrial output, but oil production has now leveled off while gas production is expected to rise rapidly over the medium term.

The 16 industries selected for the present study represented 37 percent of total manufacturing activity in Viet Nam in 2000. Table 2.1 shows the contributions of the industries, with some having been combined into major sector groupings for purposes of presentation. Wearing apparel and beverages each contributed over 8 percent of manufacturing activity, while tobacco products and production of processed meats, fish, and fruits and vegetables each accounted for around 5 percent of the total. Manufacturing of motor vehicles and transport equipment each contributed over 2 percent.

2.2 Structure of Protection

Viet Nam has made considerable progress in liberalizing its trade through both multilateral and bilateral agreements. Under the Association of Southeast Asian Nations (ASEAN), Viet Nam and other member countries have complied with the Agreement on the Common Effective Preferential Tariff (CEPT) Scheme for the ASEAN Free Trade Area (AFTA), which requires that most tariff rates on products traded within the region be reduced to no more than five percent. Similarly, the U.S.-Viet Nam Bilateral Trade Agreement (BTA), implemented by the U.S. Senate October 2001 and ratified by the Government of Viet Nam a month later, The BTA commits Viet Nam to broad economic reform, including substantial reductions in tariffs; transparency in government procurement; uniform implementation of standards, taxes, and dispute resolution; removal of quotas; market access rights; elimination of trade-related investment restrictions; and

acceptance of World Trade Organization (WTO) rules on customs valuation, intellectual property rights, and trade in services. As such, it lays the foundation for many WTO standards on market access, non-discrimination and transparency.

Viet Nam initiated its accession process in the WTO in 1995, and submitted a formal request for accession the following year. Substantive multilateral negotiations began in 2002 when the Government of Viet Nam submitted its initial market access for both goods and services, and the negotiations that followed largely determined the conditions of entry into the WTO, as well as the transitional period for making legislative or structural changes to implement the commitments. The Government also engaged in bilateral negotiations with interested Working Party members and the results of the negotiations were consolidated into the final accession package containing both the conditions of entry and a Protocol of Accession, and the agreed upon schedules of market access commitments in goods and services.

The present study assesses tariff and subsidy reform measures under the WTO accession negotiations and subsequent agreements for selected industries. Selection of the industries covered in the present SSTA for both tariff and subsidy analysis have been identified jointly by the MOF and team based on data availability and the Government's interests. Since the World Bank is conducting somewhat similar exercises for the Ministry of Industry (MOI) in selected industries of cement, paper and steel, those industries do not form part of the present study in terms of the focused industries. Appendix Tables 1 and 2 present value and volume data for 16 industries identified as focal industries for the analysis. Based on these industries, the present study assesses the implications of different scenarios of tariff reforms in terms of their impact on various industry performance indicators, as well as trade tax revenues. Possible reforms include formulas in the Doha agenda, China before and after accession, concertina, two-tier and uniform tariff structures. The comparative analysis of these performance indicators are based on revenue

Table 2.2
Viet Nam: Nominal and Effective Rates of Protection

ISIC	Description	Trade Balance a/	NRP b/	ERP		Anti-Export Bias
				Import-Substitution	Export-Oriented	
1511	Production, processing and preserving of meat products	0.30	10.0	18.28	-8.24	29.0
1512	Processing and preserving of fish and fish products	3.24	31.1	37.55	-57.09	220.5
1513	Processing and preserving of fruit and vegetables	3.09	34.3	49.87	-13.15	72.6
1514	Manufacture of vegetable and animal oils and fats	-6.24	13.6	29.15	-6.39	38.0
1520	Manufacture of dairy products	-0.70	23.8	25.35	-34.98	92.8
1554	Manufacture of non-alcoholic beverages	-0.04	50.0	86.65	-25.22	149.6
1600	Manufacture of tobacco products	-0.39	34.3	55.24	-48.96	204.2
1810	Manufacture of wearing apparel, except fur apparel	7.44	49.6	76.9	-78.78	733.5
1911	Tanning and dressing of leather	-15.64	7.6	23.69	-22.04	58.7
2021	Manufacture of veneer sheets; manufacture of plywood	-2.85	4.5	0.36	-10.86	12.6
2022	Manufacture of builders' carpentry and joinery	0.33	8.3	-1.02	-16.99	19.2
2412	Manufacture of fertilizers and nitrogen compounds	-11.08	0.4	-2.75	-3.96	1.3
2610	Manufacture of glass and glass products	-2.43	23.9	31.38	-11.88	49.1
2930	Manufacture of domestic appliances	-4.38	36.0	49.11	-21.20	89.2
3410	Manufacture of motor vehicles	-4.49	68.8	66.74	-47.44	217.2
3591	Manufacture of motorcycles	-2.77	3.8	148.69	-181.79	-404.1

a/ Defined by calculated value of (exports - imports)/production. Positive values associated with export-oriented industries; negative values associated with import-substituting industries.

b/ Weighted NRP, based on calculations reported in Athukorala (2004)

and industry-performance measures. Tariff and subsidy reforms and their associated effects on output and trade tax revenue are jointly assessed for the selected industries in an effort to identify common policy prescriptions for tariff and subsidy reforms.

Viet Nam uses tariff escalation by stages of production for its import-substitution policies. Table 2.2 measures this type of protection through the calculation of effective rates of protection (ERPs) that considers the effect of tariffs applied to imports of raw materials and intermediate goods on the price of the final good. In contrast to the nominal rate of protection (NRP) that measures the extent of protection by the difference between the border price of foreign-made products and the price of domestic import-substitutes made by local producers, the ERP measures the increase in value-added of the protected industry over value added of that same industry measured in terms of border prices. For an industry or firm, the value added is the difference between the total value of output and the cost of the intermediate inputs used in the production of the final product.³

To measure effective protection rates, we expand the estimates provided by Athukorala (2004) to include ERPs for import-substituting industries and those for export-oriented industries.⁴ Column 5 of Table 2.2 reports the ERP for import-substituting industries by the Athukorala study. Despite an apparent small level of protection as measured by the NRP, the motorcycle industry has the highest ERP among the selected import-substituting industries. Particularly high ERPs also exist in the industries for beverages, apparel, and motor vehicles, though these industries also have high NRPs.

The sixth column shows the ERP applying to a firm that produces for the export market. In that situation, it is unable to benefit from exemptions of import duties on imported inputs. As expected, the effect of the tariff regime on such a firm is negative, because of the cost-increasing effects of higher prices for intermediate goods. These negative ERP values appear because the value-added measured at world prices is negative for these industries. Specifically, valued at prices on world markets these industries used more than US\$1 of non-factor inputs to produce US\$1 of output. It is worth noting that the negative effects for exporters are the largest for such industries as apparel and motor vehicles implying increased costs of intermediate goods. This is because the government tends to use tariff and other protective measures on intermediate goods to achieve the localization objectives (See Fukase and Martin, 1999).

Clearly, tariffs on tradable inputs used in export-oriented industries can create an anti-export bias. Those industries attempting to export rather than sell in the domestic market receive no output tariff protection but must nevertheless pay the protected input costs of tradable inputs. The negative effects from the higher costs of inputs are greatest for the textile and apparel industries, fish and fish products, motor vehicles and tobacco products. While these duties on

³ The ERP brings out both the effect of an escalating tariff structure and an industry's value added in determining the effect of protection. Non-uniform tariffs affect the decisions of investment and production, the allocation of resources, and the distribution of income-earning capacity. Differences in tariff rates may increase or decrease the amount of value-added in certain lines of production, depending upon the structure of the tariff differences. Thus, while nominal tariffs determine trade levels through their relation to product prices, the ERP determines profit, resource allocation and the productive structure of the economy through its relation to value added of production. For Viet Nam the extent to which production for exports are discouraged in favor of servicing the domestic market can be derived from ERP calculations that measure the magnitude of import-substitution policies, and those that measure the extent to which those same policies create an anti-export bias.

⁴ Other ERP estimates for Viet Nam are contained in Fukase and Martin (1999) and the Institute of Economics (1999).

Table 2.3
Viet Nam: Value of Largest Imported Products in Selected Industries

Industry		Largest Imported Product	
ISIC	Description	SITC	Description
1511	Production, processing and preserving of meat products	081.4	Meat or fishmeal fodder
1512	Processing and preserving of fish and fish products	291.9	Other animal materials nec
1513	Processing and preserving of fruit and vegetables	054.8	Edible vegetables nec fresh, dry
1514	Manufacture of vegetable and animal oils and fats	081.3	Oilcake and other residues
1520	Manufacture of dairy products	023.0	Butter
1554	Manufacture of non-alcoholic beverages	111.0	Non-alcoholic beverages nec
1600	Manufacture of tobacco products	122.2	Cigarettes
1810	Manufacture of wearing apparel, except fur apparel	657.6	Hat bodies
1911	Tanning and dressing of leather	611.4	Leather bovine nec equine
2021	Manufacture of veneer sheets; manufacture of plywood	632.4	Veneer sheets
2022	Manufacture of builders' carpentry and joinery	633.0	Wood manufactures
2412	Manufacture of fertilizers and nitrogen compounds	561.1	Fertilizer, manufactured
2610	Manufacture of glass and glass products	812.4	Lighting equipment
2930	Manufacture of domestic appliances	812.1	Central heating equipment
3410	Manufacture of motor vehicles	732.3	Lorries and trucks
3591	Manufacture of motorcycles	732.9	Motorcycles

inputs are in principle offset by the existing duty-drawback scheme in Viet Nam, informal discussions with a number of firms have suggested that administrative obstacles and delays often prevent them from using the scheme.

Traded products for the selected industries are associated through standard concordance tables summarized in Annex C. Table 2.3 shows the selected ISIC, Revision 3-based industries and the largest products traded by the industries in terms of corresponding SITC, Revision 3. These are the products use in the present study to measure trade and tariff-associated changes in the magnitude of that trade.

3. Modeling Methodology

3.1 Alternative Quantitative Approaches

Several quantitative tools exist for analyzing how tariff and subsidy reforms impact on both trade tax revenue and industry-specific performances. On the demand-side, partial equilibrium models of trade like the one used in this study provide a mechanism to estimate how tariff and subsidy reforms affect imports and exports. They use single-sector, industry or product estimates to examine the effects of trade policy changes on specific sectors or products. Since these types of models examine narrow product categories, they are able to capture the likely direct effects of policy changes on individual products. The main limitation of the models, however, is that they do not capture interactions between various economic sectors, and thereby do not account for secondary or indirect effects that could result as capital and labor move from the less productive to the more productive sectors of the economy. For this reason, the models generally yield modest results since only the direct effects of price-related adjustments are measured and calculated elasticities tend to be modest.

A more appropriate tool for measuring the revenue implications of those reforms is a macroeconomic model, which provides a means of measuring feedback effects between the reforms and GDP-induced adjustments to changes in imports and exports. On the supply-side, production-shift analysis associated with ERPs changes provide the appropriate tool for assessing the impact of tariff and subsidy reforms on industry-specific performances. In an analogous manner, subsidy reforms can be evaluated through the calculation of effective rates of assistance (ERA), based on nominal rates of assistance on outputs (NRA) and nominal rates of assistance on materials (NRM), that is, on intermediate inputs. In a more general sense, computable general equilibrium (CGE) models are more suitable for analyzing the effects of trade liberalization on upstream, downstream and substitute products, but they are susceptible to several weaknesses, among which is the need to calibrate the models to a benchmark period (typically a year) which is taken to be an equilibrium, and there is no means of testing the model structure. Such weaknesses have to be weighed against the strengths and advantages of each of these quantitative tools.

Box 2.1:
Quantitative Tools for Modeling Effects of Changes in Viet Nam's Tariff Structure

D E M A N D	<i>Computable General Equilibrium (CGE) Model</i>	<i>Macroeconomic Model</i> Determines GDP components and feedback effects between changes in tariffs (t), imports (M), and GDP (Y)	<i>Partial Equilibrium Trade Model</i> Determines Imports (M) and Exports (X) based on tariffs (t), fob Prices, and GDP (Y)
S U P P L Y		<i>Production-Shift Analysis</i> Determines how ERP changes affect output and employment at industry-specific levels	[normally not modeled for relatively small country since world economy will supply all imports needed at market-determined price]

3.2 Methodology for Industrial Shift Analysis

3.2.1 Measuring the Effective Rate of Protection

The analytical tool used in the analysis is the effective rate of protection (ERP), which measures differential tariff effects by considering tariffs applied to imports of raw materials and intermediate goods that affect the price of the final good. As mentioned earlier, the recent ADB assistance to Viet Nam's WTO accession through a study on Trade Policy Reform and Structure of Protection in Viet Nam provided industry-specific estimates of tariff-related costs of inputs for all industries and prices of outputs for import-substituting industries, as well as calculations of effective rates of protection (ERP) for those industries (Athukorala, 2004). We therefore limit our presentation here to a brief summary of the concept and adopt the empirical findings of that study to our extensions of that analysis.

The ERP measures how tariffs on a product and its tradable inputs jointly affect the value-added of a particular activity. When only the nominal rate of protection is calculated, the tariff on imports suggests that domestic production will be encouraged to increase their output. However, whether they increase their output depends not only on the tariff on imports, but on the tariffs applied to inputs used in their manufacture. While domestic producers are given an implicit subsidy on their production when there are tariffs on imports, they also face a tax on their imported inputs, which can neutralize the effect of the implicit subsidy. The ERP therefore measures the net protection on the production process, rather than simply the gross protection on the industry's output.

The formula for the ERP is as follows:

$$ERP = (V^*_j - V_j) / V_j \quad (3.1)$$

where

ERP = effective rate of protection

V^*_j = Value added per unit of j in activity j at tariff applied price

V_j = Value added per unit of j in activity j at tariff-free price

Alternatively, we can specify the ERP in terms of tariffs on the applied inputs and output of the industry as follows:

$$ERP = (1 - \sum_i a_i) / [1 / (1+t)] - \sum_i [a_i / (1+t_i)] - 1 \quad (3.2)$$

where t = nominal tariff rate on imported equivalent to the domestic output.

t_i = nominal tariff rate on tradable input i in the production of the good.

a_i = value of input i per unit of output.

Like the nominal rate of protection, a positive ERP indicates that the returns earned from production are greater than those earned without intervention. Likewise, a negative ERP indicates that the reverse is true. In the case where the ERP is zero, the effect is the same as without intervention.

The ERP formula suggests the following

- $t = t_i$ implies that the ERP will equal the nominal rate of protection (NRP), i.e., $ERP = NRP$.
- $t < t_i$ implies that the ERP will be positive, suggesting that the effective protection for the industry is greater than that of nominal protection on both the final and imported inputs.
- $t > t_i$ implies that the ERP will be negative, suggesting that the effective protection for the industry is smaller than the nominal protection on both the final and imported inputs.

The incidence of tariff reductions on inputs and final products differs between import-substitution industries and export-oriented ones. The approach used to measure the incidence of the ERP in Viet Nam and its elimination under the trade liberalization therefore separates the calculation for export-oriented industries from those for import-competing ones. The distinction is critical to the output and employment effects arising from Viet Nam's trade liberalization because tariffs protect the import-substituting industries but not the export-oriented ones.

For *import-substituting industries*, the tariff on the final good acts as a subsidy to the industry, while the tariff on inputs acts as a tax. Protection granted to final goods therefore increases returns to value-adding factors in those industries. Higher protection on outputs raises the domestic prices for import-competing goods and increases the returns for their production. Taxes on intermediate inputs, however, reduce the returns to value adding factors.

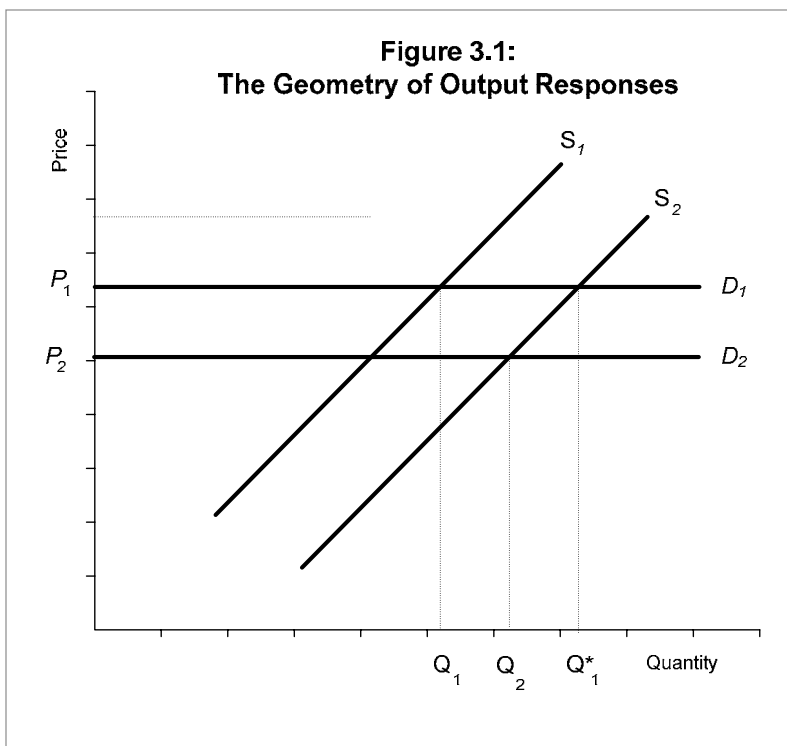
For *export-oriented industries*, there are no benefits to be derived from domestic protection on their output. Instead the industries confront world prices for their sales, while being taxed on their inputs through the tariffs they paid on imported inputs. The effect of the Viet Nam tariff regime on these industries is always negative because of the cost-increasing effects of higher prices for intermediate goods.

The *anti-export bias* is found by combining the effects of the tariffs on import-substitution activities and export-oriented activities within the same industry. We can measure the anti-export bias, denoted A , for any given industry as follows:

$$A = [(1 + ERP_m) / (1 + ERP_x) - 1] * 100$$

Where ERP_m = the ERP on the import-substitution activities of the industry, and

ERP_x = the ERP on the



export-oriented activities of the industry.

3.2.2 Output and Employment Adjustments to the trade liberalization

While estimates of effective rates of protection are suggestive of which industries are more or less favored or threatened by current tariffs and proposed reforms, the ERPs are more indicative of the potential direction of change in resource pull than of the output magnitudes involved. Predicting the quantitative impact of reforms requires a supply side analysis. To motivate the analysis, we begin with a graphic illustration of the impact of the trade liberalization on an industry.

Our approach assumes constant non-tradable factor prices except owing to tariff changes directly, and so is legitimate only to the extent that this is approximately the case. Naturally, a significant restructuring of relative output prices would lead to changes in the demand for such non-traded factors, e.g., labor or land, and so to changes in the factor prices. Tradable inputs prices are assumed fixed on world markets and so the domestic prices of these inputs depend only on changes in the input tariff rates, which are accounted for in our analysis. This maintained assumption of fixed non-traded factor prices in Viet Nam following the trade liberalization may be viewed as roughly legitimate – overall output in the industries under consideration does not dominate the economy – or it may be viewed as a simplifying assumption which could then be relaxed to mitigate the findings in a thoughtful way. For example, as labor-intensive industries expand and eventually wages begin to rise, this will impact the cost structure of firms and moderate any expansion somewhat.

We estimate the impact of the trade liberalization on the industries being considered. The approach is illustrated in Figure 3.1 which represents an industry supply curve diagram with initial price and quantity supplied given by P_1 and Q_1 . When tariffs are changed on inputs and output simultaneously, two forces are at work in the industry. First, a change in the input tariffs will alter costs and so shift the supply curve up or down depending on if unit costs have increased or decreased due to the tariff changes. In Figure 3.1, the assumption is that input tariffs have been reduced causing unit costs of production to fall and the supply curve to shift downward to S_2 . For export-oriented industries, the output price remains at the initial level P_1 , and output expands to Q_1^* by an amount dependent upon the magnitude of the cost reduction and the price elasticity of supply. In the case of import-substitution industries, however, the output price is also altered by tariff elimination on the final product, so that there is an additional adjustment represented by a movement along the new supply curve. In Figure 3.1, the assumption is that the output tariff is lowered so that price falls to P_2 , inducing a new equilibrium price and quantity at P_2 and Q_2 , the quantity change depending again on the magnitude of the output price change and the supply elasticity. Clearly, even if all tariffs are reduced, output may rise or fall. And, more generally, the net effect of tariff reform on output and so employment at the industry level is an empirical issue.

In order to calculate the effects of tariff reform, we first estimated the industry supply elasticities using a distributed lag model of the supply relationship for production, Q , with independent variables price, P , domestic income, Y , and a technology trend, T :

$$\ln Q_t = \alpha_{30} + \alpha_{31} \ln Q_{t-1} + \alpha_{32} \ln P_t + \alpha_{33} \ln Y_t + \alpha_{34} T + \mu_3 \quad (3.4)$$

The expected signs are $0 < \alpha_{31} < 1$; $\alpha_{32}, \alpha_{33} > 0$; $\alpha_{34} > 0$.

Shifts in the supply curves associated with input tariff changes are calculated as the trade liberalization-induced change in input tariffs weighted by each input's total non-factor costs. Movements along the new supply curve resulting from output tariff changes and cost-change induced equilibrating changes are then calculated using the elasticity estimates. As indicated earlier, for import-substituting industries, both cost-induced supply-adjustments and price-induced changes in output are calculated, whereas only cost-induced supply adjustments are estimated for export-oriented industries not enjoying a protected market, and consequently pre-trade liberalization higher prices.

The employment effects associated with the trade liberalization-induced adjustments in Viet Nam's industries assumes fixed labor-output coefficients in production. For this reason, the same export-oriented industries likely to expand their employment are the same ones mentioned above that will significantly increase their output, while those experiencing the largest contractions in employment are those with the relatively larger output adjustments. These employment changes are of course suggestive of the quantities involved. Using the output adjustment estimates from above, we calculate the percentage change in employment resulting from the trade liberalization-related tariff adjustments. We then calibrated the actual levels of employment by industry to calculate the estimated change in labor demand by sector.

Trade liberalization in Viet Nam can be expected to increase the long-run demand for labor. Removing policies that favor capital-intensive import-substitution sectors at the expense of more competitive export sectors ultimately results in an expansion of the export sectors and a contraction of the import-substitution sectors. While the net effect in the long run is higher wages and expanding employment, in the short-run during the transition, our results can underscore the contraction in employment likely to occur in the import-substituting industries. The export sector growth is, however, likely to absorb the displaced workers from those contracting sectors and require additional workers.

3.3 Methodology for Revenue Impact Analysis

3.3.1 Direct and Indirect Effects

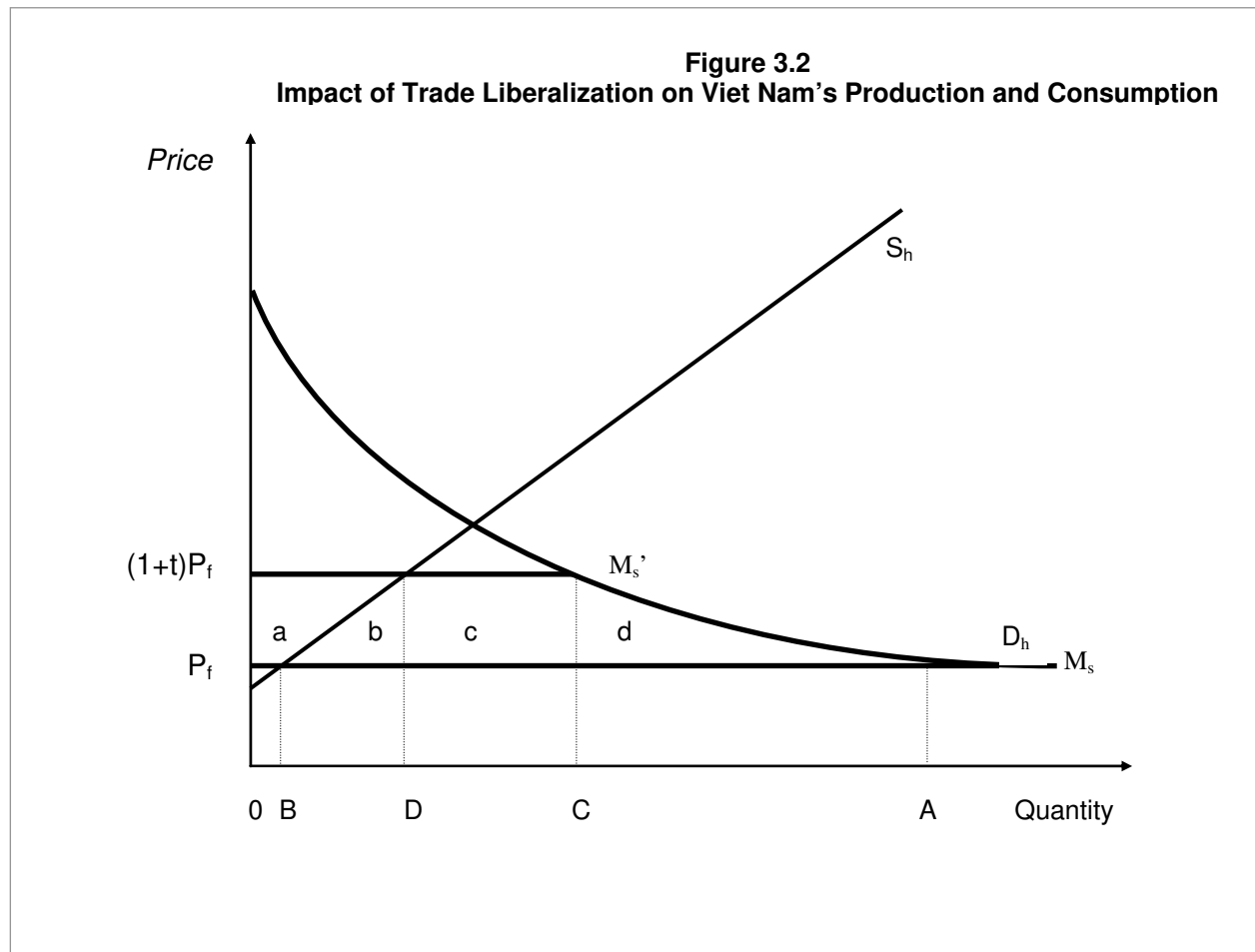
In partial equilibrium analysis, we can calculate the following direct effects on Viet Nam from the trade liberalization through econometric estimates of the demand for its imports and exports:

- *Total Effect* refers to the change in the level of domestic demand for imported inputs resulting from tariff-associated price changes.
- *Government Revenue Effect* is the change in customs fees resulting from tariff changes, which combine changes in revenue per unit of imports and changes in import volumes resulting from the *total trade* effect.
- *Consumer Welfare Effect* refers to the changes that consumers obtain from price changes on imported goods when tariffs are changed.

The indirect effects of the trade liberalization can only be measured within a general equilibrium framework, and consist of the following:

- *Sector Production Effect* refers to changes in domestic output levels associated with the changes in the allocation of resources brought about by the movements of factors of production.
- *International Competitiveness Effect* arises from the changes in the access to factors of production for export-oriented goods, and the resulting changes in the export prices relative to competing suppliers to foreign markets.
- *Terms of Trade Effect* is brought about from the changes in prices of tradables that arise from exchange rate effects and other changes in the foreign and domestic economies.

The *direct effects* of the trade liberalization are demonstrated in Figures 3.2.⁵ It shows the domestic demand schedule, D_h , and the domestic and foreign supply schedules, S_h and M_s respectively of a product. At the border-equivalent price P_f the amount OA is consumed, OB is produced in Viet Nam, and the difference BA is imported. With an ad valorem tariff of t , the foreign supply schedule (import supply schedule) shifts from M_s to M_s' . The domestic-equivalent price is $P_d = P_f + tP_f = P_f(1+t)$. At that price the quantity demanded decreases to OC and the



domestic supplied increases to OD . The tariff produces the following effects:

- (1) Consumer surplus declines by $a + b + c + d$.
- (2) Producer surplus increases by a .
- (3) Government revenue increases by c .
- (4) The 'deadweight' loss for consumers is d .
- (5) The 'deadweight' production or efficiency loss is b .
- (6) Total welfare loss is $d + b$.

The effect of the trade liberalization is now straightforward: the foreign supply schedule shifts to M_s and the domestic-equivalent price reverts to $P_d = P_f$.

We can separate these trade liberalization effects on Viet Nam's imports into five measurable components:

- The *trade creation effect* refers to the change in the level of domestic demand for imported goods, resulting from tariff-associated foreign price reductions relative to domestically-produced goods. It is given by:

$$\Delta M_{ij} = \varepsilon^p [\Delta t_i / (1 + t_i)] M_{ij} \quad \dots(3.5)$$

where M_{ij} is the import quantity of product i by country j ; ε^p is the price elasticity of import demand; and, as before, t is the ad valorem tariff rate. The trade creation effect therefore depends on the price elasticity of import demand, the percentage change in the ad valorem tariff, and the level of imports.

- The *trade diversion effect* is the substitution between supplies originating from preferential markets and those originating from foreign suppliers subject to MFN rates, and it is given by:

$$\Delta V_{jk} = -\varepsilon^p (V_{ij}/V_i) [\Delta t_i / (1 + t_i)] V_{ik} \quad \dots(3.6)$$

where V_{jk} is the value of imports from the preferential suppliers, ε^p is the own price elasticity of demand, V_{ij} is the value of imports from the non-preferential suppliers, and V_i is the total value of imports of the product i into Viet Nam.

- The *balance of payments effect* is the sum of the value of changes in individual product imports, and is therefore the sum of the trade creation and trade diversion effects:

$$\Delta V = [1 - (V_{ik}/V_i)] \varepsilon^p [\Delta t_i / (1 + t_i)] V_i \quad \dots(3.7)$$

Consequently, for those products having a price-elastic import demand schedule, tariff reductions should lead to a net increase in the value of imports over the level that existed before the tariff cuts.

- The *government revenue effect* includes both the lower revenue per unit of imports and the higher import volumes resulting from the trade creation effect:

$$\Delta T/T = \Delta t/t + \Delta M/M \quad \dots(3.8)$$

where T denotes the customs revenue.

- The *consumer cost effect* refers to the gains that consumers obtain from lower prices on imported goods when tariffs are lowered, and welfare gain, ΔW , is normally calculated as the average increase in the quantity of imports, i , valued at the average between the tariff incidence before and after liberalization:

$$\Delta W = \Delta t \Delta M/2 \quad \dots(3.9)$$

The magnitude of these effects depends on the price elasticities of import and export demand of Viet Nam, and is therefore an empirical issue. By its very nature, the econometric-based modeling approach provides internally consistent empirical results at a detailed level. In the following section, we specify the system of equations to be estimated. The estimate takes into account changes in the levels of demand arising from the imposition of tariffs, and time-related adjustments arising from the lagged response of imports and exports to possible changes in those tariffs.

3.3.2 Estimation Procedure

The elasticities approach to the balance of payments suggests that the demand for imports of Viet Nam is related to relative price movements, as well as income. The specification of the import-demand relationships for Viet Nam is derived in the Technical Annex. In this section we briefly summarize their main features:

- (1) Imports have a steady-state, or long-term, response to the growth of domestic income, but that response is not necessarily proportional. This characteristic suggests that the dynamic specification of the import demand equation should not introduce any restrictions that would impose long-run unitary elasticity with respect to income. In contrast, the model should encompass long-term proportionality responses when they exist.
- (2) The demand for imports is determined by the local currency price of imports. For Viet Nam we can decompose the (dong) price variable into the U.S. dollar price and the real effective exchange rate as follows:

$$P^n = P^c(1+t)/R = P/R \quad \dots(3.10)$$

where P^n is the Viet Nam dong price of the imported product, P^c is c.i.f. (cost, insurance, and freight) import price in U.S. dollars of the product, P is the U.S. dollar import price of the good with the tariff, t is the tariff rate, and R is the real exchange rate.

- (3) The real exchange rate takes into account changes in the price of domestic goods, P^n , relative to foreign goods, P^f , and the nominal exchange rate, R^n . It is defined as follows:⁶

⁶ This definition is the one used by the IMF, while the more traditional definition is $R = R^n P^f / P^c$. To facilitate the interpretation of the results for readers, we have adopted the IMF definition. See Edwards (1988: Appendix) for alternative definitions of the real exchange rate.

$$R = P^n / (R^n P^f) \quad \dots (3.11)$$

The demand for imports by Viet Nam is therefore directly affected by c.i.f. price in U.S. dollars of the imported good, the tariff on that good, and the real exchange rate.⁷

- (4) We adopt an error-correction mechanism (ECM) for the import demand relationship, since the growth rate of Viet Nam's imports depends on the expansion path of economic activity. The ECM specification adjusts for any disequilibrium between variables that are cointegrated and thus provides the means by which the short-run observed behavior of variables is associated with their long-run equilibrium growth paths. The expression for imports, M , in terms of income, Y , the price of the product, P , in US dollar terms and including the tariff, and the real effective exchange rate, R , is then:

$$\begin{aligned} \Delta m_t = & \alpha_{20} + \alpha_{21}(m - y)_{t-1} + \alpha_{22}\Delta y_t + \alpha_{23}y_{t-1} + \alpha_{24}\Delta p_t + \alpha_{25}p_{t-1} \\ & + \alpha_{26}\Delta r_t + \alpha_{27}r_{t-1} + u_{2t} \end{aligned} \quad \dots (3.12)$$

where $-1 < \alpha_{21} < 0$; $\alpha_{22} > 0$; $\alpha_{23} > \alpha_{21}$; α_{24} and $\alpha_{25} < 0$; α_{26} and $\alpha_{27} > 0$; and where all variables are measured in logarithmic terms. The use of the logarithmic specification provides a means by which the elasticity can be calculated directly from the estimated equation; the results are consistent when the elasticities remain constant over time. Tests of parameter constancy provide a means of validating that hypothesis.

- (5) On a steady-state growth path, the long-run dynamic equilibrium relationship implicit in equation (3.12) is:

$$M = kY^{\varepsilon_y}P^{\varepsilon_p}R^{\varepsilon_r} \quad \dots (3.13)$$

- (6) The income, price and exchange rate elasticities in (3.12) are defined as follows:

Income elasticity of import demand –

$$\varepsilon_y = 1 - (\alpha_{23}/\alpha_{21}) \quad \dots (3.14)$$

Its value is positive since the expected sign of α_{21} is negative and $\alpha_{23} > \alpha_{21}$. When $\alpha_{21} < \alpha_{23} < 0$, import demand is inelastic with respect to income; when $\alpha_{23} = 0$, it has a unitary elasticity; and when $\alpha_{23} > 0$.

Price elasticity of import demand –

$$\varepsilon_p = -\alpha_{25}/\alpha_{21} \quad \dots (3.15)$$

It has a negative value since the expected signs of both α_{25} and α_{21} are negative.

⁷ If the import supply elasticity is less than infinite, then the pass-through of exchange rate changes from import price changes in foreign currency terms to import prices in local currency terms will be less than complete (see Branson, 1972, and the summary by Goldstein and Khan, 1985). Consequently, the estimated price and exchange rate coefficients may differ from one another. For a derivation of the import supply schedule, see Lord (1991: Annex D).

Real cross-rate elasticity of import demand –

$$\varepsilon_r = -\alpha_{27}/\alpha_{21} \quad \dots(3.16)$$

It has a positive value since the expected sign of α_{21} is negative and that of α_{27} is positive.

Note that the demand for imports is determined by the local currency price (in VND) of imports. As such, we can separate the price variable into the US dollar prices and the real exchange rate. Since the real exchange rate takes into account changes in the price of domestic goods relative to foreign goods, and the nominal exchange rate, then the demand for imports in Viet Nam is directly affected by the real exchange rate, as well as the foreign currency denominated import price.

Also note that a rise in the real exchange rate represents a real *revaluation* in a fixed exchange rate system, and an *appreciation* in a flexible exchange rate system, which under the purchasing power definition can be brought about by either a fall in the nominal exchange rate, or a rise in the relative price of domestic goods (equivalent to a relative fall in the price of foreign goods). Conversely, a fall in real exchange rate represents a real *devaluation* under a fixed exchange rate system, and *depreciation* under a flexible exchange rate system. The fall is associated with either a rise in the nominal exchange rate or a rise in relative prices of foreign goods (equivalent to a rise in relative prices of domestic goods).

Finally, it should be underscored that the analysis is based on 13 observations (1990-2002). The fact that major structural changes occurred in the Viet Namese economy in the early 1990's significantly complicate the interpretation of any results derived from a data set that extended back into the previous decade. The relatively small number of data observations should be taken into account in interpreting the results of the empirical analysis.

3.4 The Data

Production-shift analysis requires time-series for production values at the industrial level, as well as corresponding prices that are usually taken from import or export price data for the industries' output. Mapping prices in Harmonized System (HS) or Standard International Classification System (SITC) nomenclature and production values in International Standard Industrial Classification (ISIC) nomenclature involves the use of concordance tables available from the United Nations and other sources.⁸ For Viet Nam, however, two additional steps are required. First, the industrial classification is based on a national ISIC nomenclature that differs somewhat from the international ISIC standard, and concordances are therefore required between the national and international ISIC tables. Second, time series dating back to the early 1990s are unavailable for Viet Nam's trade data at either the HS or SITC level. As a result, mirror trade data (data of all trading partners) is required to build up the Viet Nam trade series.

⁸ See <http://unstats.un.org/unsd/cr/registry/regot.asp?Lg=1> and <http://www.maclester.edu/research/economics/page/haveman/Trade.Resources/tradeconcordances.html>.

Efforts to develop time series for trade data have already been made for an earlier World Bank project (Lord, 2002) and those data can be used for the current project, along with existing HS-based trade data for the most recent years. These data have been completed for 2001 and 2002 for the major traded products of the selected industries covered by the present study.

The ERP estimates from the earlier TA have been used to calculate production and employment-related shifts associated with alternative tariff structures. Since the incidence of tariff reforms on inputs and final products differs between import-substitution industries and export-oriented ones, the industry-level analysis has been separated in the calculation for export-oriented industries from those for import-competing ones. Based on the selected industries being addressed in the present SSTA and data availability for time-series of industry-level production, production supply relationships to tariff-associated price changes have been estimated and the effects of tariff reforms on output and employment calculated. Shifts in the supply curves associated with input tariff changes have been calculated as the change in input tariffs weighted by each input's total non-factor costs. Movements along the new supply curve resulting from output tariff changes and cost-induced equilibrating changes have then been calculated using the elasticity estimates. For import-substituting industries, both cost-induced supply-adjustments and price-induced changes in output have been calculated, whereas only cost-induced supply adjustments have been estimated for export-oriented industries not enjoying a protected market.

Trade tax effects associated with tariff reform measures on industry-level trade taxes associated with the fob value of imports have been calculated from import demand equations for products associated with the industries. These estimates require the association of HS classified imports with ISIC industry level nomenclature. Additionally, time series are needed to estimate the import demand equations for the products associated with the selected industries. Since HS-level data are unavailable for early years, mirror trade data have been used to develop the time series for products associated with industries in the period before Viet Nam adopted the HS systems.

Tariff reform measures being considered under the WTO accession negotiations and subsequent agreements have been examined from a policy perspective. For tariff reforms the implications of different scenarios for industry performance indicators and trade tax revenue have been assessed. A comparative analysis of different performance indicators have been based on revenue and industry-performance measures. Tariff and subsidy reforms and their associated effects on output and trade tax revenue have been jointly assessed for the selected industries in an effort to identify joint policy prescriptions for tariff and subsidy reforms.

4. Tariff-Related Empirical Estimates

4.1 Measuring Revenue Effects

At the time that this report was prepared, details about Viet Nam's market access negotiations are unavailable. It has therefore been useful to hypothesize alternative tariff reforms that have been undertaken by other countries, so as not to compromise Viet Nam's negotiating position. Usually, tariffs reductions take place over several years, for example, over a ten-year period for industrial goods and a twelve-year period for agricultural products. Nevertheless, tariffs on a large portion of traded consumer and industrial products are often reduced immediately. With these generalities in mind, we evaluated the impact of several types of tariff reforms on Viet Nam's imports in the short and medium to long run.

Table 4.1 reports the unweighted income and price elasticities of Viet Nam's principal product imports of the selected industries. The long-term price elasticities vary from -0.01 for motorcycles to -5.0 edible vegetables, with an unweighted average of -1.7 . The trade-weighted average elasticity is -1.0 in the long run, and the short-term averages between -1.0 (unweighted) and -0.9 (unweighted), with most responses occurring in the first period. The price elasticity estimates suggest that tariff reductions are likely to have important consequences for Viet Nam's imports of products such as non-alcoholic beverages, oilcakes and other residues, and central heating equipment, among others. Tariff reductions are less likely to affect the demand for products whose price elasticities are low, such as those for fertilizers, cigarettes, and wood manufactures. For the export-oriented industries, the unweighted average long-run price

Table 4.1
Regression Results of Viet Nam's Import Demand for Selected Products

Rank a/	Description	SITC	Product Type	Value (1000US\$)	Income		Price	
					Short-Run	Long Run	Short-Run	Long Run
1	Lorries and trucks	732.3	Import-Subs.	534,727	0.81	1.89	-1.36	-1.31
2	Fertilizer, manufactured	561.1	Import-Subs.	476,985	0.24	1.24	-0.22	-0.03
3	Motorcycles	732.9	Import-Subs.	388,837	2.28	1.08	-0.77	-0.001
4	Oilcake and other residues	081.3	Import-Subs.	287,016	0.19	b/	1.00	-1.20
5	Hat bodies	657.6	Export-Oriented	256,362	0.67	1.00	-0.61	-0.89
6	Butter	023.0	Import-Subs.	115,953	2.55	0.46	-0.24	-0.47
7	Central heating equipment	812.1	Import-Subs.	97,962	0.56	1.00	-1.77	-2.66
8	Other animal materials nec	291.9	Export-Oriented	94,797	0.26	b/	1.00	-0.97
9	Cigarettes	122.2	Import-Subs.	89,930	0.59	1.00	-0.81	-0.29
10	Lighting equipment	812.4	Import-Subs.	56,540	0.21	1.00	-0.75	-2.31
11	Veneer sheets	632.4	Import-Subs.	28,840	1.78	3.59	-0.49	-1.41
12	Leather bovine nec equine	611.4	Import-Subs.	25,852	0.40	1.00	-1.70	-1.21
13	Edible vegetables nec fresh, dry	054.8	Import-Subs.	13,507	0.21	b/	1.00	-5.01
14	Meat or fishmeal fodder	081.4	Export-Oriented	11,653	0.47	b/	1.50	-2.37
15	Non-alcoholic beverages nec	111.0	Import-Subs.	1,887	2.27	4.05	-2.25	-4.11
16	Wood manufactures	633.0	Export-Oriented	1,206	3.80	5.59	-0.78	-0.40
Unweighted Average					1.08	1.71	-1.04	-1.68
Weighted Average					0.88	1.26	-0.86	-1.03

Note: The elasticities measure the percentage change in Viet Nam's import volume brought about by a 1 percent change in either real GDP, the own US dollar price of imports, or the real exchange rate of Viet Nam.
a/ Ranked in terms of percentage contribution to total imports.
b/ One-period lag.
-- Estimated coefficient had incorrect sign and therefore was not included in the model.
Source: Derived from estimated coefficients in Appendix Table 11.

elasticity is -1.3, and for the import-substituting industries, the comparable elasticity is -1.8.

The income elasticity of Viet Nam's major imports of the selected industries averages 1.7 on an unweighted basis and 1.3 on a trade-weight basis. Among individual products, they vary from a low of 0.5 for butter to a high of 5.6 for wood manufactures. Other than butter, all products have either a unitary elasticity or an elasticity greater than unity. The average trade-weighted short-term elasticity is similar to that of the unweighted elasticity, their average being 0.9 and 1.1 respectively. For the export-oriented industries, the unweighted average long-run income elasticity is 2.3, and for the import-substituting industries, the comparable elasticity is 1.5.

Table 4.2 summarizes the effects on imports of four alternative scenarios reported in Tables 4.3 through 4.6. The alternative scenarios are as follows:

- ◆ a 10 percent uniform tariff on all types of goods,
- ◆ a 20 percent across-the-board tariff reduction on all types of goods,
- ◆ a 25 percent reduction in tariffs for agricultural products and a 10 percent reduction for agricultural products, and
- ◆ specific product-by-product differential tariff reductions of 30, 20, 10 and 0 percent, in line with guidelines detailed in Table 4.6.

The impact various tariff reforms approaches yields considerably different outcomes. In the case of a 10 percent uniform tariff, tariffs of several products like fertilizers, veneer sheets, leather, and wood manufactures actually rise because the existing tariff is lower than 10 percent. For those product imports, the increase tariff leads to a reduction in the volume of imports. On balance, therefore, the overall value of these imports increases with the application of a uniform tariff of 10 percent. However, in the case of tax revenues, the net balance is a reduction in revenue because of the importance of declining revenues from lower imports of trucks and motorcycles (for details, see Table 4.3).

In the case of a 20 percent across-the-board tariff reduction on all types of goods, the change in revenue and tax collection is of the expected direction. Overall, the amount imported of all products increases and nearly offsets the price reductions so that, on balance, the value of imports of those products remains nearly unchanged (0.5 percent reduction). In the case of trade

Table 4.2
Summary of Tariff Cut Effects on Import Value and Trade Taxes

Description	Initial Imports		Initial Imports		Change in Value (%)	Change in Trade Taxes	
	Value (1000US\$)	Taxes (1000US\$)	Value (1000US\$)	Taxes (1000US\$)		Value (1000US\$)	%
Across-the-Board 10 Percent Rate for All Imports	1,108,424	118,627	1,131,921	102,902	2.1%	-15,725	13%
Across-the-Board 20 Percent Rate for All Imports	1,108,424	118,627	1,102,593	99,865	-0.5%	-18,761	16%
Reduction rate of 25% for industrial products and 10% for agricultural	1,108,424	118,627	1,182,129	177,500	6.6%	58,874	50%
Reduction rate of 4 different tracks of 30%, 20%, 10% and 0%^{1/}	1,108,424	118,627	1,096,841	92,876	-1.0%	-25,750	22%

^{1/} See Table 4.6 for details of the tariff cuts applied to different products.

tax revenues, there is an overall 16 percent reduction in tax revenue from the imports of those products.

In the case of differential tariff cuts between industrial products (25%) and agricultural products (10%), the impact is positive on both the value of imports and trade tax revenue. The relatively low estimated price elasticity of demand for motorcycles produces little change in the volume of imports, a significantly higher tariff (from 3.8% to 25%) produces a large increase in trade tax revenues. (For details of the individual product effects, see Table 4.5)

The more complex case, that of multiple differences in the rate of tariff cuts, the overall effect is to lower the value of imports by 10 percent and trade taxes by 22 percent. Table 4.6 provides details of the individual product effects.

The partial equilibrium approach used in the present analysis excludes consideration of feedback effects between the external and domestic sectors, and therefore fails to take into account the sectoral adjustments and indirect macroeconomic impact that would accompany trade liberalization. Moreover, one of the major issues raised by partial equilibrium analysis of trade liberalization is the small size of the estimated effects, a phenomenon that has been attributed to the very nature of the partial equilibrium calculations. These limitations suggest two directions for further analysis of Viet Nam's tariff reform analysis.

First, tariff reforms in Viet Nam will probably influence the industries that provide both material and other inputs to the final goods industries through changes in relative prices of factors of production and the final products themselves. These linkages will, in turn, affect the allocation of domestic resources and influence the competitive position of Viet Nam's products in the domestic and world markets. The effect of tariff changes on domestic production is measured through the effective rate of protection (ERP), discussed in earlier chapters of this report. The ERP measures how tariffs on Viet Nam's products and their tradable inputs jointly affect the value-added of particular activities. When only the nominal rate of protection is calculated, the tariff on imports suggests that domestic production will be encouraged to increase their output. However, whether they increase their output depends not only on the tariff on imports of final products, but on the tariffs applied to inputs used in their manufacture. The ERP therefore measures the net protection on production processes, rather than simply the gross protection on output of industries. We use this approach in the next section to measure domestic production adjustments in Viet Nam resulting from tariff reforms.

Though it is beyond the scope of the present study, a second extension is the macroeconomic framework of external sector adjustments. While not offering the same level of detail, estimates of the effects of trade liberalization in a macroeconomic framework incorporate dynamics and allow for calculations of feedback effects between import and export adjustments and the macro-economy. As a consequence, the sizes of the estimates are likely to more accurately reflect adjustments to trade liberalization associated with broad-based reforms. From an analytical point of view, the appropriate framework for Viet Nam is the Mundell-Fleming model of a small open economy. Data requirements for the macroeconomic model, though not considerable, would require careful data selection to ensure integrity of the underlying relationships. Together with the industry-level assessment, macroeconomic analysis of the tariff reforms would offer a more complete appreciation approximation of its potential impact on the Viet Nam economy.

Table 4.3
Effect on Import Value and Trade Taxes of Tariff Cut to Across-the-Board 10 Percent Rate for All Imports

Description	SITC	Current Tariff	Proposed Tariff	Initial Imports			Final Imports			Change in Value (%)	Change in Trade Taxes			
				Volume	Unit Price	Value (1000US\$)	Taxes (1000US\$)	Volume	Unit Price		Value (1000US\$)	Taxes (1000US\$)	Value (1000US\$)	%
Lorries and trucks	732.3	68.8	10.0	98,103	1.1	111,964	45,617	142,988	0.74	106,373	9,670	-5.0%	-35,947	-79%
Fertilizer, manufactured	561.1	0.4	10.0	2,026,811	0.1	108,141	390	2,020,586	0.06	118,163	10,742	9.3%	10,353	2658%
Motorcycles	732.9	3.8	10.0	1,423,553	0.4	600,451	21,830	1,423,474	0.45	636,448	57,859	6.0%	36,029	165%
Oilcake and other residues	081.3	13.6	10.0	145,495	0.1	8,706	1,043	159,038	0.06	9,213	838	5.8%	-205	-20%
Hat bodies	657.6	49.6	10.0	200	17.4	3,486	1,155	247	12.82	3,164	288	-9.2%	-868	-75%
Butter	023.0	23.8	10.0	5,554	1.4	7,654	1,470	5,845	1.22	7,160	651	-6.5%	-819	-56%
Central heating equipment	812.1	36.0	10.0	116	5.1	589	156	176	4.09	719	65	22.0%	-90	-58%
Other animal materials nec	291.9	10.0	10.0	1,286	10.8	13,940	1,268	1,286	10.84	13,940	1,267	0.0%	0	0%
Cigarettes	122.2	34.3	10.0	4,213	32.8	138,104	35,254	4,431	26.85	118,995	10,818	-13.8%	-24,436	-69%
Lighting equipment	812.4	23.9	10.0	409	18.3	7,500	1,449	515	16.27	8,385	762	11.8%	-687	-47%
Veneer sheets	632.4	4.5	10.0	2,000	3.7	7,324	314	1,852	3.86	7,138	649	-2.5%	335	106%
Leather bovine nec equine	611.4	7.6	10.0	5,668	15.9	89,940	6,386	5,518	16.22	89,481	8,135	-0.5%	1,749	27%
Edible vegetables nec	054.8	13.6	10.0	1,046	2.6	2,693	323	1,213	2.49	3,023	275	12.3%	-48	-15%
Meat or fishmeal fodder	081.4	31.1	10.0	21,644	0.3	6,034	1,433	29,919	0.23	6,995	636	15.9%	-797	-56%
Non-alcoholic beverages nec	111.0	50.0	10.0	560	2.7	1,535	512	1,172	2.01	2,358	214	53.6%	-297	-58%
Wood manufactures	633.0	8.3	10.0	150	2.4	363	28	149	2.46	366	33	0.9%	5	19%
Total						1,108,424	118,627			1,131,921	102,902	2.1%	-15,725	-13%

Table 4.4
Scenario 1: Effect on Import Value and Trade Taxes of Tariff Reduction rate Of 20% to Across-the-Board for All Imports

Description	SITC	Current Tariff	Proposed Tariff	Initial Imports			Final Imports			Change in Value (%)	Change in Trade Taxes			
				Volume	Unit Price	Value (1000US\$)	Taxes (1000US\$)	Volume	Unit Price		Value (1000US\$)	Taxes (1000US\$)	Value (1000US\$)	%
Lorries and trucks	732.3	68.8	55.0	98,103	1.1	111,964	45,617	108,608	1.05	113,853	40,401	1.7%	-5,216	-11%
Fertilizer, manufactured	561.1	0.4	0.3	2,026,811	0.1	108,141	390	2,026,858	0.05	108,066	312	-0.1%	-78	-20%
Motorcycles	732.9	3.8	3.0	1,423,553	0.4	600,451	21,830	1,423,562	0.42	596,089	17,464	-0.7%	-4,366	-20%
Oilcake and other residues	081.3	13.6	10.9	145,495	0.1	8,706	1,043	155,703	0.06	9,093	893	4.5%	-150	-14%
Hat bodies	657.6	49.6	39.7	200	17.4	3,486	1,155	212	16.27	3,446	979	-1.2%	-177	-15%
Butter	023.0	23.8	19.0	5,554	1.4	7,654	1,470	5,654	1.33	7,494	1,197	-2.1%	-273	-19%
Central heating equipment	812.1	36.0	28.8	116	5.1	589	156	133	4.79	636	142	8.0%	-14	-9%
Other animal materials nec	291.9	10.0	8.0	1,286	10.8	13,940	1,268	1,320	10.64	14,039	1,040	0.7%	-227	-18%
Cigarettes	122.2	34.3	27.4	4,213	32.8	138,104	35,254	4,275	31.11	132,970	28,615	-3.7%	-6,638	-19%
Lighting equipment	812.4	23.9	19.2	409	18.3	7,500	1,449	446	17.63	7,853	1,263	4.7%	-186	-13%
Veneer sheets	632.4	4.5	3.6	2,000	3.7	7,324	314	2,024	3.63	7,349	254	0.3%	-60	-19%
Leather bovine nec equine	611.4	7.6	6.1	5,668	15.9	89,940	6,386	5,765	15.64	90,183	5,196	0.3%	-1,190	-19%
Edible vegetables nec	054.8	13.6	10.9	1,046	2.6	2,693	323	1,172	2.51	2,944	289	9.3%	-34	-10%
Meat or fishmeal fodder	081.4	31.1	24.9	21,644	0.3	6,034	1,433	24,081	0.27	6,394	1,276	6.0%	-157	-11%
Non-alcoholic beverages	111.0	50.0	40.0	560	2.7	1,535	512	713	2.56	1,824	521	18.9%	10	2%
Wood manufactures	633.0	8.3	6.7	150	2.4	363	28	151	2.38	359	22	-0.9%	-5	-20%
Total						1,108,424	118,627			1,102,593	99,865	-0.5%	-18,761	-16%

Table 4.5

Scenario 2: Effect on Import Value and Trade Taxes of Tariff Cut with reduction rate of 25% for industrial products and 10% for agricultural

Description	SITC	Current Tariff	Proposed Tariff	Volume	Initial Imports			Final Imports			Change in Value (%)	Change in Trade Taxes		
					Unit Price	Value (1000US\$)	Taxes (1000US\$)	Volume	Unit Price	Value (1000US\$)		Taxes (1000US\$)	Value (1000US\$)	
Lorries and trucks	732.3	68.8	48.8	98,103	1.1	111,964	45,617	113,385	1.01	114,065	37,383	1.9%	-8,234	-18%
Fertilizer, manufactured	561.1	0.4	7.5	2,026,811	0.1	108,141	390	2,022,201	0.06	115,569	8,063	6.9%	7,673	1970%
Motorcycles	732.9	3.8	15.0	1,423,553	0.4	600,451	21,830	1,423,411	0.47	665,348	86,785	10.8%	64,954	298%
Oilcake and other residues	081.3	13.6	13.5	145,495	0.1	8,706	1,043	145,913	0.06	8,722	1,037	0.2%	-6	-1%
Hat bodies	657.6	49.6	22.5	200	17.4	3,486	1,155	232	14.27	3,312	608	-5.0%	-547	-47%
Butter	023.0	23.8	18.0	5,554	1.4	7,654	1,470	5,676	1.31	7,458	1,138	-2.6%	-332	-23%
Central heating equipment	812.1	36.0	22.5	116	5.1	589	156	147	4.56	670	123	13.8%	-33	-21%
Other animal materials nec	291.9	10.0	9.0	1,286	10.8	13,940	1,268	1,303	10.74	13,991	1,155	0.4%	-112	-9%
Cigarettes	122.2	34.3	30.9	4,213	32.8	138,104	35,254	4,244	31.95	135,579	31,981	-1.8%	-3,273	-9%
Lighting equipment	812.4	23.9	13.5	409	18.3	7,500	1,449	489	16.79	8,204	976	9.4%	-473	-33%
Veneer sheets	632.4	4.5	7.5	2,000	3.7	7,324	314	1,919	3.77	7,230	504	-1.3%	190	60%
Leather bovine nec equine	611.4	7.6	6.8	5,668	15.9	89,940	6,386	5,719	15.75	90,073	5,767	0.1%	-620	-10%
Edible vegetables nec	054.8	13.6	9.0	1,046	2.6	2,693	323	1,259	2.47	3,109	257	15.5%	-66	-20%
Meat or fishmeal fodder	081.4	31.1	22.5	21,644	0.3	6,034	1,433	25,028	0.26	6,517	1,197	8.0%	-236	-16%
Non-alcoholic beverages	111.0	50.0	36.0	560	2.7	1,535	512	774	2.49	1,925	509	25.4%	-2	0%
Wood manufactures	633.0	8.3	5.3	150	2.4	363	28	152	2.35	356	18	-1.7%	-10	-36%
Total						1,108,424	118,627			1,182,129	177,500	6.6%	58,874	50%

Table 4.6

Scenario 3: Effect on Import Value and Trade Taxes of Tariff Reduction rate of 4 different tracks of 30%, 20%, 10% and 0%

Description	SITC	Current Tariff	Proposed Tariff	% Change	Volume	Initial Imports			Final Imports			Change in Value (%)	Change in Trade Taxes		
						Unit Price	Value (1000US\$)	Taxes (1000US\$)	Volume	Unit Price	Value (1000US\$)		Taxes (1000US\$)	Value (1000US\$)	%
Lorries and trucks	732.3	68.8	48.1	-30%	98,103	1.1	111,964	45,617	113,860	1.00	114,064	37,061	1.9%	-8,556	-19%
Fertilizer, manufactured	561.1	0.4	0.4	0%	2,026,811	0.1	108,141	390	2,026,811	0.05	108,141	390	0.0%	0	0%
Motorcycles	732.9	3.8	2.6	-30%	1,423,553	0.4	600,451	21,830	1,423,567	0.42	593,908	15,281	-1.1%	-6,549	-30%
Oilcake and residues	081.3	13.6	12.3	-10%	145,495	0.1	8,706	1,043	150,599	0.06	8,903	972	2.3%	-71	-7%
Hat bodies	657.6	49.6	39.7	-20%	200	17.4	3,486	1,155	212	16.27	3,446	979	-1.2%	-177	-15%
Butter	023.0	23.8	21.4	-10%	5,554	1.4	7,654	1,470	5,604	1.35	7,575	1,335	-1.0%	-135	-9%
Central heating equipment	812.1	36.0	32.4	-10%	116	5.1	589	156	125	4.92	614	150	4.2%	-6	-4%
Other animal materials	291.9	10.0	9.0	-10%	1,286	10.8	13,940	1,268	1,303	0.74	13,991	1,156	0.4%	-112	-9%
Cigarettes	122.2	34.3	24.0	-30%	4,213	32.8	138,104	35,254	4,306	30.27	130,326	25,219	-5.6%	-10,035	-28%
Lighting equipment	812.4	23.9	21.6	-10%	409	18.3	7,500	1,449	427	17.98	7,683	1,362	2.4%	-87	-6%
Veneer sheets	632.4	4.5	4.0	-10%	2,000	3.7	7,324	314	2,012	3.65	7,337	285	0.2%	-30	-9%
Leather bovine nec equine	611.4	7.6	7.6	0%	5,668	15.9	89,940	6,386	5,668	15.87	89,940	6,386	0.0%	0	0%
Edible vegetables nec	054.8	13.6	13.6	0%	1,046	2.6	2,693	323	1,046	2.57	2,693	323	0.0%	0	0%
Meat or fishmeal fodder	081.4	31.1	31.1	0%	21,644	0.3	6,034	1,433	21,644	0.28	6,034	1,433	0.0%	0	0%
Non-alcoholic beverages	111.0	50.0	40.0	-20%	560	2.7	1,535	512	713	2.56	1,824	521	18.9%	10	2%
Wood manufactures	633.0	8.3	7.5	-10%	150	2.4	363	28	150	2.40	361	25	-0.5%	-3	-10%
Total							1,108,424	118,627			1,096,841	92,876	-1.0%	-25,750	-22%

4.2 Measuring Production and Employment Shifts

Viet Nam follows a 'cascading' tariff structure, insofar as trade taxes on final goods tend to be generally higher than on intermediate and capital goods used in the production of those goods. That structure implies that the resource allocation of industries is influenced by the lower tariff rates applied to production inputs than those that are applied to the final goods. In this section we examine the current incentives provided to Viet Nam industries under the current tariff regime and the implications that tariff reforms would have on those industries.

Section 3.2 discussed the concept of the effective rate of protection (ERP), which measures the cascading effects by considering tariffs applied to imports of raw materials and intermediate goods that affect the price of the final good. It will be recalled that the ERP measures how tariffs on a product and its tradable inputs jointly affect the value-added of a particular activity. When only the nominal rate of protection is calculated, the tariff on imports suggests that domestic production will be encouraged to increase their output. However, whether they increase their output depends not only on the tariff on imports, but on the tariffs applied to inputs used in their manufacture. While domestic producers are given an implicit subsidy on their production when there are tariffs on imports, they also face a tax on their imported inputs, which can neutralize the effect of the implicit subsidy. The ERP therefore measures the net protection on the production process, rather than simply the gross protection on the industry's output.

The incidence of tariff reductions inputs and final products differs between import-substitution industries and export-oriented ones. The approach used to measure the incidence of the ERP in Viet Nam and its elimination therefore separates the calculation for export-oriented industries from those for import-competing ones. The distinction is critical to the output and employment effects arising from tariff reforms because tariffs protect the import-substituting industries but not the export-oriented ones.

Table 2.2 reported on the nominal and effective rates of protection for the selected import-substituting and export-oriented industries in Viet Nam. In order to calculate the effects of tariff reform, we first estimated the industry supply elasticities using a distributed lag model of the supply relationship in equation (3.4). Table 4.7 and Appendix Table 12 report the estimates,

Table 4.7
Regression Results of Viet Nam's Production Supply Equation

Description	ISIC	Class	Price		Capacity	
			Short-Term	Long-Term	Short-Term	Long-Term
Production, processing and preserving of meat products	1511	Export-Oriented	0.91	4.26		
Processing and preserving of fish and fish products	1512	Export-Oriented	0.05	0.10		
Processing and preserving of fruit and vegetables	1513	Import-Subs.	0.34	0.54	2.13	3.4223
Manufacture of vegetable and animal oils and fats	1514	Import-Subs.	0.56	0.56		
Manufacture of dairy products	1520	Import-Subs.	0.19	1.55		
Manufacture of non-alcoholic beverages	1554	Import-Subs.	0.12	0.25	4.38	8.7604
Manufacture of tobacco products	1600	Import-Subs.	0.05	3.37		
Manufacture of wearing apparel, except fur apparel	1810	Export-Oriented	0.11	0.37	3.16	10.161
Tanning and dressing of leather	1911	Import-Subs.	0.24	0.91		
Manufacture of veneer sheets; manufacture of plywood	2021	Import-Subs.	0.62	0.62	3.86	3.8603
Manufacture of builders' carpentry and joinery	2022	Export-Oriented	0.39	0.55		
Manufacture of fertilizers and nitrogen compounds	2412	Import-Subs.	0.34	0.34		
manufacture of glass and glass products	2610	Import-Subs.	0.07	0.07		
Manufacture of domestic appliances	2930	Import-Subs.	0.18	0.18		
Manufacture of motor vehicles	3410	Import-Subs.	0.02	0.02		
Manufacture of motorcycles	3591	Import-Subs.	0.14	0.14		

Source: Derived from estimated coefficients in Appendix Table 12.

some diagnostics, and the elasticities. Overall, the unweighted average price elasticity of supply is 0.3 in the short run, and 0.9 in the long run.

Shifts in the supply curves associated with input tariff changes were calculated as the change in input tariffs adjusted by the total non-factor costs of the inputs. Movements along the new supply curve resulting from output tariff changes and cost-change induced equilibrating changes were then calculated using the elasticity estimates. As indicated earlier, for import-substituting industries, both cost-induced supply-adjustments and price-induced changes in output were calculated, whereas only cost-induced supply adjustments were estimated for export-oriented industries not enjoying a protected market, and consequently pre-reform higher prices.

The impact of Viet Nam's tariffs on inputs and outputs of each industry is shown in Table 4.8 for individual industries and the total. For import-substituting industries, the elimination of those tariffs would lead to contractions for most industries, but cost reductions substantially mitigate those declines. For instance, for import-substituting industries the average nominal rate of protection (NRP) declines by 43.4 percent, but the benefits of cost-associated price declines averaging -38.3 nearly offset the price-declines.

Table 4.8
Viet Nam's Industrial Production Tariff-Related Shift Analysis

	ISIC	Class	Base Output Value	Percent Change				Change in Value
				Cost	Qty1	Price	Qty2	
Production, processing and preserving of meat products	1511	Export-Oriented	2,844,637	-4.5%	19.0%	0%	0.0%	-
Processing and preserving of fish and fish products	1512	Export-Oriented	28,344,926	21.0%	2.0%	0%	0.0%	57,373
Processing and preserving of fruit and vegetables	1513	Import-Subs.	2,309,711	-9.2%	5.0%	33%	18.0%	531,770
Manufacture of vegetable and animal oils and fats	1514	Import-Subs.	4,241,483	-4.5%	2.5%	7%	3.9%	274,854
Manufacture of dairy products	1520	Import-Subs.	6,947,678	15.8%	24.5%	33%	51.7%	5,294,191
Manufacture of non-alcoholic beverages	1554	Import-Subs.	3,468,187	13.2%	3.2%	19%	4.6%	272,127
Manufacture of tobacco products	1600	Import-Subs.	10,448,654	19.0%	64.1%	13%	45.3%	11,430,308
Manufacture of wearing apparel, except fur apparel	1810	Export-Oriented	18,328,046	24.8%	9.1%	0%	0.0%	1,674,240
Tanning and dressing of leather	1911	Import-Subs.	161,869	14.9%	13.5%	17%	15.7%	47,298
Manufacture of veneer sheets; manufacture of plywood	2021	Import-Subs.	941,384	-6.1%	3.8%	25%	15.6%	182,410
Manufacture of builders' carpentry and joinery	2022	Export-Oriented	914,139	13.3%	7.4%	0%	0.0%	67,503
Manufacture of fertilizers and nitrogen compounds	2412	Import-Subs.	4,135,020	-3.3%	1.1%	37%	12.7%	571,706
manufacture of glass and glass products	2610	Import-Subs.	2,030,325	11.0%	0.8%	4%	0.3%	22,213
Manufacture of domestic appliances	2930	Import-Subs.	1,836,949	15.0%	2.7%	26%	4.6%	132,685
Manufacture of motor vehicles	3410	Import-Subs.	11,582,420	32.2%	0.6%	26%	0.5%	126,419
Manufacture of motorcycles	3591	Import-Subs.	13,753,832	43.1%	5.8%	50%	6.8%	1,729,992
TOTAL			112,289,260					22,415,089
Percent Change in Total								20.0%

The results in Table 4.8 clearly point to the benefits to be derived from the elimination of tariffs for both export-oriented industries import-substituting industries. On average, production would increase by nearly 15 percent. In the export-oriented industries, output of the wearing apparel industries would increase the most (9%) and, given its importance, it would dominate the overall results for the selected export-oriented industries. Among the import-substituting industries, the tobacco products industry would be the largest beneficiary since the average tariff on its inputs (23.5%) is substantially larger than the protection that it receives on its output (15.5%). Other important beneficiaries are manufactures of dairy products, tanning and dressing of leather, and manufactures of veneer sheets and plywood.

The employment effects associated with the tariff-induced adjustments in Viet Nam's industries assumes fixed labor-output coefficients in production. Table 4.9 calculates possible changes in industry employment parameterized to 1999 levels that would ensue following a hypothetical elimination of tariffs. These employment changes are of course suggestive of the quantities involved. Using the output adjustment estimates from above, we calculated the percentage change in employment resulting from the tariff adjustments. We then calibrated the actual levels of employment by industry to calculate the estimated change in labor demand by sector. Overall, total employment of Viet Nam increases by more than 16.5 percent, with the largest gains occurring in the tobacco and dairy products industries. Trade liberalization in Viet Nam can be expected to increase the long-run demand for labor. Removing policies that favor capital-intensive import-substitution sectors at the expense of more competitive export sectors ultimately results in an expansion of the export sectors and a contraction of the import-substitution sectors.

Table 4.9
Viet Nam's Employment Effects of Industrial Production Shifts

	ISIC	Classification	Employment in 1999	Change in Employment Amount	Change in Employment Percent
Production, processing and preserving of meat s	1511	Export-Oriented	131,622	-	0.0%
Processing and preserving of fish and fish products	1512	Export-Oriented	125,779	255	0.2%
Processing and preserving of fruit and vegetables	1513	Import-Subs.	36,903	8,496	23.0%
Manufacture of vegetable and animal oils and fats	1514	Import-Subs.	127,316	8,250	6.5%
Manufacture of dairy products	1520	Import-Subs.	123,011	93,735	76.2%
Manufacture of non-alcoholic beverages	1554	Import-Subs.	85,800	6,732	7.8%
Manufacture of tobacco products	1600	Import-Subs.	10,971	12,002	109.4%
Manufacture of wearing apparel, except fur apparel	1810	Export-Oriented	318,666	29,110	9.1%
Tanning and dressing of leather	1911	Import-Subs.	250,197	73,107	29.2%
Manufacture of veneer sheets; manufacture of plywood	2021	Import-Subs.	48,919	9,479	19.4%
Manufacture of builders' carpentry and joinery	2022	Export-Oriented	39,677	2,930	7.4%
Manufacture of fertilizers and nitrogen compounds	2412	Import-Subs.	43,408	6,002	13.8%
manufacture of glass and glass products	2610	Import-Subs.	150,745	1,649	1.1%
Manufacture of domestic appliances	2930	Import-Subs.	15,358	1,109	7.2%
Manufacture of motor vehicles	3410	Import-Subs.	15,482	169	1.1%
Manufacture of motorcycles	3591	Import-Subs.	34,692	4,364	12.6%
TOTAL			1,558,547	257,389	16.5%

5. Subsidy-Related Empirical Analysis

5.1 Background on Subsidies

At the time that this report was prepared, the Government of Viet Nam had submitted two notifications on the country's existing subsidies. The first submission (WTO, 2003) described certain measures that may or may not constitute 'subsidies' under Article 1 of the WTO Agreement on Subsidies and Countervailing Measures, as well as those related to specific measures under Article 2 of the Agreement. The second submission (GOV, 2004) describes agricultural subsidies, specifically for rice, cotton, sugar and pork that make up the total Aggregate Measurement of Support (AMS), and those measures that are exempt from the reduction commitment under the so-called Green Box, those that are exempt under the Special and Differentiated Treatment accord, and those that are exempt under the Direct Payments under Production-Limiting Programs. The latter form of subsidies are those that under the Doha agreement have 'legitimate development goals' and they include support for regional growth, technology research and development, production diversification, and development and implementation of environmentally sound methods of production.

The non-actionable subsidies described above, as well as the prohibited ones that are contingent on export performance or on the use of domestic over imported goods, except as provided for in the Agreement on Agriculture, define Viet Nam's actionable subsidies category, which includes by default all subsidies that are neither prohibited nor non-actionable. For the agricultural sector, the WTO subsidy rules applicable to Viet Nam are different from those of the subsidies agreement. In the case of domestic support

Table 5.1
Viet Nam: Aggregate Measures of Support (AMS) for
Agricultural Products, 1999-2001
(VND billion and percent)

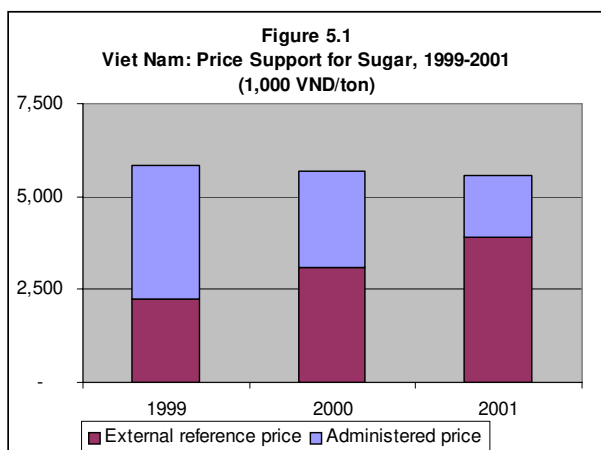
	1999	2000	2001
AMS (VND billion)			
Rice	27.2	61.9	0.0
Sugar	3,379.1	3,504.7	1,967.0
Cotton	2.0	9.6	13.4
Pork	3.2	0.0	0.0
Production (VND billion)			
Rice	76,869.4	63,691.6	63,088.1
Sugar	6,956.0	6,102.7	6,831.3
Cotton	122.1	103.4	150.1
Pork	16,641.2	17,472.1	16,969.5
Subsidy Rate (%)			
Rice	0.04%	0.10%	0.00%
Sugar	48.6%	57.4%	28.8%
Cotton	1.64%	9.26%	8.89%
Pork	0.02%	0.00%	0.00%

Source: Government of Viet Nam (GOV, 2004), "Notification on Domestic Support and Export Subsidies in Agriculture: Socialist Republic of Viet Nam (Format WT/ACC/4)

measures, the AMS total covers the whole sector and commitments are made from reductions from the country's specified benchmark level. Export subsidies are addressed in a similar way through annual reduction commitments, and there are included in the commitments budgetary outlay and export quantity reduction.

5.2 The Data

This section describes the construction of the subsidy data set used in the present analysis. It covers export-side and domestic support instruments. The export-side instruments are nominal export subsidy rates, while the domestic support data



include the rates of total domestic support on outputs and intermediate input subsidies, as well as the percentage shares of input subsidies relative to total domestic support for selected industries.

Two different methods are normally used to calculate the nominal rate of assistance on outputs (NRA). The first is based on the agricultural export subsidy rates submitted to the WTO for 2001. Table 5.1 shows the AMS amounts between 1999 and 2001 for rice, sugar, cotton and pork. Sugar had the highest subsidy rate, equivalent to 45 percent

for the period, followed by cotton, with an average rate of 6.6 percent. Subsidies on the other two products, rice and pork, were insignificant. It is also worth noting that in mid-2003 the United States imposed antidumping duties on its imports of frozen catfish fillets from Vietnam. The dumping margins were set at 44.7 percent for the companies that voluntarily responded to the investigation questionnaire, and a Vietnam-wide rate of 63.88 percent. Finally there are interest rate supports to rice and coffee exporting enterprises that amount to 1.2 percent for rice and 1.46 percent for coffee, and there are specific supports for exports of pork to Russia and Hong Kong, equivalent to 6 percent of the export price, and exports of canned pineapples and canned cucumbers to Russia and the United States, equivalent to between 2.6 and 3.3 percent of the export price of the products. The Government has suggested that it will cease export subsidies to coffee when it joins the WTO, and to rice, pork and vegetables three years after joining the WTO.

The second method for calculating the NRA is often used for agricultural export subsidies using the price gap methodology for the producer subsidy equivalent market support price values. In Viet Nam, sugar receives a substantial price support (Figure 5.1). The average subsidy, measured by the price wedge, averaged 94 percent between 1999 and 2001. That subsidy has, nevertheless, been narrowing over the years. There are also measurement errors associated with these price support measures under the WTO guidelines, as noted by de Gorter and Ingco (2002). With the AMS anchored to fixed world and domestic administered prices in the face of the volatility of many agricultural product markets, domestic support can decline or increase as domestic and world prices vary or if official prices change. The result is that the AMS can decline (increase) for changes in these prices without changing policy, thereby rewarding (penalizing) Viet Nam and other countries under the existing notification requirements.

For agricultural products, Nguyen and Grote (2004) have recently calculated the market price support (MPS) and producer support estimates (PSEs) for nine commodities (rice, coffee, tea, rubber, pepper, sugar, groundnut, cashew nut and pig meat). The findings point to the declining role of subsidies in Viet Nam as the country shifts from import-substitution to export-oriented activities. Using the OECD (1986) methodology in calculating PSEs for major agricultural products of Viet Nam, they found rice, tea and sugar to be protected, whereas of pig meat, groundnut, coffee and cashew nut have disincentives; there is a neutral policy effect on rubber and pepper, with their reference prices about the same as their corresponding farm prices.

Export-oriented products like rice and tea have been promoted through these support policies, as has been import-substituting production of sugar and sugarcane.

For the inputs subsidies, the input-output (I-O) table of 2000 for Viet Nam was used to calculate the input coefficients and the value added of the industry. Some of the estimates of the nominal rate of assistance on materials (NRM) for intermediate inputs are reported under non-product specific AMS. These cover electricity use for irrigation in the form of a price subsidy, as well as support for irrigation. The electricity price support provides for an average charge of 572.7 dong/kwh for electricity used in water pumping, irrigation in comparison with the average of 700 dong/kwh for other sectors (equivalent to an 18.5 percent subsidy). In agriculture, Nguyen and Grote (2004) suggest that there are significant subsidies in several inputs, including fertilizer. Their study found domestic prices of fertilizer to be higher than international prices in Viet Nam, and the gap between domestic and border prices to be greater than transportation costs and marketing margin of the trading companies. Their study does not, however, use the input subsidies for electricity and fertilizer to calculate PSEs because of the inability to allocate their use among individual products, other than rice where they were able to determine budgetary payments for agricultural production in Viet Nam covering irrigation fees, seed subsidies, preferential credits, and fertilizer and electricity subsidies.

5.3 Effective Rates of Assistance Concept

The concept of the Effective Rate of Assistance (ERA) is analogous to that of the Effective Rate of Protection (ERP) discussed earlier, insofar as it measures the percentage increase in returns to an industry's value added per unit of output with government assistance relative to the unassisted border price of that same product.

Following the notation for ERPs in Chapter 3, we can specify the ERA as follows:

$$ERA = (V^*_j - V_j) / V_j \quad (5.1)$$

where

- ERA = effective rate of assistance
- V^*_j = Value added per unit of j in activity j at subsidy supported price
- V_j = Value added per unit of j in activity j at subsidy-free price

Alternatively, we can specify the ERA in terms of subsidies on the applied inputs and output of the industry as follows:

$$ERA = (1 - \sum_i a_i) / [1 / (1+s)] - \sum_i [a_i / (1+s_i)] - 1 \quad (5.2)$$

where

- s = nominal rate of assistance on outputs (NRA).
- s_i = nominal rate of assistance on materials (NRM) for intermediate inputs.
- a_i = value of input i per unit of output.

Like the ERP, a positive ERA indicates that the returns earned from production are greater than those earned without intervention. Likewise, a negative ERA indicates that the reverse is true. In the case where the ERA is zero, the effect is the same as without intervention.

Unlike the ERP, however, the incidence of subsidies on inputs and final products are similar between import-substitution industries and export-oriented ones. A subsidy on output is equivalent to a tariff on imports of that product, while the subsidy on inputs reduces the cost of production. Subsidies granted to final goods therefore increases returns to value-adding factors in those industries, and subsidies on intermediate inputs increase the returns to value adding factors. Likewise, for export-oriented industries there are similar benefits to be derived from subsidies on their output. The industries receive a premium over the world prices in their sales, while receiving a subsidy on their inputs. The effect of the Viet Nam subsidy regime on these industries is always positive because of the cost-reducing effects of higher returns for outputs and lower costs for intermediate goods.

5.4 Measuring Effective Rates of Assistance

Tables 5.2 and 5.3 provide illustrations of the two approaches to measuring the ERP. In the first instance, the ERP for sugar has been calculated on the basis of the price wedge between the administered price in 2001 and the external reference price in the corresponding year. With a NRA of 43 percent, and relatively NRM on inputs, the ERA would be expected to be somewhat higher than the NRA. For the NRM, the estimates assume that 15 percent subsidies on fertilizers and electricity, as well as irrigation services, where AMS are known to exist but the magnitude of subsidy rate equivalent of product-specific assistance is unknown. For all other inputs, the subsidy rate is zero. The contribution of tradable and non-tradable inputs to a unit of output of sugar is known to be 72.3 percent from Viet Nam's 2000 I-O tables. Of that, 43 percent corresponds to tradables and the remaining 29.3 percent corresponds to non-tradables. Given the

Table 5.2
Calculation of Effective Rate of Assistance (ERA) for Sugar (ISIC rev3 code 1542)

	Subsidy Rate	Output Share	Domestic Price Index	Border Price Index	Output Share X Dom. Price	Output Share X Border Price
A. Value of Output						
Sugar 1/	42.9%	100.0%	143	100	142.95	100.00
B. Value of Inputs (C+D)		72.3%			71.80	72.33
C. Tradable Inputs		43.0%			42.86	43.00
Pesticides	15%	0.9%	87	100	0.81	0.93
Electricity, gas	15%	0.2%	87	100	0.14	0.16
Other tradables	0%	41.9%	100	100	41.91	41.91
D. Non-tradable Inputs		29.3%			28.95	29.33
Irrigation service	15%	2.9%	87	100	2.54	2.92
Other non-tradables	0%	26.4%	100	100	26.41	26.41
E. Effective Rate of Assistance					44.0%	

1/ Based on 2001 difference between domestic price support and international price (reference price) reported in Government of Viet Nam, Notification of Domestic Support and Export Subsidies in Agriculture: Socialist Republic of Viet Nam (Format WT/ACC/4), 2004.

Table 5.3
Calculation of Effective Rate of Assistance (ERA) for Cotton (ISIC rev3 code 0111)

	Subsidy Rate	Output Share	Domestic Price Index	Border Price Index	Output Share X Dom. Price	Output Share X Border Price
A. Value of Output						
Cotton 1/	8.9%	100.0%	108.9	100	108.89	100.00
B. Value of Inputs (C+D)		65.0%			67.63	68.87
C. Tradable Inputs		39.9%			42.39	43.06
Fertilizer	15%	2.2%	87	100	1.95	2.24
Pesticides	15%	1.9%	88	101	1.69	1.94
Gasoline, lubricants	15%	0.5%	89	102	0.42	0.48
Electricity, gas	15%	0.5%	87	100	0.40	0.46
Other tradables	0%	34.8%	109	109	37.94	37.94
D. Non-tradable Inputs		25.1%			25.24	25.81
Irrigation service	15%	4.3%	89	102	3.81	4.38
Other non-tradables	0%	20.8%	103	103	21.43	21.43
Effective Rate of Assistance					10.9%	

1/ Based on 2001 ratio of aggregate measurement of support (AMS) to value of production reported in Government of Viet Nam, Notification of Domestic Support and Export Subsidies in Agriculture: Socialist Republic of Viet Nam (Format WT/ACC/4).

small NRM on inputs, the results are not sensitive to these assumptions about the NRMs of inputs. The resulting estimate for sugar's ERA is 44.5 percent, compared with its observed NRA of 42.9 percent. Comparable PSE estimates for sugar were not calculated by Nguyen and Grote (2004), so the present ERA estimates cannot be contrasted with their PSE estimates.

The second approach to estimating ERAs is illustrated for cotton in Table 5.3. In this case the AMS is calculated from the VND value of the Government's support to lower the selling price of imported cross-line cotton seeds and to cover domestic producer losses. That budgetary outlay in 2001 was contrasted with the total value of cotton output in the corresponding year to derive the 8.9 percent NRA. For the NRM estimates, we have followed the same methodology as that for the sugar ERA estimates. Viet Nam's I-O tables show the contribution of tradables and non-tradables to be 65 percent, of which tradables represents nearly 40 percent and non-tradables the remaining 25 percent. With know subsidies on fertilizers, power and irrigation services, we assumed the NRM on these inputs to be 15 percent. As with sugar, the relatively small contribution of these inputs does not significantly affect the ERA estimates and the results are therefore not sensitive to the assumptions about the NRM of inputs. The resulting estimate for cotton's ERA is 10.9 percent, compared with its observed NRA of 8.9 percent.

Information contained in the notification on industrial products provides limitation information with which to calculate the AMS and derive the ERAs for selected industries. We therefore limit the remained of this section to estimates for two industries for which there are some indications of subsidy levels that can be used in the construction of illustrative ERAs for Viet Nam. The first industry is that of two-wheel motorbikes, for which preferential import tariff rates are provided based on localization ratios with respect to products and selected inputs to encourage domestic production and parts assembly. All enterprises established under Vietnamese laws, including

Table 5.4
Calculation of Effective Rate of Assistance (ERA) for Manufacture of Motorcycles (ISIC 3591)

	Subsidy Rate (%)	Output Share	Domestic Price Index	Border Price Index	Output Share X Dom. Price	Output Share X Border Price
A. Value of Output						
Motorcycles	31%	100.0%	131	100	130.70	100.00
B. Value of Inputs (C+D)		70.4%			68.18	70.39
C. Traded Inputs		52.8%			50.58	52.79
Engine parts	21%	7.6%	83	100	6.31	7.60
Other parts	21%	5.4%	83	100	4.48	5.40
Others	0%	39.8%	100	100	39.79	39.79
D. Non-traded Inputs	0%	17.6%	100	100	17.60	17.60
Effective Rate of Assistance					35%	

foreign-invested enterprises, are eligible for support in the production parts assembly of two-wheel motorbikes. These enterprises enjoy preferential import tariff rates according to localization ratios based on a sliding scale on the degree of localization. For purposes of our NRA estimates, the average of these rates has been used. This program terminated at the beginning of 2003 but serves to illustrate the application of ERAs to industries in Viet Nam. Table 5.4 shows the results of these calculations using the 2000 I-O tables and applying the average NRAs of 31 percent and average NRM of 21 percent for the MFN import tariff rates on both the output of the industry and its parts components.

The second industry, that of textiles and clothing, provides an interesting case study insofar as subsidies are only provided to selected inputs. The existing program supports the implementation of the Development Strategy of Viet Nam's textile and clothing sectors to the year 2010 by attempting to improve the competitiveness of textile and clothing products. Assistance from the state budget is granted to projects developing materials areas, investing in waste water treatment works, textile and weaving clusters, building infrastructures for new industry clusters, and training and research projects of clothing and textile institutes, colleges and research centers. Entities investing in production of fibers, weaving, complete dyeing, materials for weaving, accessories for sewing and sewing machinery are allowed to borrow development investment

Table 5.5
Calculation of Effective Rate of Assistance (ERA) for Manufacture of Textiles and Clothing (ISIC 1810)

	Subsidy Rate (%)	Output Share	Domestic Price Index	Border Price Index	Output Share X Dom. Price	Output Share X Border Price
A. Value of Output						
Wearing Apparel	0%	100.0%	100	100	100.00	100.00
B. Value of Inputs		63.8%			50.57	63.75
Spare parts	26.5%	45.8%	79	100	36.21	45.80
Non-ferrous metal products	26.5%	8.1%	79	100	6.43	8.13
Ferrous metal products	26.5%	6.2%	79	100	4.92	6.23
Other physical goods	26.5%	0.7%	79	100	0.59	0.75
Electricity, gas	26.5%	0.7%	79	100	0.57	0.72
Processed rubber	26.5%	0.3%	79	100	0.28	0.35
Others	13.2%	1.8%	88	100	1.57	1.78
Effective Rate of Assistance					26.1%	

loan from the Development Assistance Fund, 50 percent of which is subject to a preferential rate of 3 percent a year for the period of 12 years with 3 years of grace period; the remaining 50 percent is subject to the interest rate of 5.4 percent a year. The total value of the loan agreements is VND 395 million, based on a total value of medium and long term loans for 56 projects of VND 1,378.6 billions. For purposes of illustration, we have used this ratio (26.5 percent) as the NRM of eligible inputs for the industry. The resulting ERA for the industry is shown in Table 5.5 to be 26.1 percent, which approximates the NRM when the NRA is zero.

It is important to emphasize that the present calculations for the selected industries are illustrative only. They have attempted to reflect the existing situation in Viet Nam only insofar as the limited data permit; they should therefore not be taken as the actual levels of effective assistance for those industries. Instead, they serve to illustrate the different methods that can be used for the calculations of the ERA and the results that arise under different structures of assistance to the outputs of industries and their corresponding inputs.

6. Conclusions

The results of the analysis presented in this report offer a number of lessons for Viet Nam. First, the calculations of effective protection rates and their implications for output and employment clearly point to the benefits to be derived from the reduction or elimination of tariffs for both export-oriented industries import-substituting industries. For import-substituting industries, tariff cuts would lead to contractions for most industries, but cost reductions would substantially mitigate those declines. For instance, for the selected import-substituting industries the average nominal rate of protection (NRP) declines by 43.4 percent, but the benefits of cost-associated price declines averaging -38.3 nearly offset the price-declines.

Secondly, the employment effects associated with the tariff-induced adjustments in Viet Nam's industries assumes fixed labor-output coefficients in production. Using the output adjustment estimates, we calculated the percentage change in employment resulting from the tariff adjustments. We then calibrated the actual levels of employment by industry to calculate the estimated change in labor demand by sector. The employment changes are of course suggestive of the quantities involved. It is noteworthy, nevertheless, that there are tax revenue declines for some products, despite significant increases in output and employment for a number of products.

Third, the results for the effective rates of assistance are more tenuous than those for the effective protection levels, given the lack of comprehensive information on the equivalent subsidy rates of that assistance. Nevertheless, the information suggests that while Viet Nam's support mechanisms have been declining as trade policies shift from import-substitution to the promotion of exports, there remains considerable scope for rationalizing assistance programs, and for that to happen, further quantification of assistance programs will be needed. Moreover, since substantial subsidies exist at both the industry output levels and for the inputs used by those industries, the appropriate methodology for evaluating that assistance is that of the effective rate of assistance or others that take into account assistance to both industry inputs and their products.

Finally, it is important to emphasize that the partial equilibrium approach used in the present analysis excludes consideration of feedback effects between the external and domestic sectors, and therefore fails to take into account the sectoral adjustments and indirect macroeconomic impact that would accompany trade liberalization. Moreover, one of the major issues raised by partial equilibrium analysis of trade liberalization is the small size of the estimated effects, a phenomenon that has been attributed to the very nature of the partial equilibrium calculations. These limitations suggest the need for a broader approach provided by a macroeconomic model. While integrating the same level of detail, estimates of the effects of trade liberalization in a macroeconomic framework incorporate dynamics and allow for calculations of feedback effects between import and export adjustments and the macro-economy. As a consequence, the sizes of the estimates are likely to more accurately reflect adjustments to trade liberalization associated with broad-based reforms. Data requirements for the macroeconomic model, though not considerable, would require careful data selection to ensure integrity of the underlying relationships. Together with the industry-level assessment, macroeconomic analysis of the tariff reforms would offer a more complete appreciation approximation of its potential impact on the Viet Nam economy.

Annex A: Outline Terms of Reference for Consulting Services

1. The International Trade/Tariff Analysis Expert/Team Leader (1 person-month) should have profound knowledge and working experience in examining trade and tariff policy issues, including models/ methods in calculating tariff protection level, etc, as well as in formulating tariff offers for multilateral, regional and bilateral trade negotiations, in particular experiences in assisting newly acceding countries to the WTO. Under the framework of Outline Terms of Reference, the consultant should also be able to respond to in a flexible manner the request from MOF in providing advice on tariff and revenue related issues should the needs arise during the course of the TA project and the progress/status of the ongoing Viet Nam's accession negotiation for the WTO. Specifically, the expert will work closely with the WTO Division of the MOF to:

- Develop/introduce methodology to examine the revenue implications of tariff reductions/rationalization on the Government revenue, availing scenario analysis.
- Work with domestic consultant to provide on-job-training to MOF staff to understand and operate the tariff analysis model/tools, including the practical approach to calculate effective rate of protection, among others.
- Examine the methodology/approach used by other countries in formulating their commitments, obligations during the WTO accession negotiations and discuss their relevance/application in the Viet Nameese context.
- Assist MOF in strengthening their capacity to prepare tariff offer and skills for monitoring tariff reforms.
- Assist MOF staff to understand the various tariff reduction formulas proposed by the WTO members during the Doha Round negotiations and explain how they can be applied to the Viet Nameese case and what their implications will be.
- Propose negotiation strategy based on results and experiences of selected recent WTO acceding members.
- Work with domestic consultant to provide inputs and recommendations on how to improve the administrative procedures for collecting tariff revenue at the same time of introducing further tariff reduction/rationalization.
- Prepare and coordinate the submission of an inception report in the first month of commencement, sector reports, which cover the specific topics under their purview for examination, and a draft final report one month before the end of the assignment and a final report at the end of the assignment.

2. The International WTO/Industrial Issues Expert (1.5 person-month) should have profound knowledge and expertise on the WTO Agreement, in particular the Subsidy and Countervailing Measures Agreement (SCMs). Under the framework of Outline Terms of Reference, the consultant should be able to respond to the request from MOF in a flexible manner in providing advice on industry and subsidy-related issues should the needs arise during the course of TA project and progress/status of the ongoing negotiations. Specifically, the expert will work closely with the WTO Division of the MOF to:

- Conduct an overall assessment of the Government assistance program and policies in various sectors, and especially in industrial sector in Viet Nam, including examining the nature, modalities and implications of the incentive regime, in particular financial support measures aimed to enhance industrial competitiveness, export promotion in the context of trade liberalization and other market-oriented reforms.
- Assess the consistency/issues of the Government assistance program with the international trade agreement such as the WTO Agreement SCMs and TRIMs, and other international requirements, and remaining compliance requirements. Make recommendations on how to make the best use of subsidies while meeting WTO requirements.
- Availing existing literature and fieldwork, identify the current industrialization pattern of Viet Nam, identify its weakness and propose measures/policy reforms to enhance industrial sector development. This could include among others recommendations on how to strengthen the regional linkage of Viet Nam's industrial sector.
- Provide training to MOF staff on understanding the WTO Agreement the SCMs, TRIMs, etc, experiences of other newly acceding countries or countries which have similar level of economic development; anticipated results of the negotiation in this field in the context of Doha development round; its implications for Viet Nam, and options to prepare proposals to be used for the WTO accession negotiations.
- Liaison with the team leader, examine the implications of revenue implications due to accession to the WTO and its effect on provision of financial support by the Government to the industries.
- Identify and assess alternative approaches and options open to Viet Nam in regard to protection of sensitive industries in line with the WTO Agreement through a review of related documents on WTO accession negotiations.
- Coordinate with the team leader and domestic consultants for preparation and submission of various reports.

3. The Domestic Consultant in trade and tariff policy (5 person-months) should have strong academic background in the fields of international economics, econometrics and statistics; and experience in doing research and utilizing analytical tools; profound working experience in examining Viet Nameese trade and tariff policy, including models and methods in assessment of

economic integration impacts and calculation of trade and tariff indicators such as trade intensity index of exports and imports, revealed comparative advantage index (RCA), and effective rate of protection, as well as preparing tariff offers for multilateral, regional and bilateral trade negotiation; good inter-personal and team building skills; good relationship and experience in working with Government agencies; and good command of English. The domestic consultant will work with the international consultant to conduct tariff analysis, make recommendations on improving the tariff schedule to support the accession negotiation and providing training to MOF staff, specifically on:

- Collect data and develop a comprehensive integrated database for examination of the revenue implications of tariff reduction in the context of economic integration.
- Cooperate with international consultant to provide training to MOF staff to understand and operate the tariff analysis model/tool, including the practical approach to calculate effective rate of protection.
- Assist MOF in strengthening capacity to prepare tariff offer, and provide recommendations on improving tariff collection administration at the same time of introducing further tariff reduction.
- Support the International Consultants to prepare the various reports.

4. The Domestic consultant in subsidy-related issues (5 person-months) should have strong academic background in the fields of national economics; knowledge on the international trade issues; profound working experience in examining Viet Nameese subsidy policy; good inter-personal and team building skills; good relationship and experience in working with Government agencies; and good command of English. The domestic consultant will work with the international consultant to conduct a comprehensive analysis on the existing subsidy policies in relation to the requirements of joining WTO, and providing recommendations for reform. Specifically, the domestic consultant will:

- Conduct an overall assessment of the current subsidy policies and programs in industry and agriculture sectors.
- Examine the objectives, rationales, modalities, and implications of the existing subsidy policies in the context of economic integration and market-oriented reforms.
- Work with the International consultant to assess the consistency of the subsidy policies with international trade agreement, especially the WTO Agreement on SCMs and proposing solutions to make the best use of subsidy policies while in compliance with WTO rules.
- Provide training to MOF staff to better understand the nature and implications of the current subsidy policies and propose reform measures.
- Support the International Consultants to prepare the various reports.

Annex B: Technical Background

Derivation of the Trade-Related Effects of Trade Liberalization

The direct effects of trade liberalization can be separated into five components, described and specified as follows:

Trade Creation Effect -The trade creation effect refers to the change in the level of domestic demand for imported inputs and final goods from trading partners resulting from tariff-associated foreign price reductions relative to domestically-produced goods. The import price of a product is equal to the trading partner's export price plus transportation and insurance charges plus the ad valorem tariff applied to the good. The import price including the tariff (i.e., the domestic price), P_d , of a product can therefore be expressed as follows:

$$P_d = P_f (1+t) \quad \dots (B.1)$$

where P_f is the border import price of the product originating from non-preferential supplying country, which implicitly includes freight and insurance, and t is the ad valorem tariff rate applied to the product.

Since for small markets like Viet Nam the foreign market export supply to that market is likely to be perfectly price elastic, in the short run the percentage change in demand for the quantity of imports M of product i by country j associated with a change in tariff is equal to:⁹

$$\Delta M_{ij}/M_{ij} = \varepsilon_s^p [\Delta t_i/(1+t_i)] \quad \dots (B.2)$$

where ε_s^p is the price elasticity of import demand in the short run.

Similarly, in the long run the percentage change in imports of the product corresponding to a change in the associated ad valorem tariff is equal to:

$$\Delta M_{ij}/M_{ij} = \varepsilon^p [\Delta t_i/(1+t_i)] \quad \dots (B.3)$$

where ε^p is the price elasticity of import demand in the long run.

The trade creation effect is obtained when equation (B.3) is multiplied on both sides of the equation by M .¹⁰

⁹The 'small market' assumption is important for the calculations that follow. In calculating each of the different effects of tariff reductions, the assumption means that the Viet Nam market represents a fairly small proportion of its trading partners' total exports and, hence, that the import supply schedule is infinite with respect to prices. Prices of each of Viet Nam's imported products are therefore changed by the full amount of any tariff reduction on the products. Were the import supply schedule to be less than perfectly elastic with respect to prices, a change in tariffs would lead to less than proportional changes in prices and smaller increases in the volume of imports than would otherwise occur under a perfectly price elastic import supply schedule.

$$\Delta M_{ij} = \varepsilon^p [\Delta t_i / (1+t_i)] M_{ij} \quad \dots(B.4)$$

The magnitude of trade creation is therefore shown to depend on (a) the price elasticity of demand for imports, (b) the percentage change in the reduction of the MFN rate, and (c) the level of imports of individual products.

Trade Diversion Effect- The trade diversion effect is the substitution of imports from one set of suppliers for imports from other sources. For Viet Nam, that substitution refers to the substitution between supplies originating from preferential markets and those originating from foreign suppliers subject to MFN rates. In practice, MFN tariff reductions give rise to trade diversion effects in countries participating in preferential trade arrangements. The reason is that MFN tariff reductions lower the import prices of goods originating from countries that are not part of the preferential arrangement relative to those that enjoy preferential treatment. As prices fall for imports of the non-preferential sources, there is a tendency for the quantity demanded of those imports to expand relative to those of countries enjoying preferential treatment.

The amount of the erosion of preferential trade resulting from MFN tariff reductions depends on the extent to which importers respond to relative price changes. The amount by which trade in a particular good will shift from the preferential suppliers to non-preferential suppliers will depend on the cross-price elasticity between the price of goods originating from non-preferential area and the imports from preferential sources. The cross-price elasticity assumes product differentiation and requires the calculation of separate import and export demand functions for individual markets (for an application, see Lord, 1991). Rousslang and Parker (1984) offer a simplified approach based on own-price elasticity estimates of the type estimated in the present study.¹¹ The own-price elasticity approximates the cross-price elasticity as follows:¹²

$$\varepsilon^s_{jk} = -\varepsilon^p (V_{ij} / V_i) \quad \dots(B.5)$$

where the parameters and variables are defined as follows:

- ε^s_{jk} is the cross-price elasticity between the preferential-rate supplier k and the non-preferential rate suppliers j;
- ε^p is the own price elasticity of demand;
- V_{ij} is the value of imports from the non-preferential suppliers; and
- V_i is the total value of imports of the product i into Viet Nam.

Then the trade diversion effect is the given by:

$$\Delta M_{ik} = -\varepsilon^p (V_{ij} / V_i) [\Delta t_i / (1+t_i)] M_{ik} \quad \dots(B.6)$$

¹⁰Similar calculations have been used by the UNCTAD Trade Policy Simulation Model (Laird and Yeats, 1986) and Shiells *et al.* (1996).

¹¹The approach was first devised by Baldwin and Murray (1977) and used in the UNCTAD Trade Policy Simulation Model (TPSM), as described by Laird and Yeats (1986). Laird and Yeats (1990) also provide alternative methods for calculating the effects of the erosion in preferential trade arrangements.

¹²In the Baldwin-Murray (1977) approach the level of imports from non-preference receiving countries is compared with the apparent value of domestic consumption, defined as domestic output of the product *plus* imports *less* exports. Since data on domestic consumption are not available for Viet Nam, imports were used as a proxy.

where ΔM_{ik} is the change in the volume of imports from preferred sources due to the preference erosion. The value of the effect is equal to:

$$\Delta V_{jk} = -\varepsilon^p (V_{ij}/V_i) [\Delta t_i/(1+t_i)] V_{ik} \quad \dots(B.7)$$

The preference erosion for a trading partner k is shown to depend on (a) the price elasticity of demand for imports from that source, (b) the share of imports from other (non-preferential) sources, and (c) the percentage change in tariff reductions from non-preferential sources. These calculations refer to imports of individual products. Following Shiells, Subramanian and Uimonen (1996), we approximate the price elasticity of demand for imports from preferential-rate suppliers by estimates of the price elasticity of import demand from all supply sources, denoted ε^p .

Balance of Payments Effect - The balance of payments effect is the sum of the value of changes in individual product imports. It can be calculated from the sum of the trade creation and trade diversion effects:

$$\Delta V = [1 - (V_{ik}/V_i)] \varepsilon^p [\Delta t_i/(1+t_i)] V_i \quad \dots(B.8)$$

The reduction of tariffs will likely stimulate an increase in the volume of imports. As long as the absolute value of the price elasticity of import demand is greater than unity, a lowering of import prices resulting from a tariff cut should theoretically lead to a more-than-proportional rise in the volume of imports. Consequently, for those products having a price-elastic import demand schedule, tariff reductions should lead to a net increase in the value of imports over the level that existed before the tariff cuts.

Government Revenue Effect - The government revenue effect is defined as the change in customs fees resulting from tariff cuts, and it includes both the lower revenue per unit of imports and the higher import volumes resulting from the trade creation effect. The customs revenue effect is calculated from the trade creation effect:

$$\Delta T/T = \Delta t/t + \Delta M/M \quad \dots (B.9)$$

where T denotes the customs revenue. Hence, the change in the government revenue is equal to:

$$\Delta G = (\Delta t/t + \Delta M/M) T \quad \dots(B.10)$$

Consumer Cost Effect- The consumer cost effect refers to the gains that consumers obtain from lower prices on imported goods when tariffs are lowered. For the pre-tariff-cut level of imports Cline et al. (1978) have noted that the import prices resulting from tariff reductions simply represent a transfer to consumers of revenue formerly collected by the government in the form of customs duties and indirect taxes. There is, however, a welfare gain from the trade creation effect. This effect is normally calculated as the average increase in the quantity of imports, ΔM , valued at the average between the tariff incidence before and after liberalization. Following Laird and Yeats (1986), we estimate that welfare gain, ΔW , as follows:

$$\Delta W = \Delta t \Delta M/2 \quad \dots (B.11)$$

Estimation Procedure

Measuring the impact of Viet Nam's trade liberalization on its trade balance requires that we estimate product-specific relationships for import demand. The estimates of these relationships follow a sequence of steps to (a) identify the characteristics of each series, (b) specify the parsimonious model used to characterize the data-generating process, and (c) estimate the model.¹³ This section describes the steps needed to identify the characteristics of each series and, where appropriate, to model their relationship to one another.

Step 1: Unit Root Tests

An economic relationship generally refers to a state where there is no inherent tendency to change. Such a relationship is, for example, described by the relationship of the log linear form $x_i = \beta y_j$, where trade-related changes in country i are related to changes in the economic activity of a foreign market j . In practice, however, an equilibrium relationship is seldom observed, so that measures of the observed relationship between x_i and y_j include both the equilibrium state and the discrepancy between the outcome and the postulated equilibrium. The discrepancy, denoted d , cannot have a tendency to grow systematically over time, nor is there any systematic tendency for the discrepancy to diminish in a real economic system since short-term disturbances are a continuous occurrence. The discrepancy is therefore said to be stationary insofar as over a finite period of time it has a mean of zero.

Individual time series that are themselves stationary are statistically related to each other, regardless of whether there exists a true equilibrium relationship. Thus, before estimating the export demand for Viet Nam, it is useful to determine whether the data generating process of each of the series is itself stationary. Since economic activity variables have a tendency to grow (positively or negatively) over time, the variables themselves cannot be stationary, but changes in those series might be stationary. Series that are integrated of the same order, however, are said to be cointegrated and to have a long-run equilibrium relationship.¹⁴ For trending variables that are themselves non-stationary, but can be made stationary by being differenced exactly k times, then the linear combination of any two of those series will itself be stationary. It is therefore important to test the order of integration of the key series in the model.

Tests for stationarity are derived from the regression of the changes in a variable against the lagged level of that variable. Consider the following simple levels regression:

$$y_t = a + by_{t-1} + d \quad \dots(B.12)$$

where a and b are constants and d is an error term. Then y is a stationary series if $-1 < b < 1$. If $b = 1$, y is a non-stationary series and is instead a random walk with drift; if the absolute value of b is greater than one, the series is explosive.

By subtracting y_{t-1} from both sides, we obtain

¹³ For a detailed exposition of the modeling process for international trade, see Lord (1991).

¹⁴ A series is said to be integrated of order k , denoted $I(k)$, if the series needs to be difference k times to form a stationary series. Thus, for example, a trending series that is $I(1)$ needs to be differenced one time to achieve stationarity.

$$\Delta y_t = a + (b-1)y_{t-1} + d \quad \dots(B.13)$$

The disturbance term d now has a constant distribution and the t -statistic on y_{t-1} provides a means for testing non-stationarity. If the coefficient on y_{t-1} is zero, then b must be equal to 1, and y is therefore stationary. The Augmented Dickey-Fuller test is a test on the t -statistic of the coefficient on y_{t-1} . The hypothesis $H_0 = b-1 = 0$ is called the unit-root hypothesis and it implies that y_t is non-stationary.

The second test for non-stationarity is the Durbin-Watson (DW) test on the levels regression specified above. Since the DW statistically is given by

$$DW = 2(1-r) \quad \dots(B.14)$$

where r is the correlation coefficient between y_t and y_{t-1} , then y is white noise when r is zero. The DW is therefore 2 when y is stationary.

Step 2: Modeling Demand Relationships

Economic series that are related to the long-run adjustment processes of other variables have been designated to be cointegrated series by Granger and Weiss (1983) and Engle and Granger (1987). The theory of cointegration states that if two series, x and y , grow over time in such a way that the linear combination of these two variables, given by $d_t = x_t - \alpha y_t$, is stationary, and if α is unique, then x and y are said to be cointegrated. The series d_t measures the disequilibrium at period t when the long-run relationship between the two variables is $x_t = \alpha y_t$. The theory of cointegration states that movements in variables are related in a predictable way to the discrepancy between observed and equilibrium states. The sequence of this discrepancy tends to decay to its mean of zero.

Engle and Granger (1987) have demonstrated that a data-generating process of the form known as the “error-correction mechanism” (ECM) adjusts for any disequilibrium between variables that are cointegrated, which has been used for instance by Sanso and Montanes (2002) to examine the effects of a tariff cut process on trade flows when the variables are nonstationary. The ECM specification thus provides the means by which the short-run observed behavior of variables is associated with their long-run equilibrium growth paths. Davidson et al. (1978) established a closely-related specification known as the “equilibrium-correcting mechanism” (also having the acronym ECM) that models both the short and long-run relationships between variables. Rearranging the terms of a first-order stochastic difference equation yields the following ECM:

$$\Delta x_t = \alpha_0 + \alpha_1(x - y)_{t-1} + \alpha_2 \Delta y_t + \alpha_3 y_{t-1} + v_t \quad \dots(B.15)$$

where $-1 < \alpha_1 < 0$, $\alpha_2 > 0$ and $\alpha_3 > -1$, and where all variables are measured in logarithmic terms.

The second term, $\alpha_1(x - y)_{t-1}$, is the mechanism for adjusting any disequilibrium in the previous period. When the rate of growth of the dependent variable x_t falls below its steady-state path, the value of the ratio of variables in the second term decreases in the subsequent period. That decrease, combined with the negative coefficient of the term, has a positive influence on the

growth rate of the dependent variable. Conversely, when the growth rate of the dependent variable increases above its steady-state path, the adjustment mechanism embodied in the second term generates downward pressure on the growth rate of the dependent variable until it reaches that of its steady-state path. The speed with which the system approaches its steady-state path depends on the proximity of the coefficient to minus one. If the coefficient is close to minus one, the system converges to its steady-state path quickly; if it is near to zero, the approach of the system to the steady-state path is slow. Since the variables are measured in logarithms, Δx and Δy can be interpreted as the rate of change of the variables. Thus the third term, $\alpha_2 \Delta y_t$, expresses the steady-state growth in X associated with Y . Finally, the fourth term, $\alpha_3 y_{t-1}$, shows that the steady-state response of the dependent variable X to the variable Y is non-proportional when the coefficient has non-zero significance.

The equilibrium solution of equation (B.4) is a constant value if there is convergence. Since the solution is unrelated to time, the rate of change over time of the dependent variable X (given by Δx_t) and the explanatory variable Y (given by Δy_t) are equal to zero. However, in dynamic equilibrium, equation (B.4) generates a steady-state response in which growth occurs at a constant rate, say g . For the dynamic specification of the relationship in (B.4), if g_1 is defined as the steady-state growth rate of the dependent variable X , and g_2 corresponds to the steady-state growth rate of the explanatory variable Y , then, since lower-case letters denote the logarithms of variables, $g_1 = \Delta x$ and $g_2 = \Delta y$ in dynamic equilibrium. In equilibrium the systematic dynamics of equation (B.4) are expressed as:

$$g_1 = \alpha_0 + \alpha_1(x - y) + \alpha_2 g_2 + \alpha_3 y \quad \dots (B.16)$$

or, in terms of the original (anti-logarithmic) values of the variables:

$$X = k_0 Y^\beta \quad \dots (B.17)$$

where $k_0 = \exp\{(-\alpha_0/\alpha_1) + [(\alpha_1 - \alpha_2\alpha_1 - \alpha_3)/\alpha_1^2]g_2\}$, and where $\beta = 1 - \alpha_3/\alpha_1$.

The dynamic solution of equation (B.6) therefore shows X to be influenced by changes in the rate of growth of Y , as well as the long-run elasticity of X with respect to Y . For example, where the rate of growth of the explanatory variable accelerates, say from g_2 to g'_2 , the value of the variable X would increase. However, it is important to reiterate that the response to each explanatory variable can be either transient or steady-state. When theoretical considerations suggest that an explanatory variable generates a transient, rather than steady-state, response, it is appropriate to constrain its long-run effect to zero.

Step 3: Modeling Price and Income Effects of Foreign and Domestic Imports

There are several features in the modeling of Viet Nam's imports that need to be incorporated into the present analysis. The first important characteristic of the import demand for any one product is that its long-term response to the growth of domestic income is not necessarily proportional. This suggests that the dynamic specification of the import demand equation should not introduce any restrictions that would impose long-run unitary elasticity with respect to income. In contrast, the model should encompass long-term proportionality responses when they exist.

A second feature of the present modeling approach is that the dynamics for import demand relationships can be restricted to one period since the adjustment of imports to price and income changes tends to decline exponentially over time. Accordingly, in terms of the general stochastic difference specification, the expression for imports, M , in terms of income, Y , the price of the product, P , in US dollar terms and including the tariff, and the real effective exchange rate, R , can be expressed as:

$$m_t = \alpha_{10} + \alpha_{11}m_{t-1} + \alpha_{12}y_t + \alpha_{13}y_{t-1} + \alpha_{14}p_t + \alpha_{15}p_{t-1} + \alpha_{16}r_t + \alpha_{17}r_{t-1} + u_{1t} \quad \dots(B.18)$$

where lower case letters denote logarithms of corresponding capital letters, and the expected signs of the coefficients are $0 < \alpha_{11} < 1$; α_{12} and $\alpha_{13} > 0$; α_{14} and $\alpha_{15} < 0$; α_{16} and $\alpha_{17} > 0$. Income is treated as (weakly) exogenous for the parameters of interest. The use of the logarithmic specification in equation (B.7) provides a means by which the elasticity can be calculated directly from the estimated equation; the results are consistent when the elasticities remain constant over time. Tests of parameter constancy provide a means of validating that hypothesis.

The third important characteristic is that the demand for imports is determined by the local currency price (in Viet Nam dong) of imports. As such, we can decompose the price variable into the US dollar price and the real effective exchange rate in equation (B.7) as follows:

$$P^n = P^c(1+t)/R = P/R \quad \dots(B.19)$$

where P^n is the Viet Nam dong price of the imported product, P^c is c.i.f. (cost, insurance, and freight) import price in U.S. dollars of the product, P is the U.S. dollar import price of the good with the tariff, t is the tariff rate, and R is the real exchange rate.

The real exchange rate takes into account changes in the price of domestic goods, P^n , relative to foreign goods, P^f , and the nominal exchange rate, R^n . It is defined as follows:¹⁵

$$R = P^n / (R^n P^f) \quad \dots(B.20)$$

The demand for imports by Viet Nam is therefore directly affected by c.i.f. price in U.S. dollars of the imported good, the tariff on that good, and the real exchange rate.

The fourth characteristic is that if the import supply elasticity is less than infinite, then the pass-through of exchange rate changes from import price changes in foreign currency terms to import prices in local currency terms will be less than complete (see Branson, 1972, and the summary by Goldstein and Khan, 1985). Consequently, the estimated price and exchange rate coefficients in equation (B.7) may differ from one another.

It is also appropriate to adopt the error-correction mechanism (ECM), since the growth rate of Viet Nam's imports in equation (B.7) depends on the expansion path of economic activity. The ECM specification adjusts for any disequilibrium between variables that are cointegrated and thus provides the means by which the short-run observed behavior of variables is associated with

¹⁵This definition is the one used by the IMF, while the more traditional definition is $R = R^n P^f / P^c$. To facilitate the interpretation of the results for readers, we have adopted the IMF definition. See Edwards (1988: Appendix) for alternative definitions of the real exchange rate.

their long-run equilibrium growth paths. Rearranging the terms of the first-order stochastic difference equation (B.7) yields the following ECM:

$$\Delta m_t = \alpha_{20} + \alpha_{21}(m - y)_{t-1} + \alpha_{22}\Delta y_t + \alpha_{23}y_{t-1} + \alpha_{24}\Delta p_t + \alpha_{25}p_{t-1} + \alpha_{26}\Delta r_t + \alpha_{27}r_{t-1} + u_{2t} \dots (B.21)$$

where $-1 < \alpha_{21} < 0$; $\alpha_{22} > 0$; $\alpha_{23} > \alpha_{21}$; α_{24} and $\alpha_{25} < 0$; α_{26} and $\alpha_{27} > 0$; and where all variables are measured in logarithmic terms.

The import price and exchange rate terms in the foregoing specification have been so transformed as to nest the 'differences' formulation of the variables in the levels form of the equation. This transformation reduces the possibility of the occurrence of the spurious correlation typically associated with time-series data when the relationship between import demand and import prices is estimated. On a steady-state growth path, the long-run dynamic equilibrium relationship implicit in equation (B.10) is:

$$M = kY^{\varepsilon_y}P^{\varepsilon_p}R^{\varepsilon_r} \dots (B.22)$$

The income elasticity of import demand is expressed as

$$\varepsilon_y = 1 - (\alpha_{23}/\alpha_{21}) \dots (B.23)$$

Its value is positive since the expected sign of α_{21} is negative and $\alpha_{23} > \alpha_{21}$. When $\alpha_{21} < \alpha_{23} < 0$, import demand is inelastic with respect to income; when $\alpha_{23} = 0$, it has a unitary elasticity; and when $\alpha_{23} > 0$.

The price elasticity of import demand is expressed as

$$\varepsilon_p = -\alpha_{25}/\alpha_{21} \dots (B.24)$$

It has a negative value since the expected signs of both α_{25} and α_{21} are negative. The real effective exchange rate elasticity of import demand is expressed as

$$\varepsilon_r = -\alpha_{27}/\alpha_{21} \dots (B.25)$$

It has a positive value since the expected signs of α_{21} is negative and that of α_{27} is positive.

Annex C

Trade and Industry Concordances

	ISIC, Rev. 3																
	1511	1512	1513	1514	1520	1554	1600	1810	1911	2021	2022	2023	2412	2610	2930	3410	3591
SITC, rev. 2	011.11	034.19	054.61	081.31	022.11	111.01	122.1	657.61	611.2	634.11	635.31	635.11	2412	651.95	697.31	713.21	785.11
	011.12	034.21	054.69	081.32	022.12	111.02	122.2	657.62	611.3	634.12	635.32	635.12	2412	654.6	697.32	713.22	785.13
	011.21	034.22	054.7	081.33	022.13		122.31	841.11	611.41	634.21	635.33	635.2	2412	664.11	697.33	713.23	785.15
	011.22	034.23	054.85	081.34	022.21		122.32	841.12	611.42	634.22	635.39		2412	664.12	697.34	781.1	785.16
	012.11	034.24	056.11	081.35	022.22		122.39	841.19	611.51	634.23			2412	664.31	741.81	781.2	785.17
	012.12	034.25	056.12	081.36	022.23			841.21	611.52	634.31			2412	664.39	741.82	782.11	785.19
	012.13	034.26	056.13	081.37	022.24			841.22	611.61	634.39			2412	664.41	743.41	782.19	785.35
	012.21	034.27	056.19	081.38	022.31			841.23	611.62	634.41			2412	664.42	743.45	782.21	
	012.22	034.28	056.41	081.39	022.32			841.3	611.71	634.49			2412	664.51	775.11	782.23	
	012.31	034.29	056.42	091.01	022.33			841.4	611.72	634.51			2412	664.52	775.12	782.25	
	012.32	034.4	056.61	091.09	022.41			841.51	611.79	634.52			2412	664.53	775.21	782.27	
	012.33	034.51	056.69	223.9	022.49			841.59	611.81	634.53			2412	664.71	775.22	782.29	
	012.34	034.55	056.71	263.2	023.0			841.61	611.83	634.59			2412	664.72	775.3	783.11	
	012.35	035.11	056.72	411.11	024.1			841.62					2412	664.81	775.41	783.19	
	012.36	035.12	056.73	411.12	024.2			841.69					2412	664.89	775.42	783.2	
	012.4	035.13	056.74	411.13	024.3			842.11					2412	664.91	775.49		
	012.51	035.21	056.75	411.33	024.91			842.19					2412	664.92	775.71		
	012.52	035.22	056.76	411.39	024.99			842.21					2412	664.93	775.72		
	012.53	035.29	056.77	421.11	061.91			842.22					2412	664.94	775.73		
	012.54	035.3	056.79	421.19	592.21			842.3					2412	664.95	775.79		
	012.55	035.4	058.1	421.21				842.4					2412	664.96	775.81		
	012.56	035.5	058.21	421.29				842.5					2412	665.11	775.82		
	012.91	036.11	058.22	421.31				842.6					2412	665.12	775.83		
	012.99	036.19	058.31	421.39				842.7					2412	665.21	775.84		
	016.11	036.37	058.32	421.41				842.81					2412	665.22	775.85		
	016.12	036.39	058.39	421.42				842.82					2412	665.23	775.86		
	016.19	037.11	058.92	421.49				842.89					2412	665.29	775.87		
	016.81	037.12	058.93	421.51				843.1					2412	665.91	775.88		
	016.89	037.13	058.94	421.59				843.21					2412	665.92	775.89		
	017.1	037.14	058.95	421.71				843.22					2412	665.93	812.15		
	017.2	037.15	058.96	421.79				843.23						665.94	812.17		
	017.3	037.16	058.97	421.8				843.24						665.95	812.19		
	017.4	037.17	059.1	422.11				843.71						665.99			
	017.5	037.21	059.2	422.19				843.79						773.22			
	017.6	037.22	059.3	422.21				843.81						813.91			
	017.9	081.42	059.91	422.29				843.82									
	081.41	291.96	059.92	422.31				843.89									
	211.11		059.93	422.39				844.1									
	211.12		059.94	422.41				844.21									
	211.13		059.95	422.49				844.22									
	211.2		059.96	422.5				844.23									
	211.4			422.91				844.24									
	211.6			422.99				844.25									
	211.7			431.21				844.26									
	268.19			431.22				844.7									

ISIC, Rev. 3																
1511	1512	1513	1514	1520	1554	1600	1810	1911	2021	2022	2023	2412	2610	2930	3410	3591
411.2			431.33				844.81									
411.31			431.41				844.82									
411.32							844.83									
							844.89									
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							848.48									
							848.49									

Statistical Appendix

Appendix Table 1 – Viet Nam: Volume of Industrial Production of Selected Products, 1990-2002

Appendix Table 2 – Viet Nam: Output Value of Selected Industries, 2000-2002

Appendix Table 3 – Viet Nam: Employment of Selected Industries, 1990-2002

Appendix Table 4 – Viet Nam: Value of Largest Imported Products in Selected Industries, 1985-2002

Appendix Table 5 – Viet Nam: Volume of Largest Imported Products in Selected Industries, 1985-2002

Appendix Table 6 – Viet Nam: Unit Price of Largest Imported Products in Selected Industries, 1985-2002

Appendix Table 7 – Viet Nam: Output Value of Selected Industries, 1990-2002

Appendix Table 8 – Viet Nam: Value of Imports of Selected Industries, 1990-2002

Appendix Table 9 – Viet Nam: Value of Exports of Selected Industries, 1990-2002

Appendix Table 10 – Viet Nam: Trade Balance of Selected Industries, 1990-2002

Appendix Table 11 – Viet Nam: Regression Results of Import Demand Equation

Appendix Table 12 – Viet Nam: Regression Results of Production Supply Equation

Appendix Table 1
Viet Nam: Volume of Industrial Production of Selected Products, 1990-2002

ISIC	Description	Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1511	Production of meat products														
	• Frozen meat	Ton	3,402	7,404	3,158	4,486	5,125	5,658	1,526	3,135	1,635	430	549	691	1,363
1512	Processing fish/ fish products														
	• Freezing fish	Ton	32,165	47,486	49,358	59,364	67,854	93,276	106,487	126,027	124,816	126,963	176,950	229,949	298,351
	• Fish sources	1000 liter	131,248	150,941	147,710	135,265	138,717	149,030	167,300	170,167	164,426	171,141	167,135	162,313	175,519
1513	Processing of fruit/vegetables														
	• Canned vegetables	Ton	20,639	13,655	11,903	11,872	7,020	5,614	16,318	24,661	20,026	20,342	11,677	16,785	29,955
1514	Manuf. veg./animal oils/fats														
	• Oils	Ton	29,416	16,737	13,542	22,987	30,946	38,578	78,076	101,185	94,648	265,331	280,075	282,839	317,123
1520	Manufacture of dairy products														
	• Cans of Milk	1000 can	58,178	74,573	84,353	122,300	157,508	173,301	169,300	188,484	185,108	206,972	227,248	234,946	255,098
	• Milk powder												44,013	84,318	42,049
1554	Manuf. non-alcoholic beverages														
	• soft drink	1000 liter	41,513	65,514	89,102	91,913	96,096	102,044	147,173	331,431	350,622	420,782	386,299	395,018	424,631
	• Ice	1000Ton					1,929	2,779	3,166	3,872	4,829	5,648	6,827	7,742	7,516
1600	Manuf. of tobacco products														
	• Cigarettes	Million packet	1,250	1,298	1,541	1,713	1,942	2,146	2,160	2,123	2,195	2,147	2,836	3,075	3,375
1810	Manuf. wearing apparel														
	• Ready-to-wear clothing	1000 piece	125,320	106,104	104,388	90,892	121,012	145,167	206,959	302,192	275,046	302,426	337,011	375,642	489,058
1911	Tanning and dressing of leather														
	• Hard leather	Ton	85	71	38	53	25	18	12	6	5	106	97	96	64
	• Soft Leather	1000 board	310	458	478	812	645	981	1,226	5,258	4,350	4,500	4,806	4,002	5,486
2021	Manuf. veneer sheets/plywood														
	• Veneer sheets	M3	na	na	na	na	8,542	15,014	28,981	18,074	24,837	23,093	22,913	39,513	66,215
2022	Manuf. builders carpentry/joinery														
	• Roof struts	M3	na	na	na	na	974	678	567	1,494	2,997	3,069	4,315	9,500	7,798
2023	Manuf. of wooden containers														
	• Manuf. fertilizers/nitr. compounds		na	na	na	na	na	na	na	na	na	na	na	na	na
2412	Manuf. fertilizers/nitr. compounds														
	• Sulphuric acids (H2SO4)	Ton	7,768	8,876	7,176	4,446	11,860	9,768	17,943	15,173	22,864	27,348	35,652	32,251	36,129
	• Fertilizers	Ton	9,183	12,824	11,465	14,398	14,072	15,565	20,007	19,078	20,223	21,961	20,126	20,042	20,685
	• Chemical fertilizers	1000 Ton	354	450	530	714	841	931	965	982	978	1,143	1,209	1,065	1,158
2610	Manuf. Glass/glass products														
	• Glasses	1000 Ton	39,071	32,176	36,685	50,623	37,521	36	93	66	105	106	113	115	115
	• Glass for construction	1000 m2	1,327	2,783	2,890	1,790	3,504	8,790	4,877	4,755	4,600	15,658	30,718	34,300	38,776
	• Glass for hot water bottle	1000 piece	164	642	614	862	868	703	1,015	2,001	1,879	1,882	2,515	2,927	4,010
	• Glass envelopes for lamps	1000 piece	10,534	7,715	9,665	13,383	18,006	25,085	28,652	29,944	30,384	31,300	41,478	59,938	68,472
2930	Manuf. of domestic appliances														
	• Household-type fans	Piece	287,376	222,900	244,265	217,210	311,836	353,220	268,000	306,540	358,207	323,323	328,365	408,815	533,724
3410	Manufacture of motor vehicles														
	• Manuf. passenger cars							33	41	24	46	43	79	158	170

ISIC	Description	Unit	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
	• Assemble of car	1000 piece	na	na	na	na	na	182	5,971	6,535	4,905	5,915	13,547	20,526	29,536
	• Manufacture of chassis	Piece	na	na	na	na	na	308	792	215	185	175	87	186	494
3591	Manufacture of motorcycles		na	na	na	na	na	34,492	68,107	77,489	256,258	241,569	463,360	610,341	1,051,682

Source: Ministry of Finance of Government of Viet Nam.

Appendix Table 2
Viet Nam: Output Value of Selected Industries, 2000-2002

ISIC	Description	Million VN Dong			Million US Dollars		
		2000	2001	2002	2000	2001	2002
1511	Production, processing and preserving of meat products	2,399,418	2,525,535	2,844,637	178	173	195
1512	Processing and preserving of fish and fish products	20,849,681	25,680,934	28,344,926	1,813	1,759	1,942
1513	Processing and preserving of fruit and vegetables	1,323,003	1,905,540	2,309,711	135	131	158
1514	Manufacture of vegetable and animal oils and fats	3,385,796	3,619,304	4,241,483	256	248	291
1520	Manufacture of dairy products	4,452,395	6,400,391	6,947,678	452	438	476
1554	Manufacture of non-alcoholic beverages	3,588,595	3,387,320	3,468,187	239	232	238
1600	Manufacture of tobacco products	7,602,370	8,809,105	10,448,654	622	603	716
1810	Manufacture of wearing apparel, except fur apparel	11,433,075	12,201,795	18,328,046	862	836	1,256
1911	Tanning and dressing of leather	123,609	146,220	161,869	10	10	11
2021	Manufacture of veneer sheets; manufacture of plywood	493,193	783,483	941,384	55	54	64
2022	Manufacture of builders' carpentry and joinery	749,392	999,241	914,139	71	68	63
2023	Manufacture of wooden containers	60,563	81,522	62,264	6	6	4
2412	Manufacture of fertilizers and nitrogen compounds	3,044,688	3,144,953	4,135,020	222	215	283
2610	manufacture of glass and glass products	1,603,602	2,082,230	2,030,325	147	143	139
2930	Manufacture of domestic appliances	1,063,635	1,426,340	1,836,949	101	98	126
3410	Manufacture of motor vehicles	4,491,226	6,957,032	11,582,420	491	477	794
3591	Manufacture of motorcycles	10,125,668	16,733,121	13,753,832	1,182	1,146	942
	Total	76,789,909	96,884,066	112,351,524	6,841	6,637	7,698

Source: Ministry of Finance of Government of Viet Nam.

Appendix Table 3
Viet Nam: Employment of Selected Industries, 1990-2002

ISIC	Description	1999
1511	Production, processing and preserving of meat products	131,622
1512	Processing and preserving of fish and fish products	125,779
1513	Processing and preserving of fruit and vegetables	36,903
1514	Manufacture of vegetable and animal oils and fats	127,316
1520	Manufacture of dairy products	123,011
1554	Manufacture of non-alcoholic beverages	85,800
1600	Manufacture of tobacco products	10,971
1810	Manufacture of wearing apparel, except fur apparel	318,666
1911	Tanning and dressing of leather	250,197
2021	Manufacture of veneer sheets; manufacture of plywood	48,919
2022	Manufacture of builders' carpentry and joinery	39,677
2412	Manufacture of fertilizers and nitrogen compounds	43,408
2610	manufacture of glass and glass products	150,745
2930	Manufacture of domestic appliances	15,358
3410	Manufacture of motor vehicles	15,482
3591	Manufacture of motorcycles	34,692

Source: Compiled from General Statistical Office, Statistical Yearbook, Hanoi (various issues).

Appendix Table 4

Viet Nam: Value of Largest Imported Products in Selected Industries, 1985-2002

Industry		Largest Imported Product		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
ISIC	Description	SITC	Description													
1511	Production, processing and preserving of meat products	081.4	Meat or fishmeal fodder	378	2,145	1,645	422	1,146	2,289	6,776	6,558	2,182	7,011	4,745	5,788	6,034
1512	Processing and preserving of fish and fish products	291.9	Other animal materials nec	78	178	399	947	1,535	3,871	10,274	8,285	12,299	13,629	10,477	13,149	13,940
1513	Processing and preserving of fruit and vegetables	054.8	Edible vegetables nec fresh, dry	78	173	279	297	1,418	2,576	3,138	2,071	3,384	1,527	2,902	2,630	2,693
1514	Manufacture of vegetable and animal oils and fats	081.3	Oilcake and other residues	-	-	23	3,118	3,482	19,264	24,012	40,409	27,285	62,260	4,928	15,853	8,706
1520	Manufacture of dairy products	023.0	Butter	2,046	4,256	4,669	8,223	8,063	12,347	12,921	8,729	8,878	10,484	7,104	7,981	7,654
1554	Manufacture of non-alcoholic beverages	111.0	Non-alcoholic beverages nec	371	501	4,651	5,909	7,766	6,676	3,363	2,772	2,592	5,309	635	1,904	1,535
1600	Manufacture of tobacco products	122.2	Cigarettes	1,068	961	11,319	72,899	181,867	296,287	226,224	150,769	178,512	155,790	140,843	143,354	138,104
1810	Manufacture of wearing apparel, except fur apparel	657.6	Hat bodies	18	333	233	629	1,809	2,054	3,807	4,835	3,352	1,405	1,459	3,268	3,486
1911	Tanning and dressing of leather	611.4	Leather bovine nec equine	6	72	831	3,753	19,509	52,680	86,898	114,870	116,402	161,184	74,435	97,593	89,940
2021	Manufacture of veneer sheets; manufacture of plywood	632.4	Veneer sheets	623	520	755	2,178	7,104	4,086	8,710	9,271	16,413	4,592	3,888	1,548	7,324
2022	Manufacture of builders' carpentry and joinery	633.0	Wood manufactures	7	15	5	57	71	105	138	871	487	128	107	345	363
2412	Manufacture of fertilizers and nitrogen compounds	561.1	Fertilizer, manufactured	22,377	131,288	141,905	94,737	119,164	183,828	215,096	225,663	160,773	128,422	175,150	126,530	108,141
2610	Manufacture of glass and glass products	812.4	Lighting equipment	358	1,164	1,598	5,620	11,201	13,811	17,438	17,222	12,328	8,808	6,984	2,777	7,500
2930	Manufacture of domestic appliances	812.1	Central heating equipment	18	4	173	275	174	642	2,380	1,339	706	1,531	625	721	589
3410	Manufacture of motor vehicles	732.3	Lorries and trucks	3,870	15,425	4,451	36,598	34,789	88,496	84,545	53,419	53,223	40,458	104,420	97,940	111,964
3591	Manufacture of motorcycles	732.9	Motorcycles	27,735	24,796	72,031	241,767	122,082	295,527	378,122	172,291	125,073	179,193	494,827	498,278	600,451

Appendix Table 5

Viet Nam: Volume of Largest Imported Products in Selected Industries, 1985-2002

Industry		Largest Imported Product		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
ISIC	Description	SITC	Description													
1511	Production, processing and preserving of meat products	081.4	Meat or fishmeal fodder	1,050	5,450	4,252	1,216	3,053	5,724	14,360	14,098	5,713	20,065	17,551	19,705	21,644
1512	Processing and preserving of fish and fish products	291.9	Other animal materials nec	3	2	77	186	334	778	1,103	1,195	1,568	2,406	735	1,341	1,286
1513	Processing and preserving of fruit and vegetables	054.8	Edible vegetables nec fresh, dry	20	2,014	68	253	2,375	1,324	595	628	2,133	691	1,036	1,068	1,046
1514	Manufacture of vegetable and animal oils and fats	081.3	Oilcake and other residues	-	-	12	14,618	17,306	92,916	95,805	163,263	177,131	410,437	36,582	160,169	145,495
1520	Manufacture of dairy products	023.0	Butter	1,161	2,866	2,771	5,212	5,157	6,274	6,094	5,392	5,320	6,904	4,813	5,569	5,554
1554	Manufacture of non-alcoholic beverages	111.0	Non-alcoholic beverages nec	850	1,411	10,399	15,058	20,501	14,719	7,646	5,164	3,335	7,395	452	1,567	560
1600	Manufacture of tobacco products	122.2	Cigarettes	159	145	449	710	8,737	18,654	5,326	6,799	5,108	4,711	5,643	4,599	4,213
1810	Manufacture of wearing apparel, except fur apparel	657.6	Hat bodies	4	115	71	181	421	757	772	794	589	484	371	216	200
1911	Tanning and dressing of leather	611.4	Leather bovine nec equine	-	33	191	420	2,127	4,525	6,524	7,578	7,518	10,841	4,598	6,229	5,668
2021	Manufacture of veneer sheets; manufacture of plywood	632.4	Veneer sheets	108	300	267	1,140	2,363	1,146	2,278	3,026	6,182	2,207	1,167	758	2,000
2022	Manufacture of builders' carpentry and joinery	633.0	Wood manufactures	2	3	0	4	4	20	17	2	39	36	39	55	150
2412	Manufacture of fertilizers and nitrogen compounds	561.1	Fertilizer, manufactured	133,308	837,783	1,027,690	833,000	974,600	1,009,050	1,118,474	1,656,212	1,703,204	1,731,049	1,910,363	1,947,782	2,026,811
2610	Manufacture of glass and glass products	812.4	Lighting equipment	32	87	195	398	435	500	738	527	428	442	314	272	409
2930	Manufacture of domestic appliances	812.1	Central heating equipment	0	0	26	19	13	104	204	65	31	203	38	107	116
3410	Manufacture of motor vehicles	732.3	Lorries and trucks	843	4,269	216	5,744	36,689	60,982	48,215	23,791	42,882	38,646	75,567	82,994	98,103
3591	Manufacture of motorcycles	732.9	Motorcycles	50,216	33,699	43,124	265,700	70,189	253,448	306,818	346,360	332,417	176,570	1,252,262	1,167,367	1,423,553

Appendix Table 6

Viet Nam: Unit Price of Largest Imported Products in Selected Industries, 1985-2002

Industry		Largest Imported Product															
ISIC	Description	SITC	Description	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	
1511	Production, processing and preserving of meat products	081.4	Meat or fishmeal fodder	0.4	0.4	0.4	0.3	0.4	0.4	0.5	0.5	0.4	0.3	0.3	0.3	0.3	
1512	Processing and preserving of fish and fish products	291.9	Other animal materials nec	26.8	79.4	5.2	5.1	4.6	5.0	9.3	6.9	7.8	5.7	14.2	9.8	10.8	
1513	Processing and preserving of fruit and vegetables	054.8	Edible vegetables nec fresh, dry	3.9	0.1	4.1	1.2	0.6	1.9	5.3	3.3	1.6	2.2	2.8	2.5	2.6	
1514	Manufacture of vegetable and animal oils and fats	081.3	Oilcake and other residues	na	na	1.9	0.2	0.2	0.2	0.3	0.2	0.2	0.2	0.1	0.1	0.1	
1520	Manufacture of dairy products	023.0	Butter	1.8	1.5	1.7	1.6	1.6	2.0	2.1	1.6	1.7	1.5	1.5	1.4	1.4	
1554	Manufacture of non-alcoholic beverages	111.0	Non-alcoholic beverages nec	0.4	0.4	0.4	0.4	0.4	0.5	0.4	0.5	0.8	0.7	1.4	1.2	2.7	
1600	Manufacture of tobacco products	122.2	Cigarettes	6.7	6.6	25.2	102.7	20.8	15.9	42.5	22.2	35.0	33.1	25.0	31.2	32.8	
1810	Manufacture of wearing apparel, except fur apparel	657.6	Hat bodies	4.3	2.9	3.3	3.5	4.3	2.7	4.9	6.1	5.7	2.9	3.9	15.1	17.4	
1911	Tanning and dressing of leather	611.4	Leather bovine nec equine	na	2.2	4.3	8.9	9.2	11.6	13.3	15.2	15.5	14.9	16.2	15.7	15.9	
2021	Manufacture of veneer sheets; manufacture of plywood	632.4	Veneer sheets	5.8	1.7	2.8	1.9	3.0	3.6	3.8	3.1	2.7	2.1	3.3	2.0	3.7	
2022	Manufacture of builders' carpentry and joinery	633.0	Wood manufactures	3.5	5.0	12.5	16.0	17.1	5.1	8.1	368.6	12.5	3.6	2.8	6.2	2.4	
2412	Manufacture of fertilizers and nitrogen compounds	561.1	Fertilizer, manufactured	0.2	0.2	0.1	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	
2610	Manufacture of glass and glass products	812.4	Lighting equipment	11.2	13.4	8.2	14.1	25.7	27.6	23.6	32.7	28.8	19.9	22.3	10.2	18.3	
2930	Manufacture of domestic appliances	812.1	Central heating equipment	41.8	9.9	6.6	14.4	13.6	6.2	11.7	20.6	22.9	7.5	16.4	6.7	5.1	
3410	Manufacture of motor vehicles	732.3	Lorries and trucks	4.6	3.6	20.6	6.4	0.9	1.5	1.8	2.2	1.2	1.0	1.4	1.2	1.1	
3591	Manufacture of motorcycles	732.9	Motorcycles	0.6	0.7	1.7	0.9	1.7	1.2	1.2	0.5	0.4	1.0	0.4	0.4	0.4	

Appendix Table 7

Viet Nam: Output Value of Selected Industries, 1990-2002 (million VND)

ISIC	Description	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
1511	Production, processing and preserving of meat products	19,797,462	47,099,825	19,755,527	25,204,354	31,093,680	36,577,310	11,640,587	23,576,010	10,093,799	2,428,704	2,399,418	2,525,535	2,844,637
1512	Processing and preserving of fish and fish products	7,136,536	31,162,497	2,117,112	2,493,903	2,582,089	3,839,889	8,199,651	7,224,269	8,097,706	5,948,516	20,849,681	25,680,934	28,344,926
1513	Processing and preserving of fruit and vegetables	3,256,464	2,212,154	1,978,569	564,787	169,520	442,019	3,481,395	3,292,203	1,285,118	1,818,743	1,323,003	1,905,540	2,309,711
1514	Manufacture of vegetable and animal oils and fats	469,401	281,241	232,946	439,965	558,833	717,831	1,756,215	2,247,683	1,308,497	3,612,230	3,385,796	3,619,304	4,241,483
1520	Manufacture of dairy products	1,361,066	1,469,720	1,886,463	2,561,363	3,268,523	4,527,498	4,764,802	4,050,489	4,100,088	4,171,819	4,452,395	6,400,391	6,947,678
1554	Manufacture of non-alcoholic beverages	119,831	153,780	263,259	238,234	240,472	305,750	427,599	1,175,165	1,799,856	1,995,550	3,588,595	3,387,320	3,468,187
1600	Manufacture of tobacco products	900,733	923,032	4,175,319	18,903,873	4,341,930	3,661,265	9,854,764	5,056,639	8,240,263	7,626,084	7,602,370	8,809,105	10,448,654
1810	Manufacture of wearing apparel, except fur apparel	4,656,534	2,659,568	2,947,428	2,728,188	4,483,206	3,396,857	8,807,017	15,881,389	13,504,680	7,573,398	11,433,075	12,201,795	18,328,046
1911	Tanning and dressing of leather	2,759	1,608	3,301	11,539	9,397	18,146	25,943	126,624	107,002	106,297	123,609	146,220	161,869
2021	Manufacture of veneer sheets; manufacture of plywood	-	-	-	-	165,963	345,990	715,968	357,843	426,168	310,519	493,193	783,483	941,384
2022	Manufacture of builders' carpentry and joinery	-	-	-	-	1,037,986	216,493	287,126	959,353	2,331,308	679,896	749,392	999,241	914,139
2412	Manufacture of fertilizers and nitrogen compounds	1,214,544	1,295,608	922,955	470,985	1,350,728	1,657,560	3,214,140	1,925,658	2,010,310	1,889,813	3,044,688	3,144,953	4,135,020
2610	Manufacture of glass and glass products	34,752	87,668	55,692	59,342	211,520	569,064	270,230	364,683	310,539	731,619	1,603,602	2,082,230	2,030,325
2930	Manufacture of domestic appliances	2,369,911	435,821	316,178	619,127	838,852	431,228	617,898	1,249,404	1,622,583	480,975	1,063,635	1,426,340	1,836,949
3410	Manufacture of motor vehicles	-	-	-	-	-	1,970,221	2,957,844	2,217,039	2,348,928	1,852,043	4,491,226	6,957,032	11,582,420
3591	Manufacture of motorcycles	-	-	-	-	-	2,224,199	4,641,820	2,131,678	5,332,165	13,557,867	10,125,668	16,733,121	13,753,832
	Total						60,901,321	61,662,999	71,836,130	62,919,009	54,784,072	76,729,346	96,802,544	112,289,260

Source: Ministry of Finance of Government of Viet Nam.

Notes: Inter-Bank Exchange Rate (VND/USD). ISIC definitions refer to Revision 3.

Appendix Table 8**Viet Nam: Value of Imports of Selected Industries, 1990-2002 (million VND)**

ISIC	Description	2001	2002
1511	Production, processing and preserving of meat products	7,159	11,653
1512	Processing and preserving of fish and fish products	7,159	94,797
1513	Processing and preserving of fruit and vegetables	14,708	13,507
1514	Manufacture of vegetable and animal oils and fats	181,396	287,016
1520	Manufacture of dairy products	247,770	115,953
1554	Manufacture of non-alcoholic beverages	433	1,887
1600	Manufacture of tobacco products	64,431	89,930
1810	Manufacture of wearing apparel, except fur apparel	464,144	256,362
1911	Tanning and dressing of leather	15,159	25,852
2021	Manufacture of veneer sheets; manufacture of plywood	20,083	28,840
2022	Manufacture of builders' carpentry and joinery	156	1,206
2412	Manufacture of fertilizers and nitrogen compounds	430,807	476,985
2610	manufacture of glass and glass products	58,221	56,540
2930	Manufacture of domestic appliances	75,468	97,962
3410	Manufacture of motor vehicles	480,126	534,727
3591	Manufacture of motorcycles	679,613	388,837

ISIC definitions refer to Revision 3.

Appendix Table 9**Viet Nam: Value of Exports of Selected Industries, 1990-2002 (million VND)**

ISIC	Description	2001	2002
1511	Production, processing and preserving of meat products	26,956	20,120
1512	Processing and preserving of fish and fish products	749,216	1,013,731
1513	Processing and preserving of fruit and vegetables	49,539	84,773
1514	Manufacture of vegetable and animal oils and fats	33,694	22,407
1520	Manufacture of dairy products	190,569	67,094
1554	Manufacture of non-alcoholic beverages	587	508
1600	Manufacture of tobacco products	25,677	49,663
1810	Manufacture of wearing apparel, except fur apparel	1,225,012	1,619,479
1911	Tanning and dressing of leather	43	541
2021	Manufacture of veneer sheets; manufacture of plywood	3,417	1,967
2022	Manufacture of builders' carpentry and joinery	644	4,248
2412	Manufacture of fertilizers and nitrogen compounds	6,806	18,684
2610	manufacture of glass and glass products	5,205	7,120
2930	Manufacture of domestic appliances	11,386	17,590
3410	Manufacture of motor vehicles	14,890	14,468
3591	Manufacture of motorcycles	628	7,622

ISIC definitions refer to Revision 3.

Appendix Table 10: Viet Nam: Trade Balance of Selected Industries, 1990-2002 (million VND)

ISIC	Description	2001	2002
1511	Production, processing and preserving of meat products	19,797	8,467
1512	Processing and preserving of fish and fish products	742,057	918,933
1513	Processing and preserving of fruit and vegetables	34,831	71,266
1514	Manufacture of vegetable and animal oils and fats	-147,701	-264,609
1520	Manufacture of dairy products	-57,200	-48,859
1554	Manufacture of non-alcoholic beverages	154	-1,379
1600	Manufacture of tobacco products	-38,753	-40,267
1810	Manufacture of wearing apparel, except fur apparel	760,868	1,363,118
1911	Tanning and dressing of leather	-15,116	-25,311
2021	Manufacture of veneer sheets; manufacture of plywood	-16,666	-26,873
2022	Manufacture of builders' carpentry and joinery	488	3,043
2412	Manufacture of fertilizers and nitrogen compounds	-424,000	-458,301
2610	manufacture of glass and glass products	-53,016	-49,420
2930	Manufacture of domestic appliances	-64,082	-80,371
3410	Manufacture of motor vehicles	-465,236	-520,259
3591	Manufacture of motorcycles	-678,985	-381,215

ISIC definitions refer to Revision 3.

Appendix Table 11: Viet Nam: Regression Results of Import Demand Equation

$$Dm_t = a_{20} + a_{21}(m - y)_{t-1} + a_{22}Dy_t + a_{23}y_{t-1} + a_{24}Dp_t + a_{25}p_{t-1} + u_{2t}$$

Description	SITC	ln(M)-ln(Y) _{t-1}	Dln(Y)	ln(Y) _{t-1}	Dln(P/D) _t	ln(P/D) _{t-1}	Summary Statistics			
							Con	R2	dw	Period
Meat or fishmeal fodder	081.4	-0.96 (3.9)		0.47 (0.5)	-1.42 (2.8)	-2.27 (3.7)	21.66	0.80	1.60	1987-2002
Other animal materials nec	291.9	-0.26 (5.2)			-0.97 (10.8)	-0.37 (2.4)	-2.21	0.98	2.30	1991-2002
Edible vegetables nec fresh, dry	054.8	-0.21 (0.6)			-1.34 (3.3)	-1.03 (3.7)	-4.89	0.93	2.66	1987-2002
Oilcake and other residues	081.3	-0.19 (0.7)			-1.20 (4.1)	-0.55 (1.9)	-3.11	0.94	2.56	1987-2002
Butter	023.0	-0.45 (1.5)	2.55 (0.3)	-0.25 (0.7)	-0.24 (0.3)	-0.21 (0.3)	3.37	0.75	3.30	1990-2002
Non-alcoholic beverages nec	111.0	-0.74 (3.1)		2.27 (2.1)	-2.25 (4.4)	-3.05 (3.2)	-46.21	0.69	1.71	1986-2002
Cigarettes	122.2	-0.59 (1.8)			-0.81 (1.6)	-0.17 (0.2)	-2.32	0.85	0.87	1993-2002
Hat bodies	657.6	-0.67 (6.6)			-0.61 (2.3)	-0.59 (1.8)	-5.87	0.89	0.84	1987-2002
Leather bovine nec equine	611.4	-0.40 (1.7)			-1.70 (1.6)	-0.49 (0.5)	-2.18	0.91	0.74	1992-2002
Veneer sheets	632.4	-0.69 (2.3)		1.78 (1.2)	-0.49 (0.8)	-0.97 (1.3)	-28.67	0.32	1.78	1986-2002
Wood manufactures	633.0	-0.83 (4.7)		3.80 (3.7)	-0.78 (4.5)	-0.33 (1.1)	-55.26	0.91	2.13	1986-2002
Fertilizer, manufactured	561.1	-0.99 (2.1)		0.24 (0.8)	-0.22 (0.9)	-0.03 (0.2)	-1.30	0.56	2.29	1992-2002
Lighting equipment	812.4	-0.21 (3.1)			-0.75 (5.1)	-0.47 (3.3)	-1.83	0.81	2.02	1986-2002
Central heating equipment	812.1	-0.56 (3.9)			-1.77 (7.1)	-1.50 (3.7)	-8.01	0.85	1.15	1986-2002
Lorries and trucks	732.3	-0.91 (3.3)		0.81 (0.6)	-1.36 (4.6)	-1.20 (2.2)	-16.68	0.80	2.15	1986-2002
Motorcycles	732.9	-27.66 (3.2)		2.28 (1.1)	-0.77 (1.5)	-0.03 (0.3)	-27.66	0.83	1.24	1992-2002

Appendix Table 12: Viet Nam: Regression Results of Production Supply Equations
 $\ln Q_t = a_{30} + a_{31} \ln Q_{t-1} + a_{32} \ln P_t + a_{33} \ln Y_t + a_{34} \ln Y_t^* + a_{35} T + a_3$

ISIC	Description	Classification	ln(Q)t-1		lnPt		lnY			T		Summary Statistics			
			coff.	t-stat	coff.	Lag	t-stat	coff.	t-stat	coff.	t-stat	Con	R2	dw	Period
1511	Production, processing and preserving of meat products	Export-Oriented	0.79	5.6	0.91	0	1.3					-2.86	0.97	1.7	1993-02
1512	Processing and preserving of fish and fish products	Export-Oriented	0.45	1.9	0.05	0	1.8					0.97	0.99	2.6	1991-02
1513	Processing and preserving of fruit and vegetables	Import-Subs.	0.38	2.3	0.34	0	3.4	2.13	1.2			23.59	0.93	2.9	1991-02
1514	Manufacture of vegetable and animal oils and fats	Import-Subs.			0.56	0	3.6			0.38	18.6	-4.27	0.99	2.2	1992-02
1520	Manufacture of dairy products	Import-Subs.	0.88	4.3	0.19	2	0.5			0.01	0.3	-0.35	0.97	1.8	1992-02
1554	Manufacture of non-alcoholic beverages	Import-Subs.	0.50	1.7	0.12	0	0.3	4.38	1.4	-0.23	-0.9	49.15	0.96	2.3	1991-02
1600	Manufacture of tobacco products	Import-Subs.	0.99	15.5	0.05	1	1.8					-0.08	0.99	2.6	1993-02
1810	Manufacture of wearing apparel, except fur apparel	Export-Oriented	0.69	5.9	0.11	0	2.6	3.16	4.9	-0.17	-3.1	35.79	1.00	2.8	1991-02
1911	Tanning and dressing of leather	Import-Subs.	0.73	7.7	0.24	1	1.5					0.11	0.98	2.4	1991-02
2021	Manufacture of veneer sheets; manufacture of plywood	Import-Subs.			0.62	0	2.3	3.86	10.5			45.89	0.97	2.0	1994-02
2022	Manufacture of builders' carpentry and joinery	Export-Oriented	0.29	3.7	0.39	0	6.7			0.35	14.2	-4.12	1.00	1.4	1995-02
2412	Manufacture of fertilizers and nitrogen compounds	Import-Subs.			0.34	0	1.0			0.21	4.2	-0.56	0.94	3.5	1995-02
2610	manufacture of glass and glass products	Import-Subs.	0.07	0.4		0				0.35	13.1	-1.53	0.98	2.2	1993-02
2930	Manufacture of domestic appliances	Import-Subs.		0.18		1	6.5			0.06	11.8	3.06	0.99	1.9	1993-02
3410	Manufacture of motor vehicles	Import-Subs.			0.02	2	0.1			0.24	-2.3	0.84	0.94	2.2	1995-02
3591	Manufacture of motorcycles	Import-Subs.			0.14	2	0.7					-3.93	1.0	2.4	1995-02

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