

DISSERTATION

THE E-COMMERCE SALES TAX:
A CASE STUDY OF THAILAND

Submitted by

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In partial fulfillment of the degree requirements

For the Degree of Doctor of Philosophy

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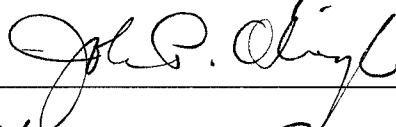
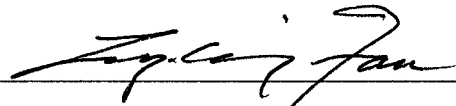
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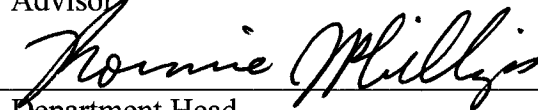
WE HEARBY RECOMMEND THAT THE DISSERTATION PREPARED UNDER OUR SUPERVISION BY KALAYA UDOMVITID ENTITLED "THE E-COMMERCE SALES TAX: A CASE STUDY OF THAILAND" BE ACCEPTED AS FULFILLING IN PART REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY.

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ABSTRACT OF DISSERTATION
THE E-COMMERCE SALES TAX:
A CASE STUDY OF THAILAND

The increase in commercial transactions by electronic means or e-commerce has concerned many governments because of lost tax revenues due to e-commerce. There is a difficulty in including e-commerce transactions in the general sales tax base, if agents and products dealing with e-commerce are in digital forms. The governments have realized that they have to minimize such tax losses, particularly the sales tax. Imposition of a new tax targeted at Internet sales is a method to prevent tax losses. However, based on optimal tax theory, preventing tax losses is not a sufficient reason for a government to decide to add a new e-commerce tax on the existing tax system. This study illustrates that criteria such as efficiency, equity, administrative costs, and technology feasibility which should be used to assess an e-commerce tax. This study applies such criteria to assess the e-commerce tax in developing countries by using Thailand as a case study. After weighing the criteria, this study suggests that an e-commerce tax should not be imposed in Thailand in the next few years. This study also demonstrates that there has been only a small amount of sales tax that has been lost from e-commerce in recent years. If the e-commerce transactions are exempted from sales tax, the tax loss is less than 1 % of total tax revenues by 2004. Nevertheless, the tax losses would increase

significantly in the future. The study recommends that the Thai government needs to revise the existing tax rules to prevent the tax losses and keep tax neutrality between traditional and electronic commerce. Moreover, to facilitate policy-making decision concerning e-commerce, including tax policies, data gathering is the most important task of the Thai government.

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CHAPTER 1

INTRODUCTION

1.1 The Growth of E-Commerce and Taxation Issues

Electronic commerce (e-commerce) refers to commercial transactions of organizations and individuals that are based upon the processing and transmission of digitalized data, including text, sound, and visual image carried out over the electronic means such as the Internet and private network. In recent years, e-commerce has grown rapidly because e-commerce creates new markets in time, space, and information. With e-commerce, consumers can log on from home or anywhere to buy goods and services over the electronic means such as the Internet. They do not need to travel to stores. Likewise, business parties can easily link their electronic information together with an efficient management, such as inventory, supply stock, and distribution channel. The efficient management allows a business to reduce costs. The benefits that consumers and businesses experience increase use of e-commerce.

In 2000, the value of total global e-commerce was \$657 billion. Forrester Research, Inc. projected that e-commerce will increase to \$6,789.8 billion in 2004 (Figure 1.1). This value is about 8.6% of total global sales in 2004. Close to 80% of e-commerce is concentrated in North America, particularly in the US. E-commerce by countries outside the United States also tends to increase, especially in Western Europe

and Japan, followed by the rest of Asia, America, and then Africa. For Thailand, e-commerce also has expanded.

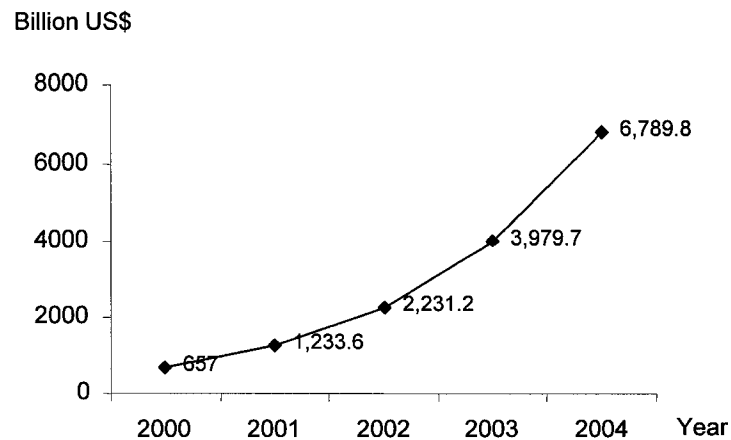


Figure 1.1 Projected Global E-Commerce 2000 – 2004

Source: Forrester Research, Inc.
(Cited in www.platts.com/ebusiness/forrester.shtml)

Due to the sudden worldwide expansion of e-commerce, especially the sales of goods and services over the Internet, a debate has emerged on whether e-commerce should be taxed. In recent years, sales tax losses from e-commerce have been increasing. This is because electronic technology allows sellers in electronic business not need to have physical stores located near to buyers since the buyers can easily order goods and services via the Internet. Moreover, some goods and services, such as computer software, music and electronic newspaper, are possibly shipped via the Internet. All these special characteristics of electronic business enable sellers to avoid paying a sales tax even if

customers live within the state/country. Some studies have forecasted that the tax revenue loss due to the e-commerce would rise very rapidly in the next few years.

Under the United States retail Sales Tax rules, for example, when Seattle-based Amazon.com sells books to someone in Colorado, the state of Colorado cannot require the out-of-state retailer to add Colorado sales tax to the purchase. Although buyers in Colorado are required to pay a use tax to the state of Colorado, the buyers always omit it. This causes a tax revenue loss for the state government. A report to the Congress by the Advisory Commission on Electronic Commerce shows that if Internet commerce is exempted from the sales tax, state and local governments could lose \$3.5 billion by 2003. This accounts around 2% of total US sales tax. However, this loss could reach 10% by 2007.

Although the e-commerce tax revenue loss in developing countries like Thailand has not increased as much as that of the United States or other developed countries, the Thai government has been concerned about this problem, especially the revenue loss from virtual stores both inside and outside the country. With the Value Added Tax (VAT), the problem of tax avoidance from non-physical present sellers in Thailand is not as large a problem as in the US. This is because sellers located either in or out of Thailand have to pay VAT. The interesting problem is how to apply VAT to a virtual store that we do not know its location. Due to this problem, the Thai government tries to prevent a huge tax revenue loss from electronic business in the future. One way for the Thai government to prevent tax revenue losses from e-commerce is to create a new tax for the e-commerce itself. However, it is not easy to implement because of two main reasons. First, now that we have many kinds of taxes, the government has to be

concerned about how to impose an additional sales tax on e-commerce as an integral part of the entire tax system. To impose a new tax the government faces a trade off between increasing tax revenue and higher administrative costs. Second, the government needs to be concerned about the Internet as an economic fueling factor in recent years. E-commerce tax should not slow down the economic growth.

1.2 Objectives and the Plan of This Study

This study aims at investigating the status of e-commerce and tax revenue losses from e-commerce in developing countries, using Thailand as a case study. This study will also assess the e-commerce tax policy with efficiency, equity, and administrative costs as criteria. The objectives of this study can be summarized as follows.

1. To study e-commerce in Thailand and the corresponding tax revenue loss, particularly the sales tax.
2. To study the criteria for assessing the e-commerce tax policy for developing countries. We will determine whether various taxes work well together if the e-commerce sales tax is added onto the existing tax system. Then these criteria will be applied to a case study: Thailand.
3. To recommend tax policies if we cannot tax e-commerce directly. From many developed countries' experiences, such as the United States, and European Countries, e-commerce tax is in moratorium for a few years because of the administration costs. Therefore, for developing countries, the interesting issue would be how the government could prevent the revenue losses.

The structure of this study includes:

1. Theory

Theories of optimal taxation are the foundation of this study. The optimal tax theory is based on three important criteria: efficiency, equity, and administrative costs. However, within these broad criteria, this study will add several quantitative indices, such as the concentration index and the dispersion index, that are very useful for assessing a tax system in developing countries. Moreover, because e-commerce deals with a new technology (information technology), we need additional criteria under a given technology. A good e-commerce sales tax should be implemented under this particular technology, which the government has. If the government needs to invest in a new technology, it should not cost more than additional tax revenues collected from e-commerce. At the same time, the e-commerce tax should keep pace with e-commerce development.

2. An economic model

This study will develop an economic model to estimate and forecast tax revenue loss from e-commerce in Thailand if the e-commerce is exempted from a sales tax. Even though the e-commerce tax is relevant in both income and consumption tax, the consumption tax, however, has increased its importance relative to income tax in developing countries. Therefore, this study will be limited to a scope of only a projection of consumption tax (sales tax) losses if e-commerce tax is exempted.

To estimate sales tax losses from e-commerce, the model will use a tax base in which the estimated e-commerce is a proportion of the total sales. If we assume that no excess supply or demand exists in the economy, the total sales would be the tax base.

After that, this study will apply tax rates to the approximate e-commerce value. For example, if e-commerce is 5% of the total sales and the tax rate is 10%, then every 100 Baht of increasing total sales will cause a 0.5 ($=100*0.05*0.1$) Baht loss from e-commerce.

3. Data collection and empirical study

This study will use secondary data to support the theoretical analysis and the economic model. This study cannot do a field survey for primary data because of the cost factor and there is no systematic data in developing countries. The collected data can be roughly categorized into two groups. The first group of data will be collected from research and empirical studies done on developed countries, such as the EU and the US. The second group of data will be collected from studies on developing countries done by international organizations. The secondary data from Thailand for this case study are collected as well. The data include demographic, economic and information technology indices. In addition, data from several surveys on Internet usage and e-commerce in Thailand will be included.

CHAPTER 2

E-COMMERCE

2.1 Developments of E-Commerce

The primary stage of electronic commerce (e-commerce) started from using electronic data interchange (EDI) between business and business over private networks. The use of EDI was the most important business development that changes business transactions from paper-based to electronic-based. However, EDI is limited to a small group of users. Choi (1997) mentioned several reasons for the limited use of EDI, with the most important reason being that EDI requires a large amount of capital investments because EDI is a private network and transactions depend on proprietary software. A new hardware and software need to be developed each time when a new EDI system is developed. In addition, EDI transactions are limited to machine-to-machine communications based on machine-readable forms. Therefore, in the first stage of e-commerce, the business transactions are limited to a small group.

The revolution of e-commerce occurred when the Internet was developed. The Internet provides a different communication method than EDI. The openness of the Internet in the 1990s facilitated connections between computers and supported exchange of data in various platforms. We can use a wide variety of application software to conduct many activities, which EDI does not support, through Internet

network. The rapid growth of the World Wide Web, for example, has established the importance of communicating multimedia contents and user-friendly interfaces. At the same time, the ease in using web browsers and authoring software, such as Hyper Text Markup Language (HTML), has spurred the number of Internet users and computers to connect to the Internet. Product and service information can be easily provided to buyers and sellers on the Internet. With this potential, businesses have found a new channel to do commercial transactions through the Internet.

Generally, E-commerce can be categorized into three types: business to business (B2B), business to consumer (B2C) and business to government (B2G). For B2B, e-commerce facilitates supplier management, inventory management, distribution management and payment management by linking an individual company's business with outside suppliers and distributor parties. For B2C, E-commerce is used as a way to connect consumers to businesses. Customers can learn about products through electronic publishing, buy products with electronic money, and find online information about existing and new products or services over the network. Almost all of e-commerce studies concern with these first two types (B2B and B2C), there is not much attention paid to B2G. This is because the B2G is not developed so far and it has limited services. Nowadays, the main electronic transaction in B2G is tax services.

2.2 Worldwide E-Commerce

There has been a vast growth of e-commerce in the United States, Western Europe, and Japan. Table 2.1 shows that the value of online commerce in the United States is expected to increase from \$488.7 billion in 2000 to \$3,189 billion in 2004.

Table 2.1 Projected E-Commerce Growth
(Billion of US Dollars)

| | 2000 | 2001 | 2002 | 2003 | 2004 | % of total sales in 2004 |
|--------------------------|-------|---------|---------|---------|---------|--------------------------|
| Total | 657.0 | 1,233.6 | 2,231.2 | 3,979.7 | 6,789.8 | 8.6 |
| North America | 509.3 | 908.6 | 1,495.2 | 2,339.0 | 3,456.4 | 12.8 |
| United States | 488.7 | 864.1 | 1,411.3 | 2,817.2 | 3,189.0 | 13.3 |
| Canada | 17.4 | 38.0 | 68.0 | 109.6 | 160.3 | 9.2 |
| Mexico | 3.2 | 6.6 | 15.9 | 42.3 | 107.0 | 8.4 |
| Asia Pacific | 53.7 | 1,17.2 | 286.6 | 724.2 | 1,649.8 | 8.0 |
| Japan | 31.9 | 64.4 | 146.8 | 363.6 | 880.3 | 8.4 |
| Australia | 5.6 | 14.0 | 36.9 | 96.7 | 207.6 | 16.4 |
| Korea, Republic of | 5.6 | 14.1 | 39.3 | 100.5 | 205.7 | 16.4 |
| Taiwan | 4.1 | 10.7 | 30.0 | 80.6 | 175.8 | 16.4 |
| All other | 6.5 | 14.0 | 60.6 | 130.5 | 197.1 | 2.7 |
| Western Europe | 87.4 | 194.8 | 422.1 | 853.3 | 1,533.2 | 6.0 |
| Germany | 20.6 | 46.4 | 102.0 | 211.1 | 386.5 | 6.5 |
| United Kingdom | 17.2 | 38.5 | 83.2 | 165.6 | 288.8 | 7.1 |
| France | 9.9 | 22.1 | 49.1 | 104.8 | 206.4 | 5.0 |
| Italy | 7.2 | 15.6 | 33.8 | 71.4 | 142.4 | 4.3 |
| Netherlands | 56.5 | 14.4 | 30.7 | 59.5 | 98.3 | 9.2 |
| All other | 25.9 | 57.7 | 123.4 | 240.8 | 410.8 | 6.0 |
| Latin America | 3.6 | 6.8 | 13.7 | 31.8 | 81.8 | 2.4 |
| Rest of the world | 3.2 | 6.2 | 13.5 | 31.5 | 68.6 | 2.4 |

Source: Forrester Research, Inc. (Cited in www.platts.com/ebusiness/forrester.shtml)

Note: Total may not equal to sum of rows due to rounding.

Forrester Research also forecasted that the global e-commerce will increase to \$6,789.8 billion by 2004. Elsewhere, Iyer, Taube, and Raquet (2002) estimated that the value of global e-commerce would be around 3,200 billion in 2004. However, the proportion of e-commerce in each region as percentage of total e-commerce found in both studies does not differ significantly. Both studies estimated that around 75% of e-commerce is concentrated in the United States. This fast expansion of US e-commerce

is because US businesses are the first to adopt e-commerce, and because many US companies produce globally. E-commerce by countries outside the United States also increase, especially in Western Europe and Japan, followed by the rest of Asia, and then Latin America. The industry that has the highest value of e-commerce transactions is computer and electronics, and then followed by motor vehicles, and petrochemicals. Iyer, Taube, and Raquet (2002) have shown more detail statistics on the value of B2B and B2C between 2000 and 2004. They reported that the proportions of total e-commerce in B2B and B2C do not change drastically. B2B is around 83% while B2C is around 17% during 2001 – 2004.

2.3 The Growth of E-Commerce: Economic Perspectives

One might be wondering that why the presence of e-commerce provided by physical stores and non-physical stores has expanded very fast in recent years. In my study, I found that there are two important reasons for e-commerce to grow dramatically: (1) increase in customer demand for e-commerce and (2) e-commerce helps sellers to reduce overall costs. In other words, e-commerce is being offered worldwide not only due to supply side influences, but also due to customer demand. Moreover, technological development has enhanced the possibility of e-commerce expansion.

A. Increase in Customer Demand

There are many reasons why demand for e-commerce is increasing. However, I categorized the factors contributing to the increase in demand into four groups:

timelessness, spacelessness, costlessness, and variety¹. Timelessness means that the store is never closed as long as customers have access to the electronic network like the Internet. Customers can do shopping, investment, and financial transaction at any time, day or night. Spacelessness means that customers can log on from home or anywhere in the world and do business transactions directly over the Internet or private network. They do not need to travel to a store or a business office. A very interesting example is online education. People can learn and get a degree from home or anywhere. The only way for foreign students to study in US university by the conventional way is physically coming to the US. With the advance of the Internet, the Web now enables distance education, providing easy electronic communication between students and instructors, and among classmates. Costlessness means that customers do not have to pay a travel cost in going to the physical store because customers can do a transaction at their home or anywhere. Variety means that consumers have wider choices and they can compare prices or qualities from different providers. Internet technology allows sellers to provide more and very detailed content. Therefore, buyers can compare among stores' offerings through the websites. In summary, e-commerce improves consumer convenience in time, space, and information.

B. Production Cost Reduction

As with Internet technological change, sellers find an easier way to reduce cost of doing the things they are already doing. For the B2C e-commerce, Borenstein and

¹This study does not focus on price reduction as a cause of increasing demand for e-commerce since the conclusion is not discovered on this issue. From an empirical literature review by Smith, Bailey and Brynjolfsson (1999), they found that there were different results on current studies.

Saloner (2001) explained the source of cost saving to include “*the reduction of handling within the store (unpacking, stocking and maintaining shelves, and such), theft (which can easily account for 3% of the sale of a retailer), rent (low-cost distribution centers replace expensive urban or suburban real estate), and selling costs (automated and tele-sales replace relatively expensive in-store salespeople)*”.

For physical goods, e-commerce plays an important role in reducing production costs. In automobile purchase and sale in the United States, for example, intermediaries and information services on the web have changed the process of buying a car.

Producers open their website which consumers can directly access to order wanted options. By this way the automobile producers can reduce over-supply.

Moreover, for information products, the potential for value creation is huge. For example, financial transactions, with their products being non-physical (i.e. services which a bank provides to consumers rather than selling goods.), e-commerce makes a big change to this sector in terms of lowering the cost of processing transactions and reducing the number of branches required to provide service to an equivalent number of customers. Statistics show that the average cost for a full-service branch transaction is roughly \$1.07. Since an electronic banking transaction links directly to a back-end processing system, an Internet transaction costs only \$0.01 (Figure 2.1). The savings associated with Internet transactions are greater due to the small incremental cost of servicing additional Internet customers compared to the large cost of opening a new branch.

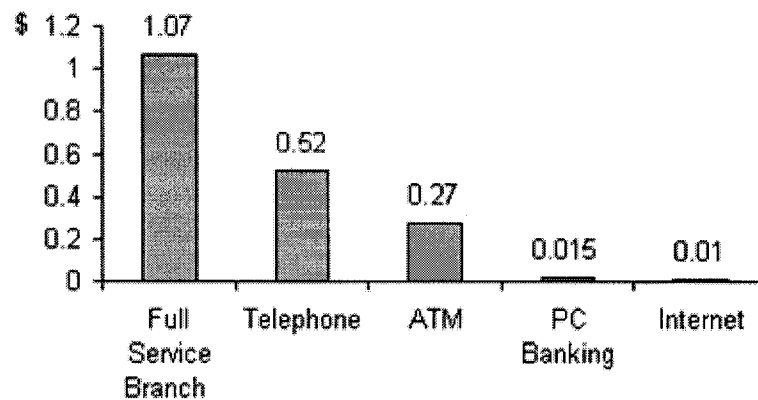


Figure 2.1 Banking Transaction Costs

Source: Electronic Banking

Another interesting example of cost reduction in B2C e-commerce is “Cisco Connection Online (CCO)” which is a website set up by Cisco in 1994. This website provides downloads of new released software, technical support and customer services. Bingi, Mri, and Khamalah (2000) claimed that the Cisco company saves about \$180 million per month in distribution, packing, and duplicating costs when new released software is handled by such website instead of the conventional way. The CCO also saves an additional \$50 million a month for printing and distribution of catalogs and marketing material to customers.

In recent years, in addition to the financial and software industries, there are also drastic changes in other information services; for instance, ticketing for travel or entertainment, newspaper or magazine, and education which e-commerce helps service providers to reduce production costs.

In B2B e-commerce, e-commerce contributes mostly to cost reduction by linking industries and suppliers electronically along the supply chain. It reduces procurement costs because e-commerce facilitates industries to find the lowest supplier prices. Moreover, a better flow of information reduces inventory stocks. OECD's report (2000a), for example, cited Goldman Sachs's study that the potential cost saving from B2B e-commerce in US industries would be between 2 and 40% of total input costs depending on the industry (Table 2.2).

Table 2.2 Potential Cost Saving from B2B E-Commerce in US industries

| Industry | Cost Saving (As a percent of total input costs) |
|--|---|
| Aerospace Machining | 11 |
| Chemicals | 10 |
| Coal | 2 |
| Communications/Bandwidth | 5-15 |
| Computing | 11-20 |
| Electronic Components | 29-39 |
| Food Ingredients | 3-5 |
| Forest Products | 15-25 |
| Freight Transport | 15-20 |
| Healthcare | 5 |
| Life Science | 12-19 |
| Machining (Metals) | 22 |
| Media and Advertising | 10-15 |
| Maintenance, Repair and Operating Services | 10 |
| Oil and Gas | 5-15 |
| Paper | 10 |
| Steel | 11 |

Source: OECD, 2000a (Cited from Goldman Sachs).

From macro economic perspectives, efficiency improvements generated by e-commerce can be highlighted as follows:

C. Reduced Transaction Costs

By linking industries and consumers through the Internet, e-commerce has a potential to reduce transaction costs. It reduces search costs by allowing consumers to increase access to information. As long as transaction cost is zero because everyone can symmetrically access information, economic agents can go to markets efficiently.

D. Increasing Return to Scale

Aggregation of consumer product information may also prove to be a source of increasing returns. For example, the Internet banking allows banks to offer new services; for instance, brokerage services, mutual funds, insurance, mortgages, car loans and credit cards. Generally, a buyer would rather visit a website with many opinions or information than fewer. Hence, with the same amount of total costs, these new additional services could generate additional revenue from new customers or initial customers. This can reduce the marginal cost of services provided.

E. Perfect Information

E-commerce reduces market entry barriers for producers, given that the cost of setting up and maintaining a web site is much lower than the installation of a “brick and mortar” firm. A large number of producers will increase competition and increase efficiency because more competition among suppliers will reduce monopolistic profits and the number of intermediaries.

The above-mentioned experience from e-commerce brings markets close to efficient markets and increased competition benefits consumers. Economic efficiency

arises because information about supply and demand is fully contained since e-commerce brings all buyers and sellers together. There are no barriers to entry Every buyer is matched with the supplier that meets his needs. Prices are exactly at the level that keeps supply and demand in equilibrium and there are no transaction costs such as time wasted in seeking the right product.

2.4 E-Commerce in Thailand

2.4.1 Estimation of E-Commerce in Thailand

International Telecommunication Union (ITU, 2000) reported that e-commerce market in Thailand in 1998 was \$9 million and was forecasted to rise to \$2,300 million in 2004 (Figure 2.2). Combined with a survey by Lemagkadej (2000) for the Ministry of Commerce, I found that 80% of e-commerce in Thailand is B2B and 20% is B2C. However, the growth rate was not as high as developed countries. From a ranking of e-commerce growing rates by Pyramid Research (www.e-businessforum.com), Thailand E-commerce was ranked 46 out of 60 countries in 2001.

The Electronic Commerce Resource Center of Thailand (ECRC) created a website survey in 2001. The survey found that there were 3,765 active Thai websites doing e-commerce. These websites provide different levels of e-commerce from basic to advanced level. A basic e-commerce website provides only advertisement on its website, while an advance e-commerce website includes ordering and paying function in its website. The ECRC's survey found that only 11% of Thai e-commerce website facilitates advanced e-commerce application including online ordering transactions and payment. This figure implied that the development of e-commerce in Thailand is still in

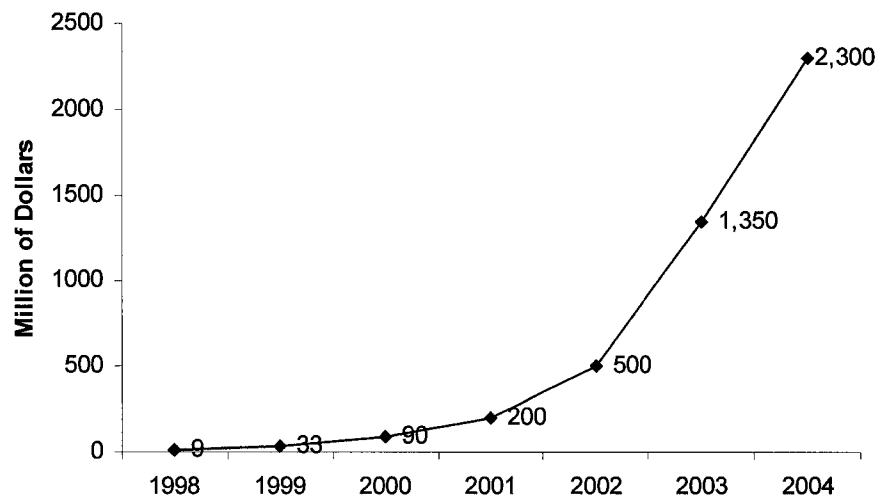


Figure 2.2 E-Commerce in Thailand

Source: ITU

an early stage since the number of websites that could perform a real business transaction, such as ordering and paying transactions, was not large. This status was confirmed by a survey of the Thailand Development Research Institute (TDRI) as shown in Figure 2.3 which reported that in 1999, around 15% of e-commerce websites in Thailand has advance transactions and around half of all e-commerce websites did only advertisement instead of business transactions (Tangkitwanich, 1999). The number of advanced e-commerce websites reported by ECRC (2001) and TDRI (1999) mentioned above were not much different. I note that although the number of business doing e-commerce has increased overtime, the development of e-commerce in Thailand did not go so far. Businesses only use e-commerce as a new channel of advertisement rather than doing electronic business transaction.

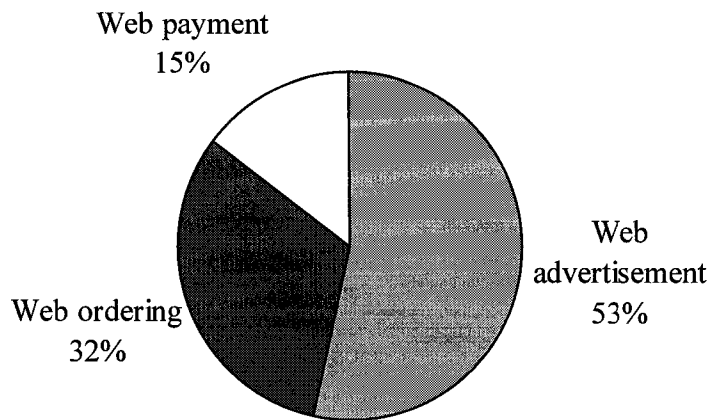


Figure 2.3 E-Commerce Transactions Provided in Thailand (1999)

Source: Tangkitwanich, TDRI.

TDRI's survey indicated that the top five industries providing e-commerce websites, by size order, were hotel, sport & tourism, computer software & hardware, media & news, and Internet related services. When looking at the product shopped online in Figure 2.4, the most frequently online-shopped products are books, followed by CD & VCD, data & information, computer software, and computer hardware. It is surprising that computer software and hardware were not the top ranked of online-shopped products as those of developed countries. Around 17% of people shopping online bought computer software and less than 10% bought computer hardware.

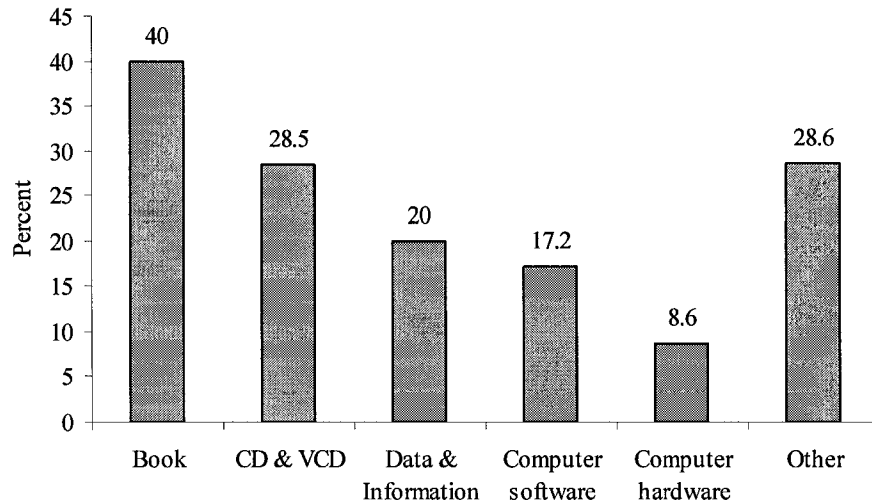


Figure 2.4 Products Shopped Online (1999)

Source: Tangkitwanich, TDRI.

Note: The total percent is over 100 percent because a respondent can answer more than one goods.

2.4.2 Problems of E-Commerce in Thailand

Table 2.3 shows that even though the value of e-commerce in Thailand has risen over time, it is not much when compared with the other developing countries in South East Asia; for instance, Philippines, and Indonesia.

Table 2.3 E-Commerce in Thailand, Philippines, and Indonesia (2000)

| Countries | E-commerce (million US\$) | E-commerce as % of GDP (%) |
|-------------|--------------------------------|-------------------------------|
| Thailand | 90 | 0.001 |
| Philippines | 250 | 0.004 |
| Indonesia | 100 | 0.969 |

Source: Collected and calculated from ITU statistics

A problem facing e-commerce in Thailand is a lack of electronic payment system, especially credit cards, which are generally used as a means of in Internet shopping. Although the number of credit cards issued by Thai commercial banks and foreign branches in Thailand was increasing rapidly before the Asian economic crisis in 1997, the number of people holding credit cards has been less than 5% of adult population (Table 2.4). After 1997, the number of credit cards dropped, and then increased again in 2001. However, the percentage of adults acquiring credit cards was still less than 5%. Combining this picture with the value of credit card transactions, I found that the value of transactions through credit cards was low too. For example, in 2001 the value of transactions was around 226 billion Baht.

Table 2.4 The Value of Transaction and Number of Credit Card in Thailand

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|---------|---------|---------|---------|---------|---------|-----------|
| Value of Credit Card Transaction (Millions of Baht) | 131,850 | 149,656 | 149,392 | 147,109 | 151,945 | 170,164 | 226,489 * |
| Number of Credit Card (Thousands) | 1,895 | 1,972 | 2,010 | 1,097 | 1,574 | 1,766 | 2,148 |
| Total Population | 59,400 | 60,003 | 60,602 | 61,201 | 61,806 | 62,405 | 62,914 |
| - Adult (15+) | 42,856 | 43,556 | 44,270 | 44,992 | 45,722 | 46,425 | 47,052 |
| (Thousand persons) | | | | | | | |
| Percent of adult holding credit card ** | 4.42 | 4.53 | 4.54 | 2.44 | 3.44 | 3.80 | 4.57 |

Source: Bank of Thailand and National Statistics Office of Thailand

Note: * Forecasted number because the exact numbers were collected until Sep 2001.

** Assume that each person holds one credit card.

Slow development of e-commerce in Thailand is also caused by security problems, intellectual property, and culture factors. From NECTEC, TDRI and ITU surveys, there was a consensus that the major reason for not shopping online is lack of

confidences when paying by credit cards. Shoppers still use the traditional way of shopping because of problems regarding security. Buyers do not want other people to know their business especially financial transactions. Buyers also need security from hackers who tamper with their accounts. Although financial institutes try to use firewalls or encryption technologies to protect against unauthorized access, people fear of these potential problems has not been eliminated. Security problems cause a lot of customers not to believe in electronic transactions; they still prefer to make their transactions by the traditional way.

Another obstacle to e-commerce in Thailand has been the availability of illegal electronic media such as computer software, music and VCDs. Illegal electronic medias are much cheaper than the legal ones because they do not include a copyright cost. Usually, the electronic media is the main product for online purchases in other countries. Since it is cheap and easy to buy illegally, the value of e-commerce by these main products is not high and then cause the total e-commerce value in Thailand to be lower than it should be. Figure 2.4 (mentioned before) is good evidence; the percentage of online-shopped product is not high for CD&VCD and computer software. Although Thailand has a copyright law, which is generally used to protect foreign copyright in Thailand, there is still a lack of resource for enforcement.

Culture factors are also one of the problems for e-commerce growth. Buyers prefer physical shops to virtual stores since it is easier for them to compare features in physical stores. For example, when a consumer wants to buy a new perfume, one prefers to test the smell in the shopping mall rather than buy it online. We call this “touch and feel” problem. In addition, some web sites offer lower prices than traditional

store but when customer incorporate estimated delivery time and shipping costs in their decision, they may still purchase from traditional stores.

In conclusion, the status of e-commerce in Thailand is still in its infancy. Although, the Internet technology and global e-commerce development have facilitated e-commerce growth, several problems mentioned above have obstructed the growth of e-commerce.

CHAPTER 3
THEORETICAL FOUNDATION:
TAX ASSESSMENT INDICES

This chapter aims to develop a set of criteria for assessing an e-commerce sales tax in developing countries and then to apply this set of criteria to Thailand. Before developing a set of criteria to assess an appropriate sales tax in developing countries, I have reviewed three principles used as main tools for this study.

The first principle is in objectives of general taxation: efficiency, equity, and administrative costs, which are generally used in public finance for evaluating a tax system. These general criteria are important because deciding the appropriateness of an e-commerce sales tax requires making trade offs among overall objectives of a tax system.

The second principle is based on V. Tanzi's (1991) justification. Tanzi's approach would be added because the three general taxation criteria are too broad and we need some specific quantitative indices. Tanzi identified specific eight indices used for assessing a tax in developing countries interested by this study.

The last principle is from the Organization for Economic Cooperation and Development (OECD). OECD's criteria for assessing an e-commerce tax are set for developed countries in the European Union. The OECD's criteria are mostly similar to the first general taxation principle, with one essential difference that OECD has added the technology criterion into its approach. The OECD criteria should be relevant to this

study because the viability of an e-commerce tax should be evaluated in the context of a given technology in that the tax should not obstruct e-commerce development and should stimulates long run economic growth.

After reviewing the three sets of criteria mentioned above, in the second section of this chapter I synthesize and select the appropriate set of indices for this study. In the last section of this chapter I apply the set of criteria to the case study of Thailand. To assess the e-commerce sales tax in Thailand, I will also use secondary and survey data to support my analysis in later chapters.

3.1 Principal Theories

3.1.1 Three General Criteria in Taxation

Many public finance economists have agreed to use the three general criteria- economic efficiency, equity, and administrative costs- to evaluate a tax system. Sandmo (1976), for example, wrote that *“first, one could argue that a good tax system is one which minimizes the resource cost involved in assessing collecting and paying the taxes. Second, one could evaluate alternative tax system in terms of justice or fairness. Third, tax system can be ranked according to the criterion of economic efficiency”*.

Economic efficiency is an objective which aims to minimize excess burden. Excess burden measures distortions in behaviors of either producers or consumers, in terms of changes in demand or supply in markets. Tax burden also reduces the incentive to engage in all of activities people undertake to better themselves such as working harder, acquiring education and training, creating new products and ways to do business, and so on.

A lot of studies dealing with economic efficiency and tax policies have focused on effects of income tax and consumption tax on economic behavior. The impacts of an income tax on economic efficiency give attention the effect of changes in marginal tax rate on work effort, on saving, and on investment. By the same token, the consumption tax analysis emphasizes the effect of taxes on prices which alter consumption and/or production choices.

However, efficiency alone is not enough for tax assessment. As the very famous Ramsey Rule has shown, tax rates should be inversely related to compensated demand elasticities. This implies that goods that have inelastic demand should be taxed at a relatively higher rate because demand will not change much from its initial level before adding a tax. One can see that the inverse-elasticity rule has equity implications especially in case of necessary goods consumed more heavily by low-income people. If we tax a medicine with a high tax rate, for example, poor people may not have a chance to get a treatment since it is too expensive for them. The question is raised that whether it is fair for the poor people to pay a high tax rate for the medicine. So we face a second best problem of trade-offs between economic efficiency and fairness. Therefore, the economic efficiency objective alone is not enough for designing a good tax policy. We need to be concerned with the equity or fairness objective too.

There are two distinct aspects of fairness or equity in a tax system. "Horizontal equity" concerning with same tax for families in the same position. "Vertical equity" refers to different treatment for people who are in different positions. In this study, position means the ability to pay instead of benefit principle. Economists have proposed two principles for determining the fair distribution of tax burden among different types

of people. The first is the “benefit principle”, which states that each individual ought to pay taxes commensurate to the benefits he or she receives from the government. The second is the “ability to pay principle” which states that the amount each taxpayer pays ought to be related to his or her level of economic well-being or income.

The vertical equity deals with an appropriate degree of tax progressivity. A tax structure is called a progressive tax if a tax takes a larger percentage of income from those with higher incomes. With diminishing marginal utility of income, the tax burden should be higher for households with higher income and wealth. In brief, two people with same incomes or well-being should be treated in the same way under horizontal equity and two people with different incomes should be treated differently under vertical equity.

However, imposing a tax which can balance between economic efficiency and equity is not a costless activity. Gathering taxes requires consumption of resources by taxing authorities. At the same time, taxpayers incur costs in complying with the tax system. The cost of tax collecting is the sum of tax collection agency’s budget, the value of the time and money spent by the taxpayers, and cost incurred in the collecting process by third parties, such as employers who withhold tax for their employees. Hence, the choices of tax systems should take into account administrative and compliance costs. Even the systems that appear fair and efficient might be undesirable because they are excessively complicated and expensive to administer. In conclusion, for designing a good tax system, we need to balance economic efficiency, equity, and administration costs.

3.1.2 The General Principles and Diagnostic Tests for Tax Systems in Developing Countries

Tanzi (1991) elaborated on eight diagnostic tests for a tax in developing countries. He focused on the use of taxes as potential instruments together with other tax instruments. His eight diagnostic tests used for assessing the efficiency of a tax system are as follows.

1. Concentration index: A good tax system should have a high concentration index which shows that a large portion of total tax revenue comes from relatively few taxes and tax rates. With higher concentration the tax system becomes more transparent and more manageable. In order to calculate the concentration index, the revenue from each tax and from each rate must be taken separately. When the tax revenues come from few major sources it is easier to perform an incidence analysis of a tax and to assess its effect on income distribution, factor utilization, saving and so on.

2. Dispersion index: An efficient tax system should result in a lower number of low-yielding, nuisance taxes. A highly dispersed tax system will cause taxpayers to face high costs of compliance as they have to comply with so many taxes. On the other hand, the tax administration is likely to have a collection exceeding the revenue intake. The general rule is that to guarantee that costs per unit of revenue are covered by additional revenue, a new good tax should raise at least 1% of total tax revenue at the margin.

3. Erosion index: The third general diagnostic test is used to measure how actual tax bases are close to potential ones. Erosion causes an actual tax base to differ from a potential tax base. Erosion may originate from either legal actions (tax holiday, personal

exemptions and deductions, exoneration from import duties, zero rating) or illegal actions (evasion, smuggling). A good tax system should have low erosion.

4. Collection lags index: Tax payments may be delayed much beyond the time when they should be made. These delays may result from long allowable lags (legal lags) or from taxpayers' abuse (delinquency-lags). Tax delay may be because of the law or even insignificant penalties connected with such action. A good tax system should have a low collection lag.

5. Specificity index: This index diagnoses a degree of how much the tax system relies on specific (*ad rem*) taxes. A specific tax is a tax which a given dollar amount is levied on each unit purchased². For example, a tax on motor fuel is a certain number of cents per gallon. The higher the share of total tax revenue collected from specific taxes (that is, the higher specificity index), the more negatively would the total tax revenue be affected when there is inflation. A government interested in maximizing total tax revenue must minimize recourse to specific taxes.

6. Objective index: This index applies to the tax system of a country whose taxes are being levied on objectively measured base. In many developing countries, incomes, imports, sales, property, and the like, may have objectives or true values totally different from those on which the taxes are actually calculated. In some countries record keeping and accounting standards may be so poor that taxpayers themselves would be unable to assess their sales or income.

²Sales taxes and import duties generally have two forms: *Ad valorem* tax and *Ad rem* tax. *Ad valorem* tax is a tax with a rate given as a proportion of the price, while *Ad rem* tax is a tax with a rate given for each unit of purchased.

7. Enforcement index: When tax compliance is not enforced, the divergence between the statutory and the effective tax rate may become large because of evasion. Evasion can be reduced by higher penalties or better administration. However, Tanzi believed that the fight against evasion should use the higher penalties rather than better administration. The reason is that penalties can generally be increased without any pecuniary costs to government.

8. Cost-of-collection index: The lower the cost of collection the better the tax system. Overall statistics shows that the ratio of collection costs to revenue ranges from 2-3% in some countries to 7-8% in others.

3.1.3 Taxation Principles for OECD Countries

Governmental bodies and international organizations, including OECD, commonly agree that e-commerce should be taxed in accordance with the standard principle governing taxation of ordinary commerce. Under a study of the Committee of Fiscal Affairs, OECD (2000b) reported the conditions needed to implement an e-commerce taxation framework as follows.

1. Neutrality: Taxation should seek to be neutral and equitable between conventional and electronic forms of commerce. Taxpayers in similar situations carrying out similar transactions should be subjected to similar levels of taxation. Moreover, business decisions should be motivated by economic rather than tax considerations.

2. Efficiency: Compliance costs for taxpayers and administrative costs for the tax authorities should be minimized as far as possible.

3. Certainty and simplicity: The tax rules should be clear and simple to understand so that taxpayers can anticipate the tax consequences in advance of a transaction, including knowing when, where, and how the tax is to be accounted.

4. Effectiveness and fairness: Taxation should produce the right amount of tax at the right time. The potential for tax evasion and avoidance should be minimized.

5. Flexibility: The systems for the taxation should be flexible and dynamic to ensure that they keep pace with technological and commercial developments.

We can see that the taxation principles that guide governments in conventional commerce should be used to guide them in e-commerce too. The taxation principle looks for a possibility of implementation under the current technology and is concerned that a good e-commerce tax should not prohibit an advance of information technology or e-commerce development.

3.2 Indices Used in This Study

Although many governments have been concerned about tax erosion originated from e-commerce, until now we do not find a specific e-commerce sales tax being practiced in a country. This is because prevention of tax revenue loss alone from e-commerce businesses is not an enough justification for a government to add a new e-commerce tax to the current tax system. In Chapter 5, I have estimated tax revenue loss by e-commerce, and the results showed that tax revenue losses from e-commerce are still small. Therefore, it is not necessary for a government to enforce a new e-commerce tax to the electronic business, mainly in developing countries.

To design an e-commerce sales tax, a government should be concerned about other criteria, such as efficiency, equity, and administrative costs criterion. A good tax, for example, might minimize excess burden, balance equity among various groups of people, practice under a reasonable administrative costs, and foster growth of e-commerce. Consequently, in this section I have developed a set of criteria under the three general principles of efficiency, equity and administrative costs, for assessing e-commerce tax policy in developing countries.

First, in terms of economic efficiency, I focused my discussion on a price distortion associated with an e-commerce sales tax. For an income tax, economic efficiency issues always focus on distortions in economic behaviors of a tax on wage earnings: distortion in saving, investment, and labor supply. But for a sales tax (or Value Added Tax), economic efficiency always concerns consumption and production distortion in terms of price and quantity changes. According to the theory, imposing a sales tax will distort prices received by producers and paid by consumers, and changes of quantity in a market. The questions of how the prices and quantities change and who bears the burdens depend upon elasticities of demand and supply. Hence, the partial equilibrium analyze is useful to elaborate the distortion on prices and quantities in demand and supply. In the next section, I will use a partial equilibrium framework to analysis market distortions.

Second, in terms of equity, vertical equity and tax neutrality are important. As discussed before, equity is categorized in two types: horizontal and vertical equity. However, for the e-commerce sales tax I have emphasized vertical equity rather than horizontal equity.

Vertical equity concerns the appropriate tax burden on household of different levels of income. In fact, a high-income group has more opportunity to access the Internet than a low-income group. This unequal opportunity generates vertical inequity. The reason is that, the high-income people can afford to pay for Internet access fee and to buy a computer to use in their home or office. Therefore, if a high-income group does not pay a sales tax when purchases goods and services from the Internet, while a low-income group needs to pay a sales tax when they purchased from to traditional stores, there is vertical inequity.

In this study I do not focus on horizontal equity among the buyers because the same income level is assumed to have equal opportunity to access the Internet or private network. In developing countries, costs of access to the Internet, such as an Internet monthly fee and a price of computer hardware, are high. Therefore, the same level income groups face the same obstacle.

In addition, I paid my attention to tax neutrality between traditional stores and electronic stores (horizontal equity between sellers). The tax neutrality means that no one is preferred over another. A traditional store and an electronic store should be treated equally by a tax system. Tax should not favor electronic stores and punish traditional stores.

Third, in terms of administrative costs, I have included the costs of tax collection by a tax authority and costs of tax compliance by taxpayers, and costs of minimizing evasion. The administrative costs issue is sometimes neglected by the government. While tax authorities are interested mainly in the size of tax revenue, they

would often ignore administrative costs. The real problem is how to raise maximum tax revenue with minimum administrative costs.

Generally, the administration cost of a tax consists of the collection costs spent by collectors and compliance costs spent by taxpayers. The collection cost is the budget spent by tax authorities. The compliance costs include hours spent by individual on preparing a tax report and a tax return, researching tax laws, meeting with a tax advisor, and arranging financial affair to minimize taxes. The US in 1995, for example, Slemrod and Bakija (1996) reported that IRS spent \$7.6 billion to enforce all varieties of federal taxes, equivalent to 0.6% of the revenue it collected. However, the compliance costs imposed directly on the taxpayers, are not measured by IRS or other tax authorities. To estimate the compliance costs in developed countries like the US, economists have to do surveys for collecting primary data. However, for developing countries like Thailand, I have not found any study on tax compliance costs. For this reason, a quantitative analysis in this study will be done only on the collection costs.

Other interesting indices that would be included in this study regarding tax administration are the dispersion and concentration indices. There are important connections between appropriate costs and tax revenues. Even though a government spends a big sum to collect a tax, the additional tax revenue collected is a very small proportion to the whole tax revenue. This is because the collection cost not only accounts for a government budget items but it also involves costs in terms of lost economic activity. So when the government decides to collect additional one dollar tax revenue, the total cost will more than one dollar, especially in the beginning. By this

point, the most importance point is that the revenues should be big enough to cover the total costs in a planning period.

Then when the government adds a new tax, the government needs to make sure that the proportion of the additional tax is significantly large enough relative to total tax revenue. To justify how large of the new tax revenue it should be, I will use Tanzi's justification. As Tanzi has recommended on the "dispersion index", the additional revenue from a new tax should be larger than 1% of total tax revenue. This dispersion index states the average share of total tax revenue that should be accounted for the e-commerce sales tax. Furthermore, if the e-commerce sales tax is set up with multiple rates, the government has to be concerned about the "concentration index" too. This index provides the guideline that the proportion of total tax revenue generated by each tax rate would be measured as if it were from a different tax source.

The next issue related to administrative costs is tax avoidance and tax evasion. The distinction between tax avoidance and tax evasion is that the former is legal while the latter is illegal. A good example of tax avoidance is the experience from the tax reform in 1986 signed by President Regan. This tax reform reduced the top marginal tax rate in personal income tax and made it lower than the corporate income tax. This provided an avoidance opportunity for corporate income tax. In the US tax system a traditional C-corporation is taxed under the corporate code, while a S-corporation is taxed under the personal code. According to this marginal tax rates change, businesses avoided a higher tax rate by switching themselves from C-corporation type to S-corporation type. Slemrod and Bakija (1996) reported that "*the number of S-corporations which had been rising at a 7.7% annually between 1965 and 1986, jumped*

to 17.5% a year from 1986 to 1990. The number of C-corporations, which had been growing by an average of 3.5% per year from 1965 to 1986, dropped by 4.8% per year between 1986 to 1990". In brief, a high marginal tax rate increases the incentives for individuals or businesses to invest energy and money into complicated tax avoidance schemes. The marginal tax rate is exactly the return to reducing taxable income by a dollar.

Unlike tax avoidance, tax evasion is illegal and it is difficult to measure. People hide their income because they receive illegal income from illegal business, such as selling drugs, prostitution, so they want to cover up or do not report actual income to tax authorities. Another reason for hiding income is that some economic activities, such as home repairs, are easy to hide from tax authorities. The number of tax cheatings tends to increase when marginal tax rates go up (like the tax avoidance) because a marginal benefit from cheating is high. In the US, IRS estimated that taxpayers voluntarily pay only about 80% of their actual tax liability (Rosen, 1999). To prevent tax evasion, a government has to devote resource to tax administration for catching cheaters. However, another way to prevent cheating is to impose a high penalty. If the penalty is high enough, tax evaders will decrease because they have a high marginal cost for cheating.

The last criterion that I would like to add is technological flexibility or the possibility to implement tax under a given technology. This criterion was not directly mentioned in general taxation assessment criteria. But I think it is important for an e-commerce sales tax because e-commerce businesses have been related to technology very closely. An e-commerce tax may slow down the growth of e-commerce which play

important role in improving the economy in this digital age, so we need to be concerned about this.

The e-commerce tax may possibly be imposed in the next few years since the e-commerce business has been increasing. One difficulty for a government to implement the e-commerce tax comes from a lack of knowledge and tools (computer hardware and software) to enforce and audit business transactions. Due to special characteristics of e-commerce business, which will be explained in Chapter 4, a government needs to invest in a new technology for auditing electronic transactions. For example, if a payment is in electronic money, there is no way for the government to know exactly the transaction value. Even though some transactions are paid by using credit cards, and one can argue that the tax collector can ask for transaction information from banks issuing the credit cards, it is difficult to do so because banks have to keep their customer information confidential. So it is not easy for the government who has a low technology, like a government in developing countries, to audit electronic transactions.

Up to this point I have elaborated on several criteria under economic efficiency, equity, administrative costs, and technology flexibility to be used in this study. Table 3.1 summarizes all these criteria. They will apply to a case study in the next section. However, in this study I do not include all indices referred in Tanzi's article such as erosion index and collection lag index, because they are not appropriate for a sales tax or VAT. The erosion index, for example, is not included because there is relatively small erosion in a retail sales tax or VAT. Unlike an income tax, a sales tax does not have a lot of exemption, deduction and special treatment. The collection lag is also

excluded due to monthly tax report. In a VAT system, generally, businesses need to report for crediting of paying a tax every month, then there is no problem of a time lag.

Table 3.1 Criteria for E-Commerce Sales Tax Assessment

| Criteria | How to Assess |
|---|---|
| Economic Efficiency 1) Market distortion 2) Specific Index | 1) Whether there is a large deadweight loss after imposition of an e-commerce sales tax? 2) Does the inflation have a high effect on e-commerce tax? |
| Equity or Fairness 1) Neutrality 2) Vertical equity | 1) Do traditional or electronic stores get extra benefits or costs after tax imposition? 2) Is there any equity among various income groups? |
| Administrative Costs 1) Costs of collection. 2) Dispersion and Concentration indexes 3) Tax avoidance and Tax evasion | 1) Does the e-commerce sales tax use a high resource costs? 2) Is the proportion of new tax revenue greater than 1% of the total revenue? 3) How does the government response to tax avoidance and tax evasion? |
| Technological Flexibility | 1) Does an Internet tax obstruct e-commerce growth? 2) Is a new tax able to implement under a given technology? |

A government can prevent tax revenue losses and balance equity between who buy and do not buy online products by imposing a tax to e-commerce. However, the tax imposition will raise government administrative and compliance costs. The costs incur both directly and indirectly. Therefore, there is a trade off between social costs and benefits in the imposition of an Internet sales tax. In this study, I use Thailand as a case study to examine that if the Thai government should enforce a new sales tax on e-commerce, what impacts will there be for occur in the economy. I conduct my

analysis by following the criteria set up in the previous section and use available data to verify these criteria.

3.2.1 The Efficiency Criterion

A. Market Distortion

If a new tax is imposed on e-commerce, the new tax will bring about misallocation of resource and excess burden. Excess burden is sometimes referred to as welfare loss or deadweight loss. Rosen (1999) introduced two methods to measure a loss of welfare above and beyond the tax revenues collected. The first one is the measuring of equivalent variation (EV) and the second one is the measuring of consumer surplus. In this section I explore the analysis by using partial equilibrium and compensated demand curve as my tool to show the distortion from imposition of a new taxation on e-commerce.

Figure 3.1 illustrated how to measure the deadweight loss (DWL) by using equivalent variation (EV). There are identical products sold in the market through conventional and electronic commerce before an e-commerce tax is imposed, a consumer chooses to consume at point E_1 where there is no distortion. Suppose the Thai government decides to impose an e-commerce tax for products sale over the e-commerce as t %. With the same amount of income, the tax causes the real income of consumers to decrease. Thus, the budget line rotates from AD to AI since now the price of e-commerce product become $(1+t)P_e$. P_e is the price before imposing a tax on e-commerce. The new combination of transactions between traditional and electronic commerce is E_2 . The consumer is worse-off at E_2 than E_1 represented by a lower level

of an indifference curve. One can see that the consumer chooses to increase transactions in traditional commerce, while reducing transaction over e-commerce. The tax paid by the consumer is equal to GE_2 : the vertical distance between old and new budget line at point E_2 .

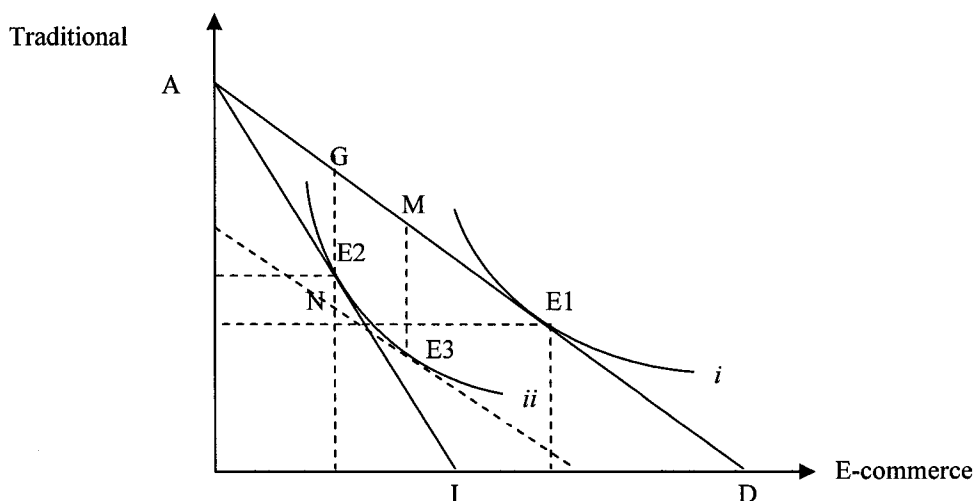


Figure 3.1 Measuring Deadweight Loss by Using Equivalent Variation

To examine that after the imposition of e-commerce tax how much distortion had occurred, we need to know the equivalent variation (EV). *The EV is the amount of income we would have to take away from a person (before e-commerce tax was levied) to induce her to move from i to ii . The EV measures the loss inflicted by the tax as the size of reduction in income that would cause the same decrease in utility as the tax.* (Rosen, 1999). In this case, EV is equal to ME_3^3 (or GN). One can see that ME_3 exceeds GE_2 by distance E_2N which means that the e-commerce tax causes this person

³We can find the equivalent variation by a parallel shifting of the old budget line inward until tangent to the new indifferent curve.

extra worse-offness by this amount. This is because the tax revenue is less than the lump-sum that would be taken away from this person. In order to estimate the EV in term of money, we need to know the prices and quantities consumed before and after taxed in both traditional and electronic means. However, data are not available for estimating the amount of distortion (or efficiency losses). We can illustrate only economic rationale as shown in Figure 3.1.

Another way to show the loss of the welfare is the measuring of the forgone consumer surplus as shown in Figure 3.2. The figure illustrates a market demand for e-commerce commodities (D_1) and supply of e-commerce commodities (S_1) in competitive market. In the absence of a tax, the equilibrium price and quantity of e-commerce market are P_1 and Q_1 . Suppose that the Thai government decides to add a new consumption tax to e-commerce sales by t % of the price (i.e. an *ad valorem* tax). The *ad valorem* tax causes the demand faced by producer rotates inward to D_2 ⁴. After adding a tax on e-commerce transactions, the price of the product purchased by e-commerce method is increased to $P_2 = (1+t)P_1$. Now, consumers have to pay P_2 for Q_2 . The new tax applied on e-commerce will lower the quantity of demand because at the higher price the consumer would want less of the product. This causes the level of production and consumption to be lower then it would have been in the absence of a new tax. Although the Thai government would receive additional tax revenue from e-commerce transaction equal to P_1P_2AB , there is an efficiency loss (DWL) ABC .

⁴In a case of *ad rem* tax (or per unit tax), this figure can be applied by shifting the supply curve upward parallel with S_1 . The new supply curve is S_{1+t} . t is noted for an amount of tax per unit.

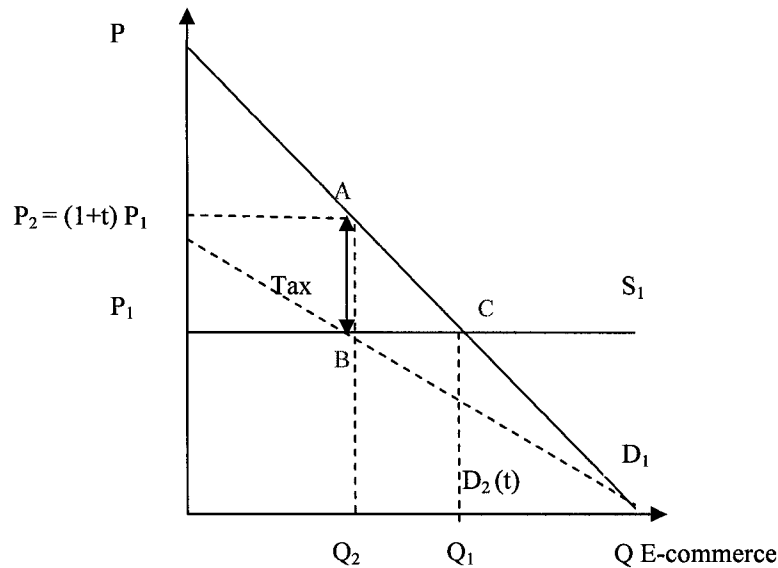


Figure 3.2 The Effect of Imposing a Tax on E-Commerce Transactions

Theoretically, DWL is directly proportional to the elasticity of compensated demand with respect to the price change. Imposing a tax on products that have inelastic demand generates less excess burden relative to the commodities that have elastic demand because the tax which raises the price does not change much demand for such inelastic demand. Moreover, a case that the compensated demand is perfectly inelastic, no DWL is found.

However, data on compensated demand and its elasticity are not readily available. Rather it is the uncompensated demand (i.e. the Marshallian demand curve) that is more readily observable. The compensated demand accounts for only the substitution effect but not the income effect. The only evidence from existing studies is that the demand for e-commerce is sensitive to a rising price due to a tax imposition (in various degree across countries). Goolsbee (2000b), for example, studied the uncompensated demand of online shopping in the US and found that e-commerce

transactions would be reduced by 25% if the existing sales tax (average sales taxes across states) was applied on the Internet transactions. For Thailand, Lemugkadej (2000) found that if the existing tax rate (7%) is imposed on e-commerce, e-commerce transactions would reduce by 5.57%. One can see that the demand elasticity for e-commerce in Thailand is low relative to the US's. The new tax imposition in Thailand would generate a lower level of deadweight losses because the tax does not have a high effect on e-commerce demand like in the US.

Although no more information is available, the market distortion as illustrated in Figure 3.2 and the evidence from Lemukadej's study is reasonable argument for the Thai government to impose a tax on e-commerce since there is likely a small distortion to be found in Thai e-commerce if any sales tax is imposition. Likewise, it is not surprising why the Internet transactions in the US are exempted from sales taxes. However, the government has to be concerned not to impose a higher tax on e-commerce than on other sectors since the tax incidence might obstruct the development of e-commerce.

B. Specific Index

The specific (*ad rem*) tax index is used to reflect the effect of inflation on total tax revenues. Theoretically, inflation could have a negative effect on tax revenues since higher prices of goods and services caused by inflation will lower the demand. Lower total demand would lower tax revenue in such goods and services because taxes are proportional to sales volume.

However, to the extent of the analysis at this point, we can look at the causes of changing demand due to changes in prices in two ways. For domestic products, inflation is an important factor affecting retail price in an economy. Furthermore, with import products, the exchange rate plays a key role to affect import prices. These two reasons explain why it is not good for a country to count on the specific tax if the objective is to maximize total tax revenue.

Fortunately, the VAT and import duties in Thailand do not take a specific form, therefore if an e-commerce tax, is instituted in Thailand, it is likely to be in the same manner as the existing VAT and import duties. The existing VAT and import duties are *ad valorem* tax which would be less affected by inflation and exchange rate relatively to a specific tax.

However, in the future, even if the Thai government would like to change the import duties to a specific form for some reasons, it still has less effect on e-commerce tax. This is because most e-commerce in Thailand is based on domestic and import transactions which are still in small volume, only around 19.44% of total e-commerce in 1998 (Lemugkadej, 2000). Therefore the main source that would generate the negative effect from specific tax is from domestic transaction.

3.2.2 The Equity Criterion

In the previous section, we can see that imposing an e-commerce sales tax brings a welfare loss to e-commerce consumers and producers. However, the absence of e-commerce tax is unfair to a person who does not have a chance to trade on the electronic means. Absence of an e-commerce sales tax also create an advantage to

virtual stores. This is the trade off between efficiency and equity. Thus, in this section I will examine the e-commerce sales tax in terms of the equity.

A. Tax Neutrality between Traditional and Electronic Commerce

Assume a good is available to consumers in two markets: traditional and electronic markets. There is no market failure, and consumers are divided between the markets based on their personal preferences. Now suppose that a tax is added to the traditional market only. This causes the price of the good in that market to increase. As this occurs, consumers would prefer buying online rather than buying from a traditional store. As depicted in Figure 3.3, the demand in traditional market decreases, while the demand in electronic market increase since a sales tax is absent from electronic market.

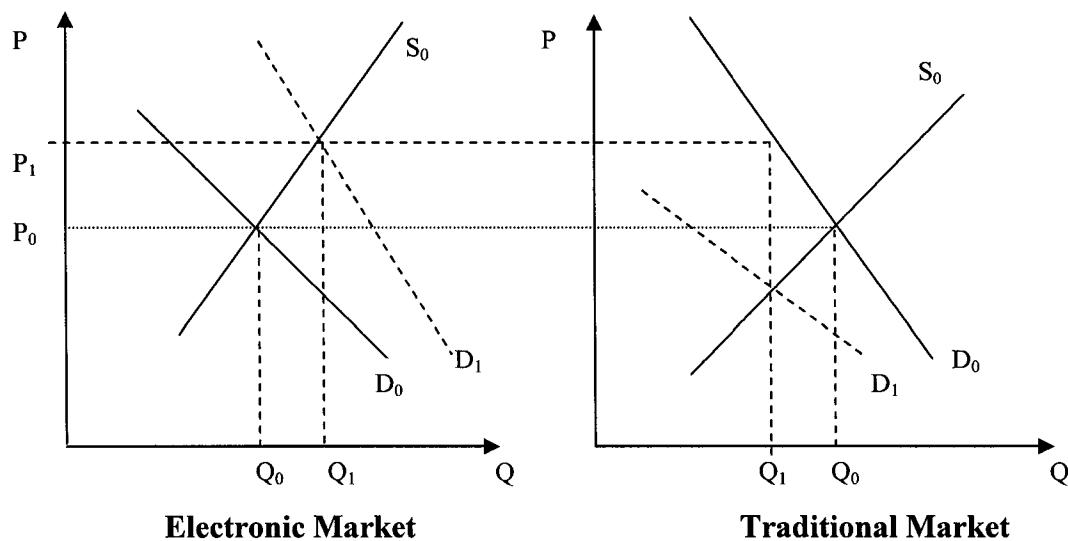


Figure 3.3 The Effects of Imposing a Differential Tax

After consumers relocate their purchase to the new market (electronic market), the price in the traditional market will begin to increase, as an indirect result of the tax.

After consumers adjust for changes in their preferences, a new equilibrium in both markets will occur at a higher price P_1 , and consumption levels will increase in the untaxed market and decrease in the taxed market. This is unfair because the absence of a tax in e-commerce business has lowered the quantities in traditional market (forgone output).

To eliminate this unfair disadvantage, the Thai government should enforce taxes on e-commerce. Imposition of a tax on e-commerce will create an equal competition opportunity. Even though the competition issue is not an important issue addressed in Thailand because currently e-commerce sales are so small, it may become more intense as time progresses and online business becomes a larger fraction of total retail sales. This is the argument why e-commerce should be taxed.

In short, failing to tax electronic business will cause a shift of consumption from traditional retailers who are required to collect tax, to electronic retailers. Consequently, the tax base for the government will erode.

B. Vertical Equity: Fairness among Various Groups

An absence of e-commerce sales tax not only redistributes among different income consumer but also create inequity between different income levels. This violates the principle of a good tax which is supposed to promote equity between different income groups.

To support this point, we can look at an e-commerce survey data by National Electronic and Computer Technology Center in Thailand (NECTEC) in 2000 and 2001 as presented in Table 3.2. The fourth and the seventh columns show that the rates of

buying something online for the low income people are lower than the high income people. This is because the high income people have more chance to access the Internet than low income people, so they do more online shopping. In developing countries, like Thailand, the unequal opportunities to access the Internet are caused by a high Internet access fee and a high price of computers⁵. Thus, if online purchases are not taxed, anyone who has enough money to buy a computer and access the Internet can avoid a sales tax, while less well-off individuals cannot. This implies a regressive tax system.

Table 3.2 Income and Online Purchase in Thailand

| Income (Baht/Month) | 2000 | | | 2001 | | |
|------------------------|--------------------------|--|---|--------------------------|--|---|
| | Number of Respondents | Number of Respondents Having Bought Online | Percent of Respondents Having Bought Online | Number of Respondents | Number of Respondents Having Bought Online | Percent of Respondents Having Bought Online |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Less than 10,000 | 190 | 10 | 5.26 | 2265 | 240 | 10.60 |
| 10,001 - 20,000 | 434 | 62 | 14.29 | 4117 | 619 | 15.04 |
| 20,001 - 30,000 | 463 | 87 | 18.79 | 3692 | 609 | 16.50 |
| 30,001 - 50,000 | 634 | 117 | 18.45 | 4412 | 889 | 20.15 |
| 50,001 - 70,000 | 338 | 68 | 20.12 | 2256 | 539 | 23.89 |
| 70,001 - 90,000 | 114 | 27 | 23.68 | 943 | 235 | 24.92 |
| 90,001 - 110,000 | 70 | 20 | 28.57 | 640 | 165 | 25.78 |
| 110,001 - 130,000 | 61 | 17 | 27.87 | 367 | 108 | 29.43 |
| 130,001 - 150,000 | 37 | 7 | 18.92 | 218 | 68 | 31.19 |
| More than 150,000 | 108 | 41 | 37.96 | 781 | 290 | 37.13 |
| Total | 2449 | 456 | Average =18.62 | 19691 | 3762 | Average =19.11 |

Source: NECTEC, Thailand.

⁵In developed country, the Internet usage costs have also been important factors on Internet access. OECD Outlook (2000) showed that in some OECD countries access to the Internet has lagged due to the high local communication charges. Countries with more expensive Internet communication costs tend to have a lower Internet access.

In addition to evidences in developing countries, studies in developed countries such as Goolsbee and Zittrain (1999) and Jones and Busa (2002) agree that an exemption of Internet tax violate the equity. Their studies have shown that there is no reason that the government should favor the wealthy customers by exempting tax from e-commerce. In the United Staes, for example, Goolsbee and Zittrain’s study (1999) illustrated that the higher income level access online more than the lower income level and they purchase online more than the lower income too (Table 3.3). Therefore the online tax exemption would make those online, who have higher income, better off than those not online.

Table 3.3 Income and Online Purchase in the United States

| Income (\$) | Percent Online | Percent of Online Users Having Bought Online |
|------------------------|----------------|--|
| Income < 25,000 | 0.11 | 0.17 |
| Income 25,000 – 50,000 | 0.22 | 0.21 |
| Income > 50,000 | 0.41 | 0.23 |

Source: A. Goolsbee and J. Zittrain (1999).

In brief, absence of e-commerce sales tax hurts a big group of people who do not shop online. A presence of e-commerce sales tax may cause a few people to pay more but it provides equity in society. Therefore, if e-commerce tax is enforced in electronic market, it will create more equity among income groups and also can make a tax system more progressive.

3.2.3 The Administrative Costs Criterion

Like most of tax policies, a presence of e-commerce sales tax brings equity to our society. However, there are some administrative costs arising from tax collection process and the necessary government expenditure for the prevention of tax evasion. A good tax should not have its administrative costs higher than the additional tax revenues it generates. In the following section, I will examine administrative costs associated with the e-commerce sales tax.

A. Collection Costs

Table 3.4 showed that the average resource cost of collecting tax by Revenue Department of Thailand is approximately 0.7 – 0.9%⁶ of total tax revenue between 1998 and 2001 (fiscal year). This is a budget spent by the tax authority for tax activities and investment in facilities. When we investigate each tax separately, it is possible that the e-commerce tax requires a high resource cost to operate. This is because it is difficult for the government to reinforce the e-commerce tax under available technology.

Table 3.4 Revenue Department of Thailand Budget and Revenue

| | 1997 | 1998 | 1999 | 2000 | 2001 |
|---|------------|------------|------------|------------|------------|
| Total Tax Revenues (Million Baht) | 518,713.00 | 498,965.00 | 452,316.00 | 461,321.00 | 499,882.00 |
| Total Budget of Revenue Department (Million Baht) | 4,483.46 | 3,711.26 | 3,071.99 | 3,529.73 | 3,722.13 |
| Percentage of Total Budget of Total Tax Revenues | 0.86 | 0.74 | 0.68 | 0.77 | 0.74 |

Source: Revenue Department, Thailand

⁶Account only the government budgets spent by Revenue Department.

There are two important problems in applying a tax to online trades. The first problem is in identifying activity locations. If both merchant and consumer can be anonymous online (giving no indication of their physical locations), there is no way for the government to identify a location for imposing a tax. The second problem is in verifying transactions. In the electronic environment, a payment system tends to use electronic money or in *e-cash* which is untraceable.

Therefore, to enforce and audit Internet transactions, the government has to incur high costs. The additional costs include not only an investment in new technology, but also a cost of auditing which I will discuss later.

B. The Dispersion and Concentration Indexes

Until now it is unclear how to implement an e-commerce sales tax in Thailand. The government has tried to apply the existing rule, used in the VAT, to the e-commerce business. Assume that the e-commerce tax is practiced under the same rules as the VAT in which tax rates have been set as a single rate (i.e. current VAT tax rate is 7%). So I test the concentration index and the dispersion index together since we do not need to measure the proportion of total revenue by each tax rate. We can estimate the e-commerce tax revenue as a proportion of the total tax revenue from this single tax rate. This estimated revenue proportion will show whether the revenue from adding a new tax on e-commerce sales is large enough to warrant a new tax.

In order to project the tax revenue that would be collected from e-commerce in this section, I use data from International Telecom Union (ITU), and Revenue

Department of Thailand. I base the values of e-commerce in Thailand on ITU's study and present them in the second column of Table 3.5.

Table 3.5 Estimated of Internet Sales Tax Revenue Losses in Thailand

| Year (1) | E-com (\$Million) (2) | E-com Sales Tax Revenue (\$Million) (3) = (2) * 7% | Total Tax Revenue* (\$Million) (4) | E-com Sale tax as % of Total Tax Revenue (5) = (3)/(4) |
|-------------|-----------------------------|--|---|--|
| 1998 | 9 | 0.63 | 11,603.84 | 0.005 |
| 1999 | 33 | 2.31 | 10,518.98 | 0.022 |
| 2000 | 90 | 6.30 | 10,728.40 | 0.059 |
| 2001 | 200 | 14.00 | 11,625.16 | 0.120 |
| 2002 | 500 | 35.00 | 12,554.37 | 0.279 |
| 2003 | 1,350 | 94.50 | 13,557.86 | 0.697 |
| 2004 | 2,300 | 161.00 | 14,641.55 | 1.100 |

Source: ITU, Revenue Department of Thailand, and Author's calculation.

Note: * Data are available until 2001 and the exchange rate is \$1 = 43 Baht.

If the e-commerce sales tax rate is 7% as applied in current VAT in Thailand, the total tax revenue from e-commerce will be \$35 million by 2002 and is projected to increase to \$161 million in 2004 (third column). On Column (5) shows that the sales tax as proportion of total tax revenue is less than 1% except in 2004. However, this proportion may be overly estimated. In my opinion, we need to be concerned about two factors. First, the estimation of Thailand e-commerce presented by ITU is probably too high for 2003 and 2004 since Thailand does not have a good information infrastructure to serve the increase in the demand for e-commerce. Then it is possible that e-commerce might face a problem of infrastructures bottleneck in the next few years. Second, if we make allowance for tax exemption and evasion, the value of the Internet sales tax collected from electronic business may be less than the calculated number. For

the amount of tax evasion, no study have estimated the evasion. For the exemption, books, agriculture products, and education business are exempted under VAT in Thailand. If the new e-commerce tax has made exemptions as the existing VAT, the total tax revenues would be less than the estimates. Therefore, I believed that after considering these two factors the distribution of the Internet sales tax in 2004 would be less than 1%.

In short, if the Thai government imposes the e-commerce sales tax in the next couple years, it will generate a low additional tax revenue relative to total tax revenue. It is also difficult for the government to conduct a coherent tax policy when tax revenue is diffused in many small tax revenue sources, such as the e-commerce sales tax.

C. Tax Avoidance

The sellers or producers can take advantages of differences in marginal statutory tax rates across states or countries by relocation. In the electronic industry, there is a high degree of capital mobility because there is little reason for producers to locate near inputs and there are low costs of transporting output to users. One incentive to relocate production or business location is to avoid tax. As a result, there is an incentive to relocate production to lower or zero tax states or countries to avoid the origin-tax. For example, a business can transfer its tax bases (computer server) to other tax origin, even if physical capital (real activity) remains the same. In brief, taxpayers (businesses owners or producers) do not have to hide their revenues from tax authorities, but the arm lengths of tax jurisdictions cannot reach to enforce taxes on business.

In Thailand tax avoidance created by the difference in statutory tax rates is not a big problem as that of the United States that have difference tax rates across states. Currently, the important cause of tax revenue loss is whether electronic stores that have only a web-server (no permanent establishment) require remit taxes to the government. For example, renting a movie from a traditional store, a sales tax (in term of VAT) is added, but if the same movie is ordered from the Internet, the renter does not need to pay the sales tax because there is no clear regulation to force the Internet movie provider to charge a sales tax from Internet movie. Nowadays this legal tax avoidance has increased more in services than in goods.

D. Tax Evasion

Tax evasion is the other issue that should be addressed in the e-commerce sales tax. Currently, e-commerce tax evasion is not a significant problem because of the relatively small volume of e-commerce in developing countries but we need to be concerned about it in the future.

Although we do not have a confirmation statistics, we cannot refute that the e-commerce can be used as a channel for tax evasion. The opportunities for tax evasion are discovered not only because of the difficulty to check digitized products, but also the use of unaccounted money and unknown server. Then, the tax authority requires an enforcement system to monitor the unregistered business, detect exaggerated refund claims, and minimize transactions.

Currently, although a new specific e-commerce tax has not been added by the Thai government, the government has issued a new regulation added into the existing

VAT system for taxing some services and electronic products traded over electronic means, particularly the Internet. Under this new regulation, the government aims to include services and electronic goods in the tax base; however the percentage of tax evasion from e-commerce in Thailand is still high.

3.2.4 The Technological Flexibility

A good e-commerce sales tax should not stifle the growth of e-commerce which fuels the overall economic growth. There has not been any study dealing with the relationship between e-commerce business and economic growth in Thailand, but several studies of developed countries, such as Iyer, Taube and Raquet (2002), have found a significant relationship between the e-commerce and GDP.

In digital era, it is easy for consumers to buy goods and services worldwide because e-commerce reduces border between countries. Therefore, if the Thai government added tax rates greater than other countries, consumers will switch to buy goods and services from other countries. This will obstruct an e-commerce development in Thailand and may slow down economic growth.

Another issue dealing with the feasibility technology is whether the government is able to prevent tax evasion. To limit tax evasion, tax authorities need to identify e-commerce transactions. One way to identify such transactions is to look over credit card companies and financial intermediary records. But it is impossible for governments to step on those records since banks and financial institutes need to make the consumers trust them by keep consumers' records from the third party. Then the way to audit and enforce the tax may call for technological improvement like Teltscher (2002) has noted

that “*tax collection on e-commerce activities will require access to the latest technologies by tax authorities.*” The latest technologies may presence huge costs to the government. I believe that it is possible that investment costs for new technologies might be greater than the additional revenue from the new tax imposed on e-commerce. Therefore, under the technology criteria, a sales tax should be absence from e-commerce for the take off period of e-commerce and when the expected tax revenue from e-commerce is less then the expenditure for new technologies.

3.3 Conclusion

Like many questions in tax policy, adding an appropriate e-commerce tax requires making a judgment among efficiency, equity, and administrative costs criteria which often pointed in different directions as shown in Table 3.6. The e-commerce sales tax could lead to an efficiency loss due to the disincentive effects of taxation, but it could improve equity among income groups. We can see that imposing a sales tax on e-commerce sales raises vertical equity, neutrality between electronic and traditional commerce, and may also increase government tax revenues. Nevertheless, I conclude that neutrality and vertical equity are the important and appropriate reasons to tax e-commerce, rather than to increase tax revenues. In Chapter 5, we can see that the potential tax revenue losses from e-commerce in developing countries, such as Thailand, are not significant.

The fact is that fairness in taxation could not be separated from the issue of administration costs. After weighing between equity and administrative costs, e-commerce tax should not be imposed in developing countries where e-commerce is

Table 3.6 Conclusion of Assessing

| Criterion | Argument | Should/Should not |
|---|---|---|
| Efficiency | (1) Small amount of DWL after imposing a new consumption tax. (2) Small impact from inflation and exchange rate. | Should However, there is small amount of e-commerce transactions. |
| Equity | (1) Keep tax neutrality between traditional and electronic stores. They can compete with each other. (2) Progressivity among difference income and education groups. | Should However, there are small group of people deal with the e-commerce. |
| Administrative Costs and Technology Flexibility | (1) High collection costs and the additional revenue would less than 1% of total tax revenue. (2) Up till now, the government does not have a clear policy to minimize the tax avoidance and evasion. (3) To audit the e-commerce transactions call for a large amount of investment. | Should not However, in the future when the e-commerce increase its significant and could cause a huge tax revenue loss the government needs to be concerned. |

limited to a small group of users. If tax authority imposed e-commerce sales tax, a lot of expenditure would be used for collecting and enforcing the tax. In order to achieve an objective of assigning taxes fairly among individuals, the government is required to design a more complex tax system. In addition, in order to prevent evasion the government also needs to invest in advanced technologies for identifying the location of sellers and buyers, and for verifying transactions over the electronic means.

Furthermore, the most difficult problem to imposed e-commerce sales tax is that up to now the government in developing countries like Thailand does not have enough data on e-commerce. We need to do a lot of surveys and studies. In short, based on current knowledge, imposition of a new specific e-commerce sales tax in developing countries will cause social costs to be greater than social benefits. Therefore, a new tax should not be added in the next few years.

CHAPTER 4

STRUCTURE OF E-COMMERCE TAXES AND EXPERIENCES IN DEVELOPED COUNTRIES

This chapter is composed of two parts. The first part is a discussion on e-commerce taxation problems raised by special characteristics of e-commerce. The discussion will focus on sales tax revenue losses⁷ that are directly related to e-commerce transactions, particularly via the Internet; the most popular method to do e-commerce in recent years.

The second part is a review of e-commerce tax experiences in developed countries where e-commerce has experienced vast growth. In the past few years, governments in many countries have realized the significance of tax revenue losses from e-commerce. They have discussed and issued tax policies to deal with this problem. Their policies are useful models for policy makers in other countries where e-commerce growth has just picked up speed.

⁷Studies of the impacts of e-commerce on tax revenue losses can be roughly categorized into two types: income tax and sales tax. Most studies focused on the impacts of e-commerce on sales tax. And some have mentioned impacts on income tax. There are two key discussions of the impacts of e-commerce on the income tax revenue. One is about how to define a server as a permanent establishment (PE). The difficulty to define a PE is a problem found in collecting sales tax too. Another is the double taxation problem. Even in some cases we can count a server as a PE for a business, however under different income tax rules (source-based versus residence-based) among countries, it can lead to the double taxation problem.

4.1 Special Characteristics of E-Commerce and Sales Tax Problems Associated with E-Commerce

There are significant differences between e-commerce transactions over the electronic means and traditional transactions. These differences cause a difficulty in the application of apply existing tax rules to e-commerce transactions. The difficulty arises from an easy mobility of web-servers and digital products trade on electronic means, especially the Internet.

- **Easy Mobility Servers**

The Internet technology has allowed a company to operate an entire business remotely by creating a website on a (computer) web-server. The web-server can be easily located anywhere without affecting the performance or operation of the website. The concept of location of supply becomes less determinate in electronic businesses since the development of e-commerce facilitates suppliers of goods and services not need to be located at the same place as the consumers. Sometimes, a web server is located in another city or another country. For example, a foreign company can operate a US-based web-server from its home country. The reason that some companies choose to operate web-servers in different locations from their business head quarters is tax advantages.

- **Digital Products (Digital Goods and Services)**

There are products being transformed into digital form and distributed by using electronic means, such as computer software, videos, recorded music, newspapers,

magazines, books, and photographs. We call these products digital goods⁸. In addition, the Internet is also used as a way to access electronic or online services⁹ such as databases, encyclopedias, and electronic newspapers which are provided online. The electronic services differ from physical goods. These electronic services can be used by many users at the same time while physical products cannot. Furthermore, consumers can obtain the electronic services on the Internet only but cannot own the property of the services as in the case of the physical goods. For example, when users search for a history of stock prices from a database, they can get a result but they cannot possess the whole database.

When many goods and services can be converted into digital forms and sale by (computer) web-servers via the Internet, the existing sales tax rules are not enough to deal with these conversion items. With the special characteristics of e-commerce, the conventional tax rules cannot adequately answer the question of “who, where, and what” should be taxed. It is not clear that “who” should be taxed and remitted tax to a government. In e-commerce there does not have to have a personal presence in the transactions because a web-server can perform transactions like a business company. In addition, it does not have answer to “where” the tax activity is located among server locations, business locations, and consumer locations. Likewise, the interesting question

⁸In some studies, digital products are called “intangible products”. I found that in several studies “intangible products” are composed of digital product, digital services, and stocks of e-commerce company. This is a widely used definition. Therefore, in this study, I use “digital products (i.e. digital goods and digital services)” instead of “intangible products”.

⁹Electronic services are defined as services which can be accessed by means of telecommunications equipments for the purpose of either “[e]xamining or acquiring data stored in or accessible to the computer equipment,” or “[p]lacing data into the computer equipment to be received by designated recipients with access to the computer equipment” (Grierson, 1996).

is whether digital and physical products should be taxed the same because the existing tax rules are designated for physical products. Due to these obstacles, e-commerce has created some tax problems such as tax avoidance, tax evasion, unclear tax agent, which cause an increase of sales tax revenue losses as the e-commerce expands rapidly over time (Figure 4.1). Recently tax authorities have become concerned about such digital products and planned to develop taxing statues to recapture lost sales transactions where electronic conversion has occurred.

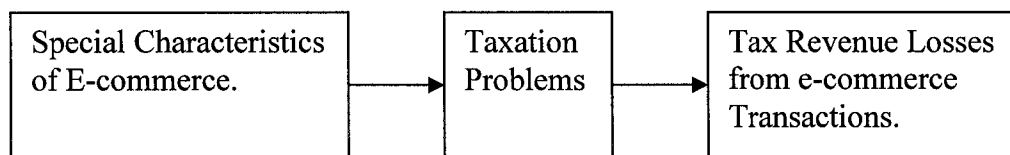


Figure 4.1 How Does the E-Commerce Cause Tax Revenue Losses?

A. Tax Avoidance

Generally a tax system relies on knowing where a particular economic activity is located. It was no problem in the past because a company was deemed to have a taxable presence in a country (or state); tax authorities could easily collect taxes from businesses by their physical presence. Nowadays the Internet and private networks may enable individual workers to operate in many different states or countries while sitting at the same place. Therefore, businesses may avoid paying a higher tax by relocating their web-server in a lower statutory tax rate state or country.

A good example of e-commerce tax avoidance is a sales tax system of the United States where tax rates are different across states. Under the US tax rules, sales

taxes are collected from purchasers by sellers at the time of sale, and then remitted by the sellers to the government. Sales taxes are charged on sales transactions that occurred within the boundaries of the taxing jurisdiction only¹⁰. For example, the Colorado sellers will charge only transactions occurring within Colorado. If the transactions are outside of Colorado, Colorado sellers cannot apply the Colorado sales tax rate to such transactions. The Colorado residents who purchase out-of-state are required to remit use taxes to Colorado tax authority. The use tax is charged on the purchase price of goods purchased out of state but brought into the state for consumption. The use tax rate is typically set at the same level as the given jurisdiction's sales tax rate and is usually applied to the same kinds of goods covered by the sales tax.

Suppose that Colorado has zero sales tax rate like Oregon¹¹, every transaction in Colorado will not need to collect sales tax. The prices of goods and services with zero tax rate are lower than prices including a sales tax. Such lower price creates a market competition opportunity to the business. This is one of the reasons why companies prefer to locate their web-server in lower or zero tax rates states. This is the same reason for an increase in multinationals operation in developing countries where tax rates are low, or where a tax regime can be negotiated to attract the business.

¹⁰The Supreme Court has ruled that a state has no jurisdiction to require an out of state seller with no employees or other physical presence in state, known as "nexus", to collect the tax (Goolsbee, 2001).

¹¹Currently, five states do not levy a sales tax: Alaska, Delaware, Montana, New Hampshire, and Oregon.

B. Tax Evasion

Digital goods and services are capable of being delivered by means of the Internet; therefore many buyers and sellers use the Internet as a method of ordering, receiving, and sending digital products without needing to meet each other as the conventional way. Under this electronic circumstance, tax evasion becomes easy. This is because it is difficult for tax authorities to identify locations of the buyers or sellers and audit the sales volumes over the electronic media.

In addition, electronic payment has also enhanced the opportunity for tax evasion. When anonymous electronic money and encryption are used in transactions, tax authorities cannot track either sellers' or buyers' addresses. Although in some cases the credit card or financial companies may have information about the seller and buyer locations from billing addresses but that information is probably confidential for the third party to track. Then, taxing the Internet may be harder than expected.

C. Tax Agent

In the Internet commerce, it is difficult to claim whether a web-server is a tax agent or not. Generally a tax agent is a seller or buyer who has a permanent establishment (PE) in a location for a period of time. However, in the case of e-commerce, it is difficult to classify whether a website on a computer in a country should be considered a permanent establishment of the vender. In order to constitute a fixed business location, a server will need to be located at a certain place for a sufficient period of time. If computer equipments at a given location meets the requirement of

being fixed, the businesses operating on them should collect and remit taxes to governments.

Even though a web-server has a PE, it may have a problem of distinguishing between the website and the server owner for tax responsibility if the company operating the server is different from the company that carries on business through the website. Many companies do not maintain their own web-server because they want to reduce costs paid to in-house technical experts. Instead they share a server with other companies and let the server be operated under an independent company who knows about the computer and web technology. Due to this is difficult for tax authorities to decide who should remit taxes.

D. Inconsistency of Tax Systems in a Global Trade

E-commerce is a very important tool that makes our world borderless in doing business. This is because the Internet and digital technology have supported a globalized mobility of business operation. Therefore, it is inevitable to have an international tax problem among countries. When there are cross border transactions, the inconsistency of tax systems among countries leads to double taxation and tax credit problems. In a traditional commerce these problems also exist, but e-commerce makes them more evident.

4.2 The Sales Tax Revenue Loss Arena

The special characteristics of sellers and products in e-commerce mentioned in section 4.1 are synthesized in Figure 4.2. The figure shows that a market has two

components: agents and products. Market agents are sellers, buyers, intermediaries, and other third parties such as governments and consumer advocacy groups. In this study, I have emphasized the sellers rather than other agents because sellers have a vast impact on sales tax revenue losses due to their location decision.

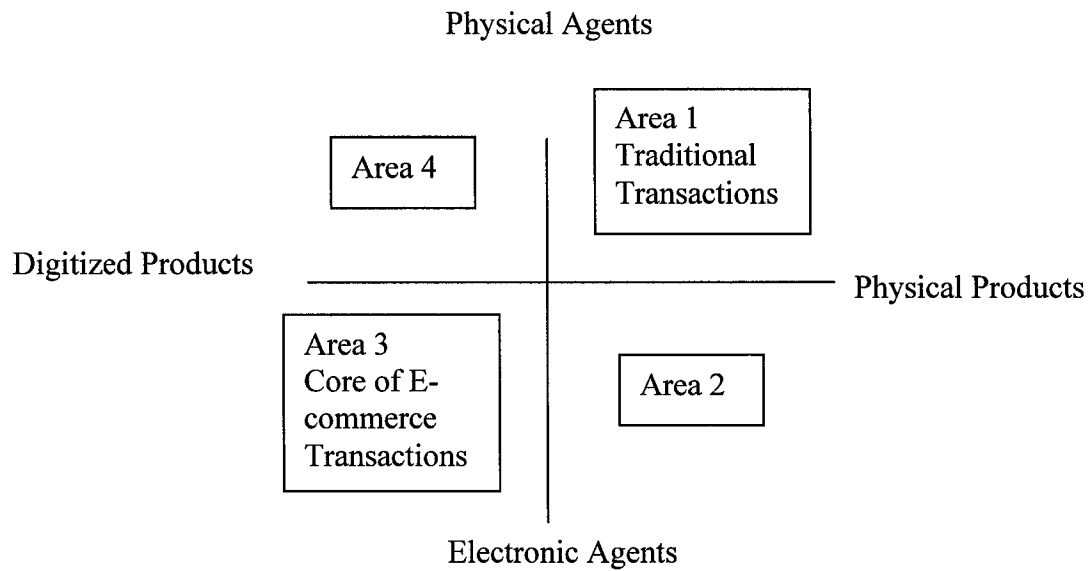


Figure 4.2 The Differences between Traditional and Internet Transactions

The market agents may be either physical or electronic represented by the vertical axis. For example, a web store is an electronic agent, whereas a department store is a physical agent. Products are the commodities (goods and services) being exchanged as represented by the horizontal axis. Commodities may be either physical or digital products. For example, a printed newspaper is a physical commodity, while its

online version is a digital commodity¹². Area 1 is the traditional market where agents and products are physical. Area 3 is the core of e-commerce market where agents and products are digital. Areas 2 and 4 are the combination of traditional and electronic transactions where one of the components is digital and another is physical.

E-commerce causes sales tax revenue losses, however, the degree of tax losses in each market is different depending on the agent, commodity, and tax base applied in the tax system. The market in Area 2 in Figure 4.3 (where products are physical), for example, if a destination-based tax is applied to the sales tax system, the sales tax revenue losses are not high. A sales tax can be collected at the consumption point by tracking a destination address where physical products are sent even without the presence of sellers.

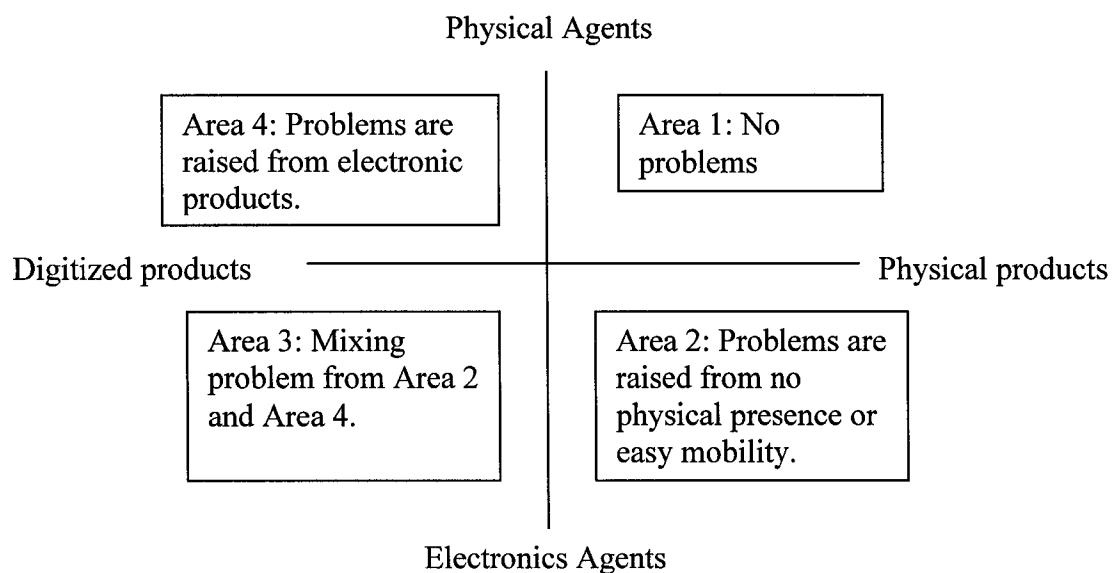


Figure 4.3 Characteristics of E-Commerce and Taxation Problems

¹² For generality and simplification of analysis, I will omit products which place in-between physical and digital products such as CD-ROMs. In Choi, Stahl, and Whinston (1997), CD-ROMs are treated in-between because their contents are digital products but packaged in physical containers.

The market in Area 1 is a traditional market where physical products are sold by physical stores. There is no problem of tax revenue losses raised by e-commerce because we know exactly who, where, and what should be taxed. Then, in this case, tax authorities can easily audit taxpayers and trading values.

The market in Areas 2 and 4 are combinations of traditional and electronic commerce. Tax problems in area 2 arise because the vendors do not have a physical presence or they set their websites separated from their parent headquarters for tax purposes. In practice, when physical presence of a vendor in the taxing jurisdiction is absent (no nexus), the tax remittance falls. The lack of physical presence of many firms leads to tax base erosion. BarnesandNoble.com, for example, has separated itself from the parent stores to avoid having a physical presence and requirement to collect sales taxes on all its sales through the Internet. This will make it more difficult for tax authorities to collect tax.

Tax problems in Area 4 arise because digitized products are delivered via the Internet or other electronic means. States are concerned about the losses of revenue from tax on sales of digitized products, such as software programs and music, delivered online. It is easy for sellers and buyers to evade sales taxes because the government may not know the values and location of buyers. Although in this case we do not have a problem of a physical presence of sellers who usually collect and remit taxes to the government, sellers still can hide or avoid reporting transactions over the Internet. CISCO company, for example, set up a website to deliver newly released software to consumers. If CISCO intends to avoid paying taxes, it will be difficult for the government to track the real values of digitized products and consumption locations.

The market in Area 3 is the core of the e-commerce market where both agents and commodities are digitized. This area is a combination of problems in Area 2 and Area 4 which is the most difficult for a tax authority to prevent tax revenue losses.

The problem of sales tax revenue losses in each market can be reduced. Theoretically it depends on which tax base is applied to the market. Generally there are two approaches of collecting tax on final sales of physical products (Fox and Murray, 1997). The first approach is to tax physical products on the source base at the point of production¹³. The collection burden falls onto producers who have a physical presence in tax jurisdiction. The second approach is to collect from final consumers (including business), which is the destination-based tax.

It is worth noting that one sales tax base is suitable for some markets, but not for the others. The market in Area 2 (where products are physical), for example, if a country applies a destination-based tax to its sales tax system, the sales tax revenue losses from e-commerce is not a serious problem. Because even though a tax authority does not know the agents (sellers/suppliers), shipping a physical product requires a destination or address, and a sales tax can be collected at the consumption point.

On the other hand, markets in Area 4 (where sellers are physical), a source-based tax is more suitable for a sales tax system. For the markets in Area 4, the location of a business is known by the physical presence, but digital goods and services are traded in the market. In the case of physical products, to determine an activity location is relatively easy because tax authorities just find out where the goods are delivered.

¹³This approach can be applied to mail order sales by taxing at the point which the goods are shipped.

However, in the case of digitized products, it is not always so clear that where the digitized products are delivered. Therefore, taxing digitized products where they are consumed may prove to be almost impossible, because we may not know where the products are delivered and to whom. In order to solve this problem, the Economist (2000) recommended that collecting a sales tax from the suppliers might be easier if suppliers have physical presences. So in Area 4 taxing at the production point will reduce a sales tax revenue loss from e-commerce.

In the real world, however, we do not have only markets in Areas 2 or 4 where either agents or products are digitized. In the advanced stage of e-commerce, a lot of goods and services are converted to digitized form and digitized suppliers provide them. It is the case of the market in Area 3. The question is that either consumption-base or production-base should be applied to the tax system. It is not easy to assign a tax base to Area 3 in the same manner as in Area 2 and 4 where one of the components is physical.

To design a sales tax base in this case, a government faces trade-offs between both approaches. In a developing country like Thailand where its economy depends on investment from other countries, taxing at the production point (source-based tax) could be harmful, even though the source-based tax has lower administrative costs relative to destination-base tax. Taxing e-commerce at the production point encourages e-commerce companies to hide their taxes or relocate businesses to lower or zero tax countries to avoid origin taxes.

On the other hand, if the policy makers choose the destination-based tax, the weaknesses are the high administrative costs and the difficulty in practice, particularly for consumption outside the countries. Administrative costs of the destination-based tax

are high because the tax administration may need to audit the physical presence of a consumer. Moreover, it seems impossible to impose taxes on transactions outside the countries if there is no tax agreement among trading partners.

We can see that under different circumstances, each market may need a different tax base system. So it is inevitable to face combinations of inconsistent tax systems among countries. Governments need to eliminate the inconsistent tax laws among them. This issue is a common concern at the international level. Up to date, there has been no consensus reached on how sales tax should be imposed on e-commerce transactions.

4.3 New Ideal Tax Forms

The VAT will become more complicated in the context of the global economy because of the flexibility of e-commerce. Some studies have recommended other types of taxes for fighting tax erosion in the future. There are two possible tax transitions to deal with e-commerce. The first is “Bit Tax” which is based on volume of bits sent instead of value of goods and services as in current sales tax system. The second is a change of tax remitted agents. Under this manner, the tax base is still calculated from value of goods and services but network service providers or payment providers instead of consumers or sellers would remit tax to their government.

A. Bit Tax

Bit tax (or an Internet access tax) is an alternative taxation system introduced by the High Level Expert Group (HLEG) of the Social of the Information Society. It recommended use of the Bit tax instead of sales taxes. The Bit tax is a tax on the

volume of the transaction (the number of bits sent) rather than the value of the transactions.

The advantages of the Bit tax are simplicity and progressivity. Bit tax is a progressive tax because it decreases the burden on small-scale users, and increases the burden on large-scale users. Moreover, it is easy to implement since it taxes on volume instead of on values. Even though Bit tax is more simplified than sales tax, taxing Internet access may create considerable deadweight loss. The new tax will generate an impact on the decision to adopt new technology. Internet users will face an increasing cost to access the Internet. This would reduce the number of Internet users and could limit a development of Internet technology that enhances e-commerce market. Thus far the Bit tax does not seem to be widely discussed because many studies are paying attention to simplifying the sales tax or use tax.

B. New Remitting Tax Agents

Taxing at the consumption point or production point, under the sales tax rules, is difficult if the digitized products are purchased or sold by digital agents. Therefore, taxing at the intermediary, such as Internet Service Providers (ISP), financial institutes, might be easier than taxing at the production or consumption point.

Soete and Weel (1998) presented an Internet business model¹⁴ (Figure 4.4) to show players involved in the Internet business. From this model we can see that taxing

¹⁴ Besides the Internet business, this model can be also extended to all kinds of electronic businesses. Instead of limiting to only Internet service providers; this model could include all private providers such as EDI. In addition, it could include transactions in B2B e-commerce as well as transactions in B2C e-commerce.

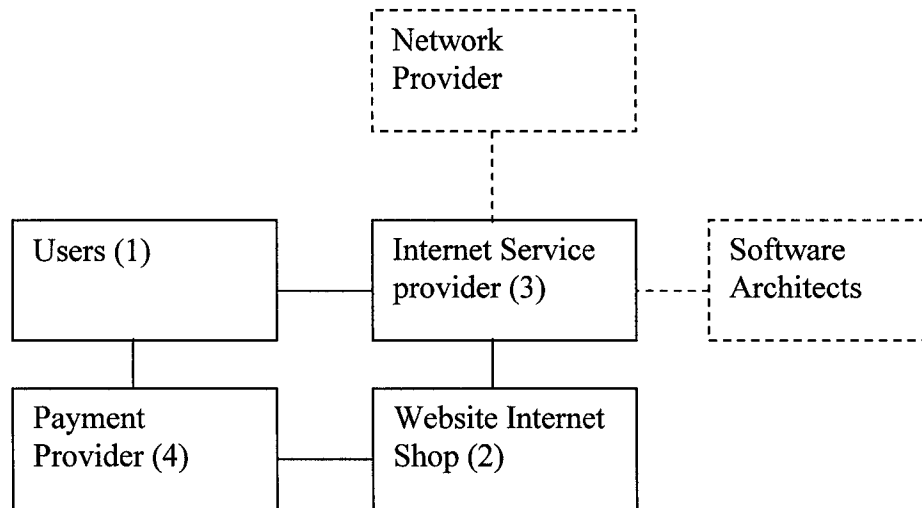


Figure 4.4 Internet Business Model

the buyers or sellers at points (1) and (2) are likely impossible for digitized products. Therefore, other ways for a tax authority to tax the electronic transaction are to tax at the ISPs or the payment providers at points (3) and (4) by order.

In general, the network users and businesses pay fees to the ISPs who supply an Internet or private network connection. Since ISPs (or private network service providers) know the identity of the users, they could take the responsibility of keeping track of all financial transactions of their users. However, a disadvantage of taxing at the ISPs is that it would increase the costs of using the Internet (or private network).

The other option is a tax on payment providers. Financial institutes (or other forms of payment providers) can monitor all transactions of their customers made on the electronic channels and they can levy VAT on the final bill. Even though this way is the better one to track all money for the electronic transactions, taxing at the payment providers is the most difficult to implement since Banks or credit companies do not

want to step on their customer transactions. The more they step into the customers account information, the more they lose the confidence of their clients. This may cause them to lose their customers in the future.

4.4 E-Commerce Taxation Experiences from Developed Countries

A number of tax authorities started to respond to the Internet challenge after it had become an active commercial medium. By virtue of the Internet, a large amount of international business can be conducted without the need for persons or facilities to be located in the customer's marketplace. Digitization and electronic delivery allow a new universe of electronic products to cross borders without going through the normal entry procedures. Moreover, the fears of massive tax base erosion are originated from the potential anonymity of Internet activities, the development of electronic cash, and the high mobility of cyber business. It is clear that current tax rules are not adequate to deal with e-commerce transactions over the Internet. Therefore, governments in many countries have studied and issued tax policies to prevent tax revenue losses from e-commerce transactions, mainly Internet transactions. The US, the EU, and Australian are examples of tax authorities that have started to make explicit recommendations on how to apply sales, valued added, and goods and services tax to e-commerce transactions. In this section I review tax policies experienced in these countries whose e-commerce have growth dramatically. Experiences from these developed countries can serve as models for developing countries that have not established coherent tax rules for the e-commerce.

A. Three Types of Indirect Taxes

Before reviewing e-commerce tax policies experienced in developed countries, I have introduced indirect taxes used in developed countries for a background. There are three types of indirect tax systems commonly used in developed countries, namely, general sales tax on goods and services, Value Added tax (VAT), and goods and services tax (GST). The general sales tax on goods and services system is used in the US. This system is usually applied to physical products and services, and final users pay the tax. Business inputs generally are exempted from this tax. There are many different tax rates, depending on locations. The VAT is widely used in the EU countries. Under the VAT system, a tax on supplies of goods and services is applied to all stages of the production process. It is charged only to the suppliers and then credited to the users of the inputs in the course of doing business. The GST is used in Australia (and Canada). The GST is applied at the point of sales and collected by the sellers. There is one tax rate used across country. All goods and services are subjected to tax under the GST system, however, in order to avoid a regressive tax distribution, some items such as foods, clothing, and public transportation, are exempted from GST. These exempted items are found in the sales tax, and the VAT as well.

B. The United States

By early 1996, the US Treasury Department had been studying a broad range of US tax issues associated with the Internet. And in 1998, Congress passed the “Internet Tax Freedom Act” (ITFA) placing a three year moratorium on new taxes on the Internet. The ITFA restricts local states to apply sales and use taxes to nexus companies

doing business online and prohibits states from applying new taxes to Internet access. In the year 2000 the Congress passed an additional Internet taxes titled “Internet Tax Reform and Reduction Act of 2000” to extend the moratorium to October 2003.

The temporary moratorium of e-commerce tax in the US raised neutrality problems between (1) physical stores and electronic stores, and (2) physical products and digitized products. The interesting question is whether digitized products, which are similar to physical products like software, books or music, should not be taxed.

C. The European Union (EU)

The European Commission began to explore the possible impacts of e-commerce that would have on the EU’s Value Added Tax (VAT) in 1997 and in June 2000, the Commission issued a proposal for amending existing VAT rules. This proposal is based on a set of guidelines on indirect taxation formed in an OECD meeting in Ottawa in 1998. The proposal seeks to revise the existing VAT rules to deal with e-commerce, especially digital transactions involving merchants and final consumers.

The proposal is composed of three principal concepts. “First, the existing tax structure of the EU member countries should be adapted to address the realities of electronic commerce; thus, there is no reason to impose new taxes on electronic transactions. Second, for the purpose of applying VAT, products delivered by electronic means should be characterized as the supply of services, not goods. Third, the EU’s VAT regime should only apply to services consumed in Europe” (Luguna, 2000).

It is important to denote that under the Commission's proposal, there are two modifications for dealing with e-commerce: (1) an electronically delivered product is classified as a service, and (2) the EU VAT should be applied to consumption in the EU only. These two modifications have led to observations as follows.

First of all, the proposal stated that goods supplied electronically are considered to be services, while goods supplied by physical means are considered to be goods¹⁵. Thus, the tax treatment of computer software, for example, will depend on how software is delivered to the consumer. This violates the neutrality principle since digitized and physical goods are subjected to different VAT rules.

Second of all, this proposal has revised the existing VAT on electronic suppliers in two ways. First, this proposal aims to require non-EU suppliers of online services for the EU to apply VAT on the same basis as the EU suppliers. Thus the proposal stated that all electronic supplies consumed in the EU member countries are subjected to the EU VAT. This proposal seeks for an equal treatment between non-EU and EU suppliers. This is because under the current EU VAT rules, non-EU suppliers of online digital services into the EU are not subjected to the EU VAT, while the EU suppliers of online digital services are subjected to VAT.

Second, all electronic supplies consumed outside of the European Union are exempted from the EU VAT. Therefore, under this proposal, electronically delivered products from EU suppliers to US consumers, for example, will be exempted from EU VAT.

¹⁵The OECD framework conditions declared that digitized goods are not goods, but did not conclude that they are services.

Until recently, the EU has not decided to implement this proposal, but it is impossible that once e-commerce takes off, goods and services sold over the Internet will still be allowed to avoid to pay VAT. One of the reasons is that the tax revenue from VAT in the EU is a large contribution to the total tax revenue. In the EU, VAT rate is as high as 25% in some countries and accounts for an average of 40% of Europe's tax revenue (Maguire, 1999). Therefore, the EU countries have been concerned about how to tax e-commerce, contrary to the US which is in a moratorium on e-commerce tax.

D. Australia

The Australian tax system has been reformed in the past few years. An important part of the reform project was the introduction of a goods and services tax (GST). The GST Act was effective on July 1, 2000. The Australian Taxation Office (ATO) introduced the GST for replacing the complex Wholesale Sales Tax regime, which involved taxing goods at various rates on the last wholesale sale. Under the GST, tax rate is 10% for all goods and services (one tax rate). This new GST Act also aims to prevent revenue losses from e-commerce transactions. Nutnam and Klasic (2001) summarized the key principles of the GST legislation as follows.

- GST applies to most goods and services within Australia.
- GST does not apply to most cases where consumption occurs outside Australia; and
- GST is paid by the end consumer and remitted by the supplier.

Taxable importations are also subjected to GST. A taxable importation arises from where goods are imported for home consumption.

There are two important points of GST which directly affect e-commerce. First, to prevent revenue losses from electronic transactions, GST applies to most goods and services in Australia. Thus the downloading of digitized products cannot legally escape consumption tax. Second, when an Australian business exports goods and services to non-resident consumers, GST is exempted. In general, the importation of goods and services will be subjected to GST at the time the goods and services are imported for home consumption in Australia.

E. What Do We Learn?

There are differences among the United States, Europe Union, and Australia on how the Internet e-commerce transactions should be taxed. The EU and Australia are in favor of taxing them like any other transactions, while the US is in favor of not taxing such transactions (Figure 4.5).

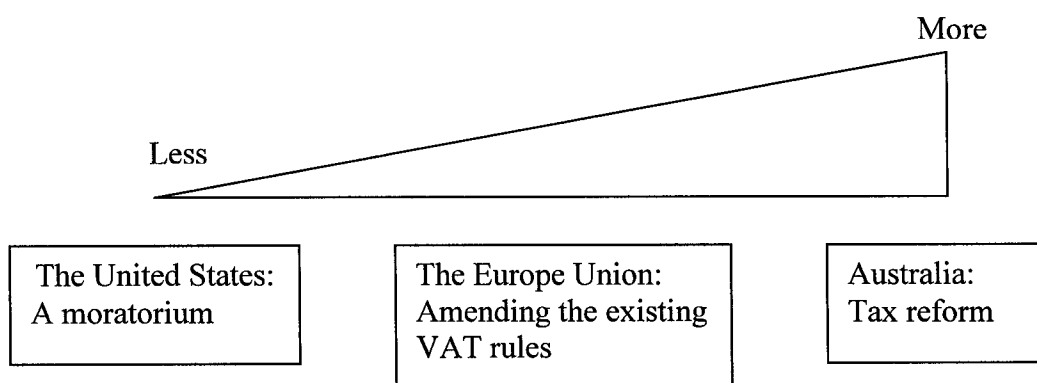


Figure 4.5 Degree of E-Commerce Taxing Favor

The United States issued a moratorium on any Internet tax because the US government believed that e-commerce had supported its economic growth. If any tax is imposed on Internet transactions, it might slow down the economy. This is because when the Internet tax is imposed, businesses will find ways to do business in markets where the Internet tax is absent. Consequently, the US has stipulated that there should be no new taxes on the Internet. This has proven to be a motivation for keeping online businesses.

Another reason for the US government to impose a moratorium on Internet tax is the high administrative costs. Administrative costs for taxing e-commerce over the Internet are relatively high compared with additional tax revenues it generates. So until now, at the federal level, the tax rate for electronic transactions in the US is zero. However, this tax policy has created an unequal treatment between electronic and physical stores. Transactions on physical stores are subjected to tax, while transactions over the electronic stores are exempted from tax.

Conversely, the 2000 Australian tax reform had the objective of preventing tax revenue losses by e-commerce. Under GST rules, the problem of unequal treatment between goods and services is eliminated because the GST is applied to all goods and services at the same rate. It does not matter whether the products are physical or digitized products. Every transaction will be taxed with no exemption. But the problem of tax activity locations remains. When an Australian enterprise exports supplies overseas, the supplies will be GST-free. A complex issue of e-commerce is how to determine whether a recipient of supply is a non-resident for GST purpose. This is because if a recipient is a computer server, in the case of electronic products, the

recipient can avoid GST by registering as a non-resident outside Australia, whether the real or personal recipient is an Australian resident or not. Therefore, the Australian government needs a more reliable method to determine residency or location of both exporters and importers, who have chances to take advantages from GST exemption rules.

The European Countries' e-commerce taxing rule is in between that in the US and Australia. They would not exempt the Internet tax like the US, and would not totally reform their indirect tax system as in Australia. They improve the existing VAT tax by extending the existing tax rules to cover all digitized transactions, and making a clear rule that any transaction from non-EU suppliers to the EU consumers is subjected to tax. However, the EU tax proposal might create a new problem of unequal treatment between product in both physical and electronic forms. This is because as soon as products are delivered by an electronic means, they are treated like services. In practice, the tax rates for physical and electronic products are different, although they give the same satisfactions. For example, a book delivered by electronic means has a higher tax rate than a physical book.

In addition, this tax proposal may not solve the problem of tax avoidance within the EU member countries as long as there are different tax rates among them. Under the EU proposal, electronic services delivered from one member country to consumers in another member country are subjected to VAT at the rate where the supplier is registered. If the Luxembourg VAT rate is lower than the Italian VAT rate, for example, the non-EU suppliers may decide to register in Luxemburg and they are subjected to less tax than those registering in Italy.

In conclusion, although tax authorities in each country have responded to e-commerce transactions in different ways, we cannot say which one is the best policy. Issuing a tax policy depends on many criteria discussed in Chapter 3. In general, I would like to recommend that before issuing any Internet e-commerce tax law, tax authorities should review existing taxation arrangements. If the existing tax rules are in need of modification, tax authorities have to ensure that they have developed fair alternatives to provide a clear and equitable taxation environment for business engaging in both physical and e-commerce.

CHAPTER 5
THE E-COMMERCE TAXATION IN THAILAND:
MODEL AND EMPIRICAL STUDIES

In this chapter, I review the current tax system in Thailand and proceed with a quantitative analysis on sales tax revenue losses from e-commerce in Thailand. The review of the current tax system will give readers a background on tax revenues collected in Thailand and a sales tax system used in Thailand. One will see that in the past decade the Value Added Tax (VAT) has become an important source of tax revenues. The Thai government has been concerned about the VAT loss because of a shift from conventional commerce to e-commerce. However, the size of potential tax revenue loss from e-commerce has never been estimated before. Therefore, I will attempt to estimate the revenue loss from e-commerce in the Thai tax system by using economic methods.

5.1 Current Tax System and Record of E-commerce Taxation in Thailand

The summary and the changing trend of tax revenue structure are presented in Table 5.1. Total tax revenue in Thailand in 2001 (fiscal year) was around 500 billion Baht. It was less than the total revenue before the economic crisis in 1997. In 1998, the value of total tax revenue dropped by 4% from the year earlier. Even though the total tax revenue has increased since then, it has only done so very slowly. Table 5.1 also

Table 5.1 Thailand Tax Revenues
(Unit: Million of Baht)

| | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 |
|-----------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Tax Revenue | 260,935 | 300,320 | 366,400 | 443,935 | 507,521 | 518,407 | 498,749 | 452,103 | 461,127 | 499,677 |
| Direct Taxes | | | | | | | | | | |
| (Tax on Inc, Profits, Cap Gains) | 140,218 | 160,873 | 200,548 | 242,902 | 280,637 | 277,714 | 222,424 | 214,890 | 237,344 | 250,816 |
| Percentage on Total Revenue | 53.71 | 53.54 | 54.71 | 54.69 | 55.27 | 53.54 | 44.58 | 47.51 | 51.45 | 50.18 |
| Individual Income Tax | 52,945 | 56,835 | 67,386 | 85,754 | 108,785 | 115,005 | 122,946 | 106,070 | 91,790 | 101,149 |
| Corporate Income Tax | 87,273 | 104,038 | 133,162 | 157,148 | 171,852 | 162,709 | 99,478 | 108,820 | 145,554 | 149,667 |
| Indirect Taxes | | | | | | | | | | |
| (Dom. Taxes on Goods&Services) | 117,833 | 135,999 | 162,249 | 197,837 | 223,454 | 235,058 | 271,009 | 226,341 | 213,044 | 231,707 |
| Percentage on Total Revenue | 45.14 | 45.26 | 44.26 | 44.54 | 44.01 | 45.32 | 54.31 | 50.04 | 46.18 | 46.35 |
| V.A.T. | 66,614 | 112,583 | 134,791 | 163,122 | 184,155 | 195,730 | 232,388 | 201,976 | 192,510 | 215,318 |
| Percentage on Total Revenue | 25.52 | 37.47 | 36.77 | 36.73 | 36.27 | 37.73 | 46.57 | 44.65 | 41.73 | 43.07 |
| Excises | 51,193 | 23,379 | 27,421 | 34,678 | 39,263 | 39,290 | 38,574 | 24,320 | 20,492 | 16,346 |
| Other Taxes | 2,884 | 3,448 | 3,603 | 3,196 | 3,430 | 5,635 | 5,316 | 10,872 | 10,739 | 17,154 |
| Non Tax Revenue | 134 | 184 | 224 | 249 | 244 | 344 | 263 | 258 | 236 | 248 |
| Total Revenue | 261,042 | 300,468 | 366,586 | 444,146 | 507,729 | 518,714 | 498,964 | 452,317 | 461,322 | 499,882 |

Source: Revenue Department of Thailand

shows that the percentage of direct taxes, such as individual and corporate income tax¹⁶, have tended to decrease in the past decade, while the percentages of indirect taxes, especially VAT, have increased.

Under Thai tax rules, VAT is imposed on domestic sales of goods and services provided in the country, and goods and service imported to Thailand. Currently, the government collects taxes from every step of production with 7%. Several products, such as agriculture, foods and books, are exempted from VAT. Furthermore, any domestic goods and services exported for users in foreign countries pay zero tax rate, except traveling services. The VAT is remitted by goods sellers or services providers.

The VAT has become an important part in the total tax revenue of Thailand in the past decade. In 1992 the proportion of VAT over total tax revenue was 25.52%, while income tax proportion was 53.71% which is more than half of total tax revenue (Figure 5.1). But by 2001, the Thai VAT produced nearly 43% of total revenue, contrasting to the declining share of income tax. This total VAT revenue is close to all indirect taxes put together.

In contrast, the tax structure in developed countries differs from that of developing countries. The developed countries have a higher proportion of income tax. For example, in the United States sales and goods taxes account for about 12% of total revenues. In the countries of the EU VAT revenues account for about 30% of total tax revenues (Mann, Eckert, and Knight, 2000).

¹⁶Income taxes are taxes on income, profits and capital gains from individual and corporate. Indirect taxes are domestic taxes on goods and services deriving from tax on general sales, motor fuels, alcoholic beverage, and tobacco.

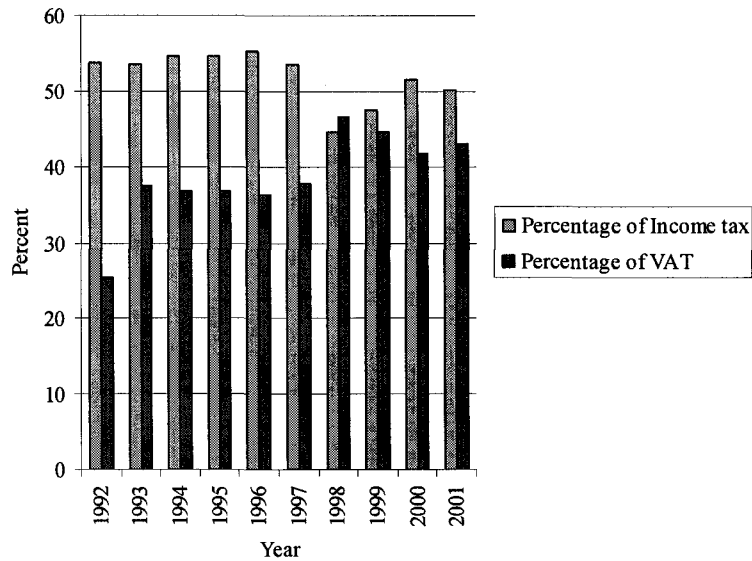


Figure 5.1 Percentage of Income Tax and VAT on the Total Tax Revenues

Due to the fact that the VAT revenue has become a substantial share of the Thai government revenue, it is easy to understand why the government is concerned that the VAT loss would be caused by e-commerce. The Thai government has realized that migration of consumers to the web would reduce tax revenues. In 1999, the government assigned a working group to study and introduce e-commerce tax legislation. Although the working group was unable to develop official recommendations, it was able to provide some guidelines to the government. The working group agreed that Thailand should not have a new specific tax for e-commerce itself. Since e-commerce in Thailand is in its infancy, the tax revenue losses from e-commerce are not sufficiently significant to warrant a new specific tax on e-commerce. The working group also suggested that an e-commerce tax should only be instituted when e-commerce is more mature and the revenue generated by e-commerce is enough to cover the social costs of the new

e-commerce tax. Meanwhile, the Thai government needs to improve the laws to support e-commerce transactions.

Although the tax authority should not levy any specific tax on e-commerce itself, technically this does not mean that transactions over the Internet or other electronic means are tax-free. The Thai tax authority has been effectively taxing e-commerce traded over the Internet as well as a physical trade. Generally, there are three tax rates: normal tax rate, exempted tax rate, and zero tax rate levied on e-commerce sales as well as traditional sales. However, as mentioned in Chapter 3, some goods and services traded over electronic means are difficult to audit by the tax authority. On the direct income tax, income (profit gain) in corporations that do e-business is also taxed by income tax similar to the conventional business.

5.2 The E-Commerce Sales Tax Revenue Losses Estimation: The Model

For Thailand, the debate on whether a special tax should be imposed on e-commerce transactions has been limited to qualitative discussion only. There has been relatively little quantitative analysis on the impact that e-commerce has. Consequently, in this section, I attempt to do a quantitative analysis on an estimation of tax losses from e-commerce, especially the sales tax that has become an important contribution to the total tax revenue for the Thai government. Before performing a quantitative analysis, I have reviewed several empirical studies conducted in the US and Thailand on the subject of e-commerce tax. These studies are useful as a base for my estimation. After reviewing the empirical studies, I have developed an economic model for estimating the e-commerce tax revenue loss in Thailand due to the absence of a specific e-commerce tax.

5.2.1. Empirical Studies Review

A. The United States

After reviewing the existing literature on the e-commerce tax issue, I found that several studies in developed countries, such as the US, the EU, and Australia, have estimated the sales tax revenue losses from e-commerce. The US has had more quantitative analyses on e-commerce tax than other developed countries. The US economists are able to conduct more advanced empirical studies than other countries because the majority of online commerce is located in the US and there are enough systematic data for performing advance quantitative analyses on the e-commerce tax revenue losses. The empirical studies have been done on the “total” potential sales tax revenue losses from e-commerce in the United States (Goolsbee and Zittrain, 1999; Cline and Neubig, 1999; the United States General Accounting Office, 2000; and Goolsbee, 2001), the “state” sales tax revenue losses from e-commerce (Bruce and Fox, 2000), and the sensitivity analysis of e-commerce tax (Goolsbee, 2000a and 2000b).

The estimations by Goolsbee and Zittrain (1999) and Goolsbee (2001) are based on the survey from the Forrester Research on estimated annual e-commerce sales from 1999 through 2003. There were 24 categories of business to consumer sales (B2C) and 13 categories of business to business sales (B2B) in the Forrester survey. From the e-commerce market size estimated by Forrester Research (Table 5.2), Goolsbee categorized all businesses into three categories: large, partial, and less sales tax revenue losses, then he calculated the likely total sales tax revenue losses. The results showed that the revenue losses from e-commerce business would rise to \$6.88 billion in 2004. This possible loss

of tax revenue from e-commerce is around 2.6% of projected total sales tax revenue in 2004.

Table 5.2 The Value of E-Commerce in US.
(Unit: Millions of Dollar)

| Type of Good | On-line Commerce | |
|-----------------------------|------------------|----------------|
| | 1999 Estimate | 2004 Forecast |
| Total Sales | 20,249 | 192,763 |
| Little Revenue Loss | 8,965 | 71,928 |
| Automobiles | na. | 16,567 |
| Leisure Travel | 7,798 | 32,097 |
| Event Tickets | 300 | 3,929 |
| Food | 513 | 16,863 |
| Flowers | 354 | 2,472 |
| Partial Revenue Loss | 3,204 | 24,211 |
| Computer Hardware | 1,964 | 12,541 |
| Computer Software | 1,240 | 11,670 |
| Large Revenue Loss | 8,080 | 96,624 |
| Books | 1,202 | 3,279 |
| Music | 848 | 4,286 |
| Videos | 326 | 1,743 |
| Apparel | 1,620 | 27,128 |
| Greetings & Special Gifts | 301 | 2,087 |
| Household Goods | 250 | 5,755 |
| Toy & Recreation | 595 | 15,039 |
| Consumer Electronics | 1,205 | 11,670 |
| Housewares | 446 | 5,908 |
| Health and Beauty | 509 | 10,335 |
| Miscellaneous | 778 | 9,394 |

Source: Forrester Research, Inc. (cited in Goolsbee, 2001)

Goolsbee did another study on the impact of Internet tax on Internet sales.

Goolsbee (2000a) examined the purchasing decisions of 25,000 users. His objectives were to determine how the local sales tax rate affected the average amount of money

spent online by typical consumers. He found that applying the existing sales taxes on the Internet could reduce online sales by up to 25%.

However, the studies by Goolsbee and Zittrain (1999) did not analyze the values of sales tax losses by state. Goolsbee and Zittrain just estimated the value of sales tax revenue loss from e-commerce at a national level. Bruce and Fox (2000) extended the study of Goolsbee and Zittrain by using data from Forrester Research as well. Bruce and Fox found that tax revenue losses from e-commerce could be up to \$10.8 billion¹⁷ by 2003 with as much as 70% coming from lost revenue from B2B. The levels of sales tax revenue losses from e-commerce differ across states. The losses ranged from the lowest of \$17.1 million in Vermont to the highest of \$1,493 million in California.

Cline and Neubig (1999) also did a calculation on sales tax losses from e-commerce based on 1998 data. They investigated how much sales tax would be lost from e-commerce, mainly the Internet sales, in the absence of new taxation legislation. Cline and Neubig determine that the total amount of untaxed sales in 1998 was approximately \$2.6 billion.

In short, all of the empirical studies done on the estimation of sale tax revenue losses in the US show that sales tax losses from e-commerce in the US could range from \$2.6 (in 1998) to \$10.8 (in 2003) billion. When comparing this loss with the total tax revenue collected each year, it is a small proportion of the total tax revenue. This result was confirmed by the United States General Accounting Office (GAO, 2000)'s study. GAO (2000) found that the size of tax losses from Internet sales for 2000 is less than 2%

¹⁷The calculation of Bruce and Fox on the future state revenue losses from e-commerce are higher than that of Goolsbee and Zittrain (1999) even the original data were from the same source.

of aggregate sales tax revenues. For this reason, the US government chose to issue a moratorium on the Internet sales tax. The moratorium on sales tax on e-commerce transactions will support the growth of e-commerce which is expected to fuel the US economy in the new economic age.

B. Thailand

There were two studies from Thailand done on e-commerce tax analysis. The first study is “E-Commerce and Its Impacts on Taxes” by Tangkitwanich (2000) under the Thailand Development Research Institute (TDRI). The study has explored the effects of e-commerce on income and consumption taxes. He explained difficulties of taxing e-commerce due to its special characteristics. He also recommended the Bit tax, a new type of tax, on the Internet commerce. The Bit tax charges do not depend on the values of products but vary according to the bit volumes of the downloaded products. In addition, the tax base should be the consumption base introduced by H. Varian. Under the consumption tax base, saving can be deducted from aggregate income. He claimed that the administrative costs of consumption tax base are lower than that of the existing income tax base.

Tangkitwanich also studied the losses of tax due to the absence of import duties. He estimated the values of import duties that would be lost during 1991-1998 if the import duties were not imposed on information technology (IT) products. The study estimated that revenue loss from the exemption was only between 0.01 and 0.03% of total tax revenue for 1991 – 1998. IT products in the study were composed of CD-ROM, Music media, Laser Disk, Movie film, VDO tape and books. These products are easy to

be traded over the electronic means by converting to digital form. Then it is easy for these products to evade taxes and difficult for tax authorities to audit.

Associated with the import duties losses, Teltcher (2002) has also estimated the tariffs that would be lost in developed and developing countries, including Thailand. The author has estimated the potential revenue losses from import duties on a number of products that have been traded physically in the past but are increasingly being imported digitally. Teltcher's study involved import duties as Tangkitwanich but group of products were not absolutely the same and the estimates were in various countries. The digitized products in the study were composed of five product categories: (1) printed matter, (2) software, (3) music and other media, (4) film, and (5) video grams. The study reported that the Thai government would lose the tariff revenues of about \$21.31 million if these digitized products shift from physical delivery to digital delivery which easy to delivers tariff-free. This accounts for 0.12% of total tax revenue in 1999. The author also noted that the fiscal losses from these digitized products might be smaller than the estimate since e-commerce trading in developing countries would be increase slower than the forecast.

The second study, "The Effects of Government Policies to the Borderless E-Commerce" is by Lemugkadej (2000) under the Research and Consulting Institute of Thammasat University (TU). Lemugkadej estimated the e-commerce market size in Thailand for 1998 and projected the market size in 1999. The estimated market sizes of e-commerce in Thailand were around 22,099 and 22,053 million Baht in 1998 and 1999 (Table 5.3). The estimated e-commerce market sizes in both years were very close. These values included both domestic and cross border (exports and imports) transactions.

The domestic transactions contributed to more than 80% of the total value. The Internet was an important channel for Thai corporations to expand their sales to overseas, whereas the private network, such as EDI, was mostly used as a channel for domestic transactions. The private network created a large proportion of e-commerce in Thailand because this kind of network has been used in B2B sector, which has contributed to almost 80% of total e-commerce market in Thailand.

Table 5.3 The Value of E-Commerce in Thailand
(Unit: Millions of Baht)

| Business | 1998 Estimated | 1999 Forecasted |
|---|-------------------|--------------------|
| Agriculture | 3,268 | 3,353 |
| Mining and Quarrying | 0 | 0 |
| Manufacturing | | |
| Food and Beverage Manufacturing | 350 | 368 |
| Textile Industry | 384 | 409 |
| Leather Products | 0 | 0 |
| Saw Mills and Wood Products | 0 | 0 |
| Paper Products and Printing | 369 | 372 |
| Rubber, Chemical and Petroleum Industries | 1,050 | 1,084 |
| Non-metallic Products | 2,716 | 2,858 |
| Metal and Metal Products | 0 | 0 |
| Electrical Machinery | 1,254 | 1,336 |
| Computer and Accessories | 445 | 427 |
| Motor Vehicles and Repairing | 0 | 0 |
| Other Manufacturing | 561 | 591 |
| Construction | 637 | 531 |
| Wholesale and Retail Trade | 3,275 | 3,382 |
| Transportation | 0 | 0 |
| Services | 7,791 | 7,342 |
| Total E-Commerce Market Size | 22,099 | 22,053 |

Source: Lemugkadej (2000)

The methodology used by Lemugkadej to measure e-commerce revenues is similar to the survey done by the Forrester Research in the US. Both surveys gathered the value of e-commerce transactions from various businesses and then drew up the total market sizes of e-commerce in their countries. The measurements include both business-to-business (B2B) transactions and business-to-consumer (B2C) transactions.

An interesting point is that most of the electronic businesses found in the US were found in Thailand as well, except automobile since the business does not fit the culture of the Thai people. The automobile sector is not a usual online business because Thai people do not feel comfortable spending a large sum of money on cars they just see on a web site. This fact is also confirmed by the surveys of NECTEC on e-commerce from 1999 to 2001. No respondent had shown that he/she had bought an automobile online. This culture factor is the same as that found in the EU countries.

Lemugkadej's study (2000) also analyzed government policies on the e-commerce regime. Under the fiscal policy analysis, the study investigated whether imposing a consumption tax on e-commerce would have effects on e-commerce transactions. The study found that if a consumption tax was added to e-commerce, at the same rate as VAT (7%), it would reduce e-commerce transactions 5.57% only. Therefore, the study suggested that electronic merchants and physical merchants should not be discriminated between.

In conclusion, there was little in the way of empirical studies in Thailand investigating the tax revenue losses from e-commerce. Moreover, existing studies did not estimate how much the total sales tax revenue loss from e-commerce would be. Although the Kangkitwanich's study has estimated the tax revenue loss from e-commerce, it was

limited to IT products tariffs only. Lemugkadej's study examined no more than the sensitivity analysis of imposing taxes on e-commerce. The most important problem limiting academic works on the e-commerce tax in Thailand is the lack of available data on the subject. Little empirical data exist on the key factors, which are needed for the calculations of the amount of sales tax revenues losses from e-commerce. Therefore, this chapter intends to develop a methodology to estimate such tax losses under available data.

5.2.2 Methodology

Estimation and forecast will be made on the potential sales tax revenue losses from e-commerce in Thailand between 1998 and 2004 if a sales tax does not apply to e-commerce. To perform the estimation, it will be assumed that the existing tax rules are applied to e-commerce and all other transactions to prevent discriminatory treatment between online and physical stores.

There are three steps involved in the model (Figure 5.2). The first step is an estimation of e-commerce values. One cannot deny that any legitimate estimation of future revenue losses from e-commerce must begin with a forecast of e-commerce sale volumes. In this study, the estimated e-commerce sales were based on the Lemugkadej (2000) survey. I assumed that the proportion of e-commerce in the total GDP remains the same during the period of the study. Even though, in fact, the proportions of e-commerce to GDP have changed year by year, there was no survey done on e-commerce sales after Lemugkadej's study (2000) to show how much they are, particularly by sectors. Therefore it is difficult to adjust such proportions. In addition, I believed that even if

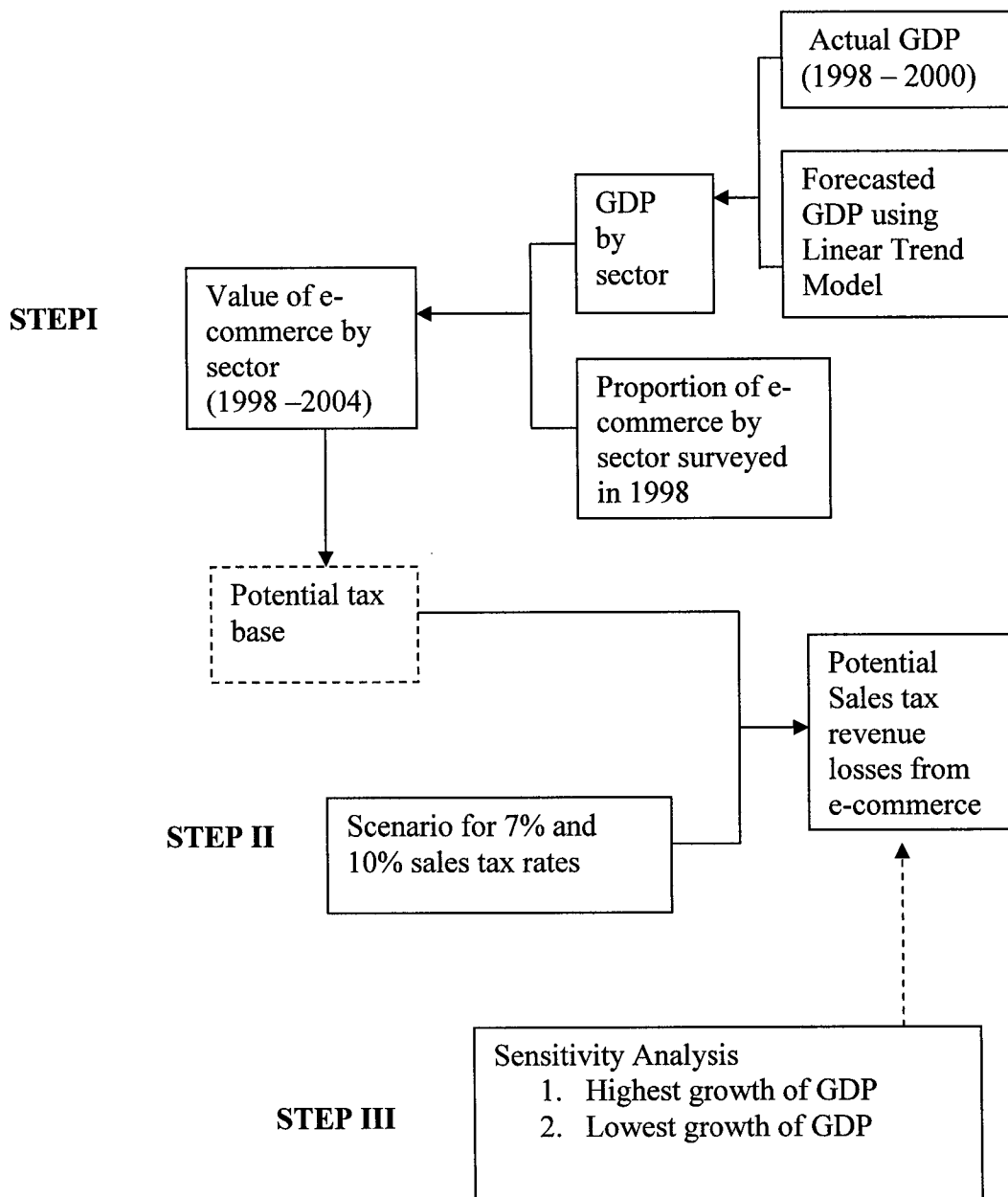


Figure 5.2 Modeling Methodology

there are some changes; there are not many since e-commerce in Thailand is just in its infancy. Furthermore, the economy after the Asian Crisis has not much recovered, and aggregate demand does not drastically pull up the demand for e-commerce. Thus, to obtain the e-commerce sales, I calculated the percentage of e-commerce based on total GDP from Lemukadej's survey on e-commerce in 1998 and matched such proportion with the years after 1998. Furthermore, since actual GDP are published over NESDB website up to 2000 only, the GDP after that time are estimated by using the linear trend model (i.e. a regression of GDP on time). With the first step, I have obtained the values of e-commerce sales in each sector.

The second step is the calculation of the potential tax revenues that would be lost. In this step, I perform the calculations under 2 scenarios in which different tax rates (7 and 10%) were assumed. Now the VAT rate is 7% but it is likely to rise to 10% in the near future. Then I performed the calculations in both possible ways.

The last step is the sensitivity analysis. The estimation of tax revenue losses would depend on the e-commerce market sizes relative to GDP. Then in this step, I will change my assumptions on the growth rates of GDP to obtain tax revenue that would be possibly lost from e-commerce. The details of calculations and results mentioned in these three steps were shown in Appendix A.

5.2.3 Sources of Data and Data Collection

The fundamental economic data, such as GDP and total tax revenues, have been gathered from National Economic and Social Development Board (NESDB), Bank of Thailand (BOT), and Revenue Department of Thailand. Meanwhile, the e-commerce

data, such as the e-commerce market size and number of Internet users, have been collected from International Telecommunication Union (ITU), Electronic Commerce Resource Center of Thailand (ECRC), and surveys done in Thailand.

However, a major problem limiting empirical works on e-commerce taxes has been the lack of data on both taxes and e-commerce. The tax data¹⁸ collected in Thailand today are annually reported and categorized in terms of tax types such as personal income tax, corporate income tax, VAT, and excise tax. None has categorized the collected taxes by method of selling (e.g., online or traditional channels), thus it is difficult to compute the tax losses from electronic means. On the other hand, e-commerce organizations, such as the ECRC just started to conduct surveys on e-commerce in the past few years but they do not have enough information. Therefore, it is not surprising that the discussion of the tax losses from e-commerce in Thailand has been limited to qualitative analyses rather than quantitative analyses since the data from government officials are not enough to estimate sales tax revenue losses from e-commerce. Consequently, to estimate tax losses from e-commerce, additional information on e-commerce collected by private studies is needed to coordinate with the analysis.

¹⁸The tax data are collected from two important sources. One is the Revenue Department of Thailand that collects data on tax revenue from domestic transactions. Another is the Custom union who gathers tax revenue data collected from import transactions.

5.3 Preliminary Results

5.3.1 Estimated E-Commerce Market Size

This study found that e-commerce market size has tended to increase over time and it would be 27,640 million Baht¹⁹ (or around \$ 643 million) by the year 2004 as shown in Table 5.4 (see calculation details in Appendix A). This result is different from ITU's study (2002) which forecasted that the e-commerce market size in Thailand would rise from \$9 million in 1998 to \$2,300 million in 2004 (Figure5.3). Only the year 2002, the estimation of this study is close to that of ITU's²⁰. However, the results from this study are in agreement with that of Lemugkadej's (2000) which estimated that e-commerce in 1999 was approximately 22,053 million Baht (or around \$514 million).

Table 5.4 Estimated E-Commerce Market Size
(Unit: Millions of Baht)

| Year | E-Commerce Market Size |
|------|------------------------|
| 1998 | 22,099 |
| 1999 | 21,815 |
| 2000 | 23,294 |
| 2001 | 25,029 |
| 2002 | 25,899 |
| 2003 | 26,769 |
| 2004 | 27,640 |

Source: Lemugkadej (2000) and calculation

¹⁹Under the assumption that the proportion of e-commerce in the total sales (i.e. total GDP) remains the same as that of 1998.

²⁰ ITU obtained e-commerce market sizes for the year 1998-1999 from the study of Tangkitwanich and year 2000 from IDC. ITU did not show how to project the e-commerce market size since 2001. Then it is possible that they use difference method and definition to estimate e-commerce market size.

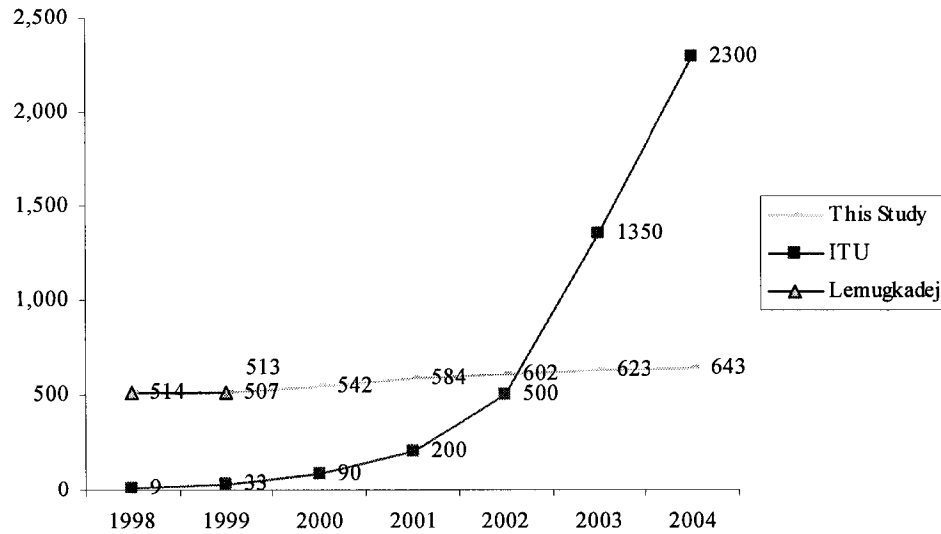


Figure 5.3 Comparing E-Commerce Market Size (in Term of Dollars)

Source: ITU, Lemugkadej and Calculation
 Note: Convert to Dollar by Approximated \$1 = 43 Baht

I found that the increase of e-commerce could be related to income, number of sellers and buyers accessing the electronic means, and cost reduction. The changes in income cause a rise in demand for e-commerce. Theoretically, this is because the increase of purchasing power of households causes the increase of demand for all (normal) goods sold over electronic means as well as goods sold by the conventional way (i.e. income effect). Survey data from NECTEC on Internet User Profile 2000 and 2001 showed that there is a positive relation between Internet shopping and income.

The number of sellers and buyers and their access through the electronic means also affect e-commerce sales. It is evident from ITU's survey that the total amount of e-commerce sales in Thailand have been rising along with the increase in the number of Internet Hosts and Internet Users in the last few years (Figure 5.4 and Figure 5.5).

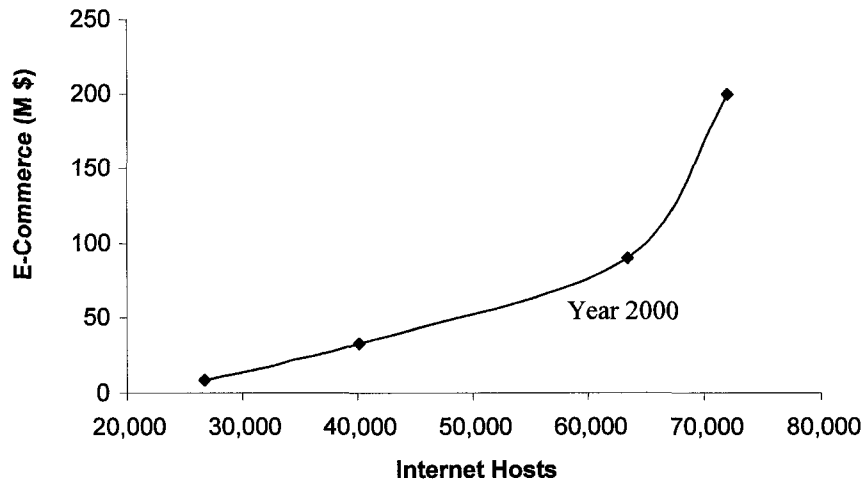


Figure 5.4 Internet Hosts and E-Commerce 1998 – 2001

Source: ITU

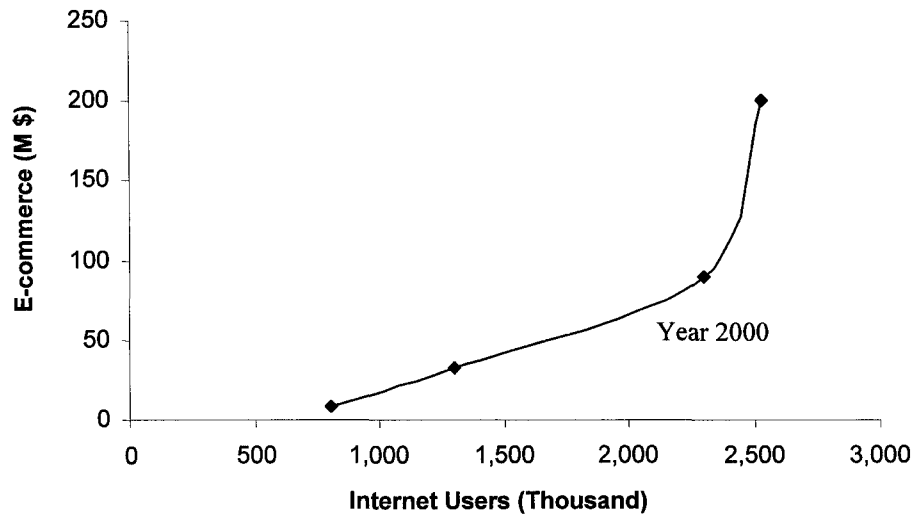


Figure 5.5 Internet Users and E-Commerce 1998 - 2001

Source: ITU

Moorhouse (2001) agreed that Internet technology and income have significant effects on e-commerce market size. The author explained that on the one hand Internet technology eases the transmission of text, data, and images which leads to drastically reducing the cost and lowering the price of information-based services; therefore more consumers would switch to the Internet. At the same time the new electronic channel helps businesses to reduce their costs, particularly distribution and operation costs. On the other hand the rise of income increases the consumer demand in both hard goods and services which now are commonly provided over the Internet. For these reasons the e-commerce has grown along with the increase of income and Internet access.

However, UN (2001) argued that most potential (and actual volume) e-commerce is not much related to Internet access for home consumers. This is because e-commerce today is very much of a business to business (B2B) type. However, in my opinion, this is not absolutely true since the “volume” of e-commerce between business to consumer (B2C) over the internet has been significantly rising even though its “proportion” to total e-commerce is still relatively smaller than B2B. Official data from the US Census Bureau is a good evidence to show that the volume of e-commerce relative to total retail sales, which is mainly transactions of B2C, has tended to increase. The total retail sales over e-commerce in 2002 was double of that in 1999. In 1999 the percentage of e-commerce retail sales to total retail sales was 0.7% but two years later the proportion rose to 1.3% (Table 5.5). Therefore, we cannot deny the fact that the number of people accessing to the Internet has an important effect on increased e-commerce volume in recent years and the future.

Table 5.5 Estimated Quarterly US Retail Sales^{1/} : Total and E-commerce

| Period | Retail sales | | E-com as % Of Total sales |
|--------|----------------------|------------------------------------|------------------------------|
| | Total (\$Million) | E-com ^{2/} (\$Million) | |
| 1999Q4 | 784,278 | 5,481 | 0.70 |
| 2000Q1 | 711,600 | 5,814 | 0.82 |
| 2000Q2 | 771,691 | 6,346 | 0.82 |
| 2000Q3 | 765,536 | 7,266 | 0.95 |
| 2000Q4 | 810,311 | 9,459 | 1.17 |
| 2001Q1 | 810,311 | 9,459 | 1.17 |
| 2001Q2 | 805,245 | 8,246 | 1.02 |
| 2001Q3 | 782,088 | 8,236 | 1.05 |
| 2001Q4 | 856,285 | 11,178 | 1.31 |
| 2002Q1 | 743,810 | 9,880 | 1.33 |
| 2002Q2 | 825,532 | 10,243 | 1.24 |

Source: US Census Bureau (<http://www.census.gov/mrts/www/current.html>)

Note: 1/ Does not include Food Services.

2/ E-commerce sales are sales of goods and services where an order is placed by the buyer or price and terms of sale are negotiated over an Internet, extranet, Electronic Data Interchange (EDI) network, electronic mail, or other online system. Payment may or may not be made online.

It is difficult to develop a quantitative analysis to illustrate that the rise of e-commerce is originated from the complementary or substitute relations between the traditional and electronic commerce since there is no evidence or study for performing an analysis on such relations even in developed countries²¹. E-commerce could create additional new customers by supporting the traditional way (i.e. a complementary between traditional and electronic commerce) and at the same time it could cause some

²¹The only evidence I found is from Madden and Coble-Neal (2002) which claimed that 6% of B2C e-commerce is new spending. There is no more statistic show the switching from traditional to e-commerce either B2C or B2B.

existing consumers to move from traditional to online stores (i.e. a substitute between traditional and electronic commerce). An example of the complementarity between traditional and electronic commerce is the automobile industry. Generally, consumers do not want to buy a car without seeing and test-driving it. Thus, car company websites do not function as car dealers to substitute the traditional dealers. The websites just offer price and product information, and test-driving arrangement. These online services help car companies to provide a suitable business for such industry. On the other hand, an example of a substitute between traditional and e-commerce is the airplane ticket businesses. Nowadays travelers do not need to go to airline or agent offices since they can reserve and buy tickets online. Even though there is no statistic to show the degree of substitution, I believe, like Madden and Coble-Neal (2002), that there is a substantial degree of substitution across electronic and traditional commerce.

From the production point of view, e-commerce is a tool which facilitates firms to cut their costs, increase efficiency, and reduces time and distance (Bingi, Mir, and Khamalah, 2000). This cost savings does not only affect the reduction of total cost in a firm but also improves overall economy productivity (UN, 2000 and Madden and Coble-Neal 2002). No specific experiment has been done on e-commerce and cost reduction in Thailand. However, United Nation (2000) conducted an experiment to examine the impact of cost reduction due to e-commerce in Asia, mainly services sector. It reported that *“productivity growth in all services combined is expected to increase GDP by 0.43%, wages by 0.42% and welfare by \$12 billions (1997dollars)”*.

5.3.2 Estimated Tax Losses

The expansion of e-commerce in Thailand raised a concern on how much tax revenue would be lost by e-commerce to the government. This study found that if the tax rate is 7% in year 2004, the potential tax losses from e-commerce in Thailand would be 1,935 million Baht or 0.307% of total tax revenue if all sales taxes are exempt from every goods and services sale over electronic means (Table 5.6). The number of potential tax losses would be smaller than mentioned before if we adjusted the exemption of agricultural products which are exempted from existing tax rules. After precluding the agricultural sector the total tax loss would be only 0.265% of total tax revenues in the year 2004. Furthermore, this total tax loss from e-commerce accounts for around 0.58% of VAT in the same year. This is a small amount compared to the US. The General Accounting Office reported that e-commerce tax losses in the US would be approach to 2% of aggregated sales tax revenue. Even if the tax rate is 10% in year 2004, the potential tax loss from e-commerce in Thailand is also small. The losses would be around 2,764 million Baht only (Table 5.7).

Table 5.6 Total Tax Losses from E-commerce (Base on This Study)
(Unit: Millions of Baht)

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|----------|----------|----------|----------|----------|----------|----------|
| Total Tax Losses from E-commerce (Millions of Baht) | 1,546.95 | 1,527.08 | 1,630.58 | 1,752.07 | 1,812.98 | 1,873.89 | 1,934.81 |
| Total Tax Revenue (Millions of Baht) | 498,965 | 452,316 | 461,321 | 499,882 | 539,838 | 582,988 | 629,587 |
| Percentage of e-com tax to total revenue | 0.310 | 0.338 | 0.353 | 0.350 | 0.336 | 0.321 | 0.307 |
| Total Collected VAT | 232,388 | 201,976 | 192,510 | 215,318 | 249,227 | 288,476 | 333,906 |
| Percentage of e-com tax to total VAT | 0.666 | 0.756 | 0.847 | 0.814 | 0.727 | 0.650 | 0.579 |

Source: Author's Calculation and Revenue Department of Thailand

Table 5.7 Tax Losses from E-Commerce by Sector
(Unit: Millions of Baht)

| Sector | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | | | Tax Rate =7% | Tax Rate=10% |
| Agriculture | 228.76 | 201.44 | 204.00 | 237.06 | 247.61 | 258.16 | 268.71 | 383.87 |
| Mining and Quarrying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Manufacturing | | | | | | | | |
| Food and Beverage Manufacturing | 24.50 | 26.99 | 22.21 | 29.64 | 31.33 | 33.03 | 34.72 | 49.60 |
| Textile Industry | 26.86 | 26.79 | 27.89 | 30.22 | 31.48 | 32.73 | 33.99 | 48.56 |
| Leather Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Saw Mills and Wood Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paper Products and Printing | 25.84 | 27.40 | 29.29 | 32.62 | 35.07 | 37.52 | 39.98 | 57.11 |
| Rubber, Chemical and Petroleum Industries | 73.47 | 70.28 | 78.88 | 89.64 | 96.96 | 104.28 | 111.60 | 159.43 |
| Non-metallic Products | 190.11 | 213.64 | 224.55 | 228.05 | 231.48 | 234.92 | 238.35 | 340.50 |
| Metal and Metal Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electrical Machinery, Computer, and Supplies | 118.92 | 115.09 | 156.61 | 147.72 | 155.57 | 163.42 | 171.27 | 244.68 |
| Motor Vehicles and Repairing | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other Manufacturing | 39.28 | 43.46 | 51.46 | 50.63 | 52.84 | 55.04 | 57.25 | 81.79 |
| Construction | 44.56 | 41.48 | 37.49 | 39.96 | 35.68 | 31.40 | 27.12 | 38.74 |
| Wholesale and Retail Trade | 229.26 | 232.68 | 245.61 | 262.14 | 272.12 | 282.10 | 292.07 | 417.25 |
| Services, Banking and Insurance | 545.40 | 527.83 | 552.59 | 604.39 | 622.84 | 641.30 | 659.75 | 942.50 |
| Total | 1,546.95 | 1,527.08 | 1,630.58 | 1,752.07 | 1,812.98 | 1,873.89 | 1,934.81 | 2,764.01 |

Source: Author's calculation

The tax loss from e-commerce in Thailand is still small even basing the calculation on the ITU data whose forecasted e-commerce market sizes are significantly larger than those used in this study, mainly in the year 2003 and 2004. Table 5.7 shows that with 7% tax rate the total tax loss would be around 1.10% (or around 6,923 million Baht) in the year 2004 if any tax provision and evasion do not appear in the tax system.

Table 5.8 Total Tax Losses from E-commerce (Base on ITU)
(Unit: Millions of Baht)

| | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|---|---------|---------|---------|---------|---------|---------|---------|
| Total Tax Losses from E-commerce (Millions of Baht) | 27 | 99 | 271 | 602 | 1,505 | 4,064 | 6,923 |
| Total Tax Revenue (Millions of Baht) | 498,965 | 452,316 | 461,321 | 499,882 | 539,838 | 582,988 | 629,587 |
| Percentage of e-com tax to total revenue | 0.005 | 0.022 | 0.059 | 0.120 | 0.279 | 0.697 | 1.100 |

Source: International Telecommunication Union and Revenue Department of Thailand
Note: \$1 = 43 Baht

After excluding the agriculture sector, the top five sectors (by rank order) that would cause high tax losses are (a) services, banking and insurance, (b) wholesale and retail trade, (c) non-metallic products (d) electronic machinery, computers and supplies, and (e) rubber, chemical and petroleum industries (Figure 5.6).

Half of potential sales tax revenue from e-commerce is a contribution of (a) service, banking, and insurance and (b) wholesale and retail trade account. This result could be confirmed by Baily and Lawrence (2001)'s study. Their study showed that 70% of IT products, which are mainly products traded over e-commerce, are purchased by wholesales and retail trade, finance, and telecommunications. Then it is not surprising that these two sectors are expected to generate large amounts of e-commerce sales taxes relative to other businesses.

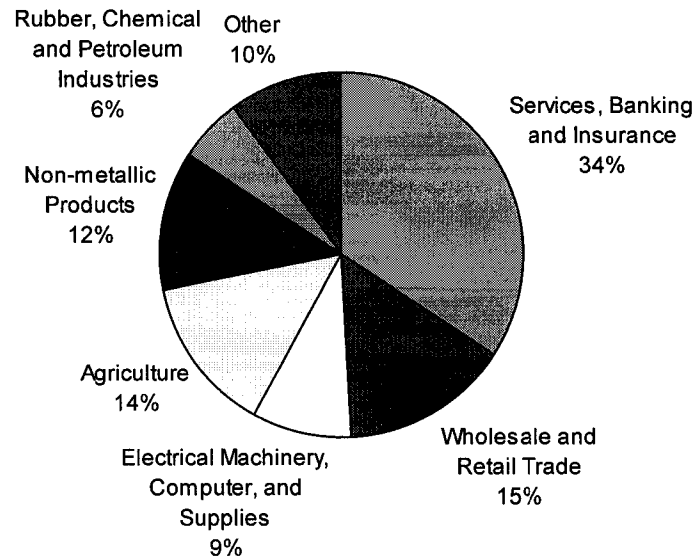


Figure 5.6 Sales Tax Losses from E-Commerce by Sector

Source: Author's Calculation

One can see that the total amount of tax revenue losses from e-commerce in Thailand is small since the values of e-commerce in both domestic and import transactions are not high. For example, from a 1998 survey (Lemugkadej, 2000) the e-commerce transactions in Thailand are around 0.48% of GDP in that year. However, it has tended to increase since the rise of transaction of digitized products over the electronic means rose faster than the growth of e-commerce. Jones and Basu (2002) have noted that the growth rates for both exports and imports of digitized products are significantly higher than the growth rates for total merchandise trade. For this reason it is possible that the revenue losses from e-commerce would increase in the future because of the rise of transactions of digitized products over e-commerce.

5.3.3 Sensitivity Analysis

In order to analyze other possibilities of tax losses, I performed the calculations using different assumptions by varying the growth rates of GDP as shown in Appendix A. After varying the GDP by estimating them from minimum and maximum growth rate, the calculation results show that if the tax rate is 7%, the range of tax revenue losses from e-commerce would be between 1,163 and 3,303 million Baht by the year 2004 (Table 5.9). The results demonstrate that the tax loss in the extreme case (i.e. high growth of GDP and tax rate is 10%) is still less than 1% of total tax revenues (Table 5.10).

Table 5.9 Estimated Tax Losses 2001 – 2004 in Various Cases
(Millions of Baht)

| | 2001 | 2002 | 2003 | 2004 |
|-----------------|----------|----------|----------|----------|
| Low GDP Growth | 1,487.97 | 1,364.83 | 1,257.57 | 1,163.45 |
| Base Case | 1,752.07 | 1,812.98 | 1,873.89 | 1,934.81 |
| High GDP Growth | 1,932.93 | 2,300.57 | 2,750.08 | 3,302.90 |

Source: Author's calculation

Note: Tax rate is 7%.

Table 5.10 Range of Tax Losses from E-commerce
(Millions of Baht)

| | Low GDP Growth | Base Case | High GDP Growth |
|--|-------------------|-------------------|--------------------|
| Tax Loss for Tax Rate is 7% in 2004 | 1,163 (0.185%) | 1,935 (0.307%) | 3,303 (0.525%) |
| Tax Loss for Tax Rate is 10% in 2004 | 1,662 (0.264%) | 2,764 (0.439%) | 4,718 (0.749%) |

Source: Author's calculation

Note: Numbers in parentheses are the proportion of tax revenue losses from e-commerce to total tax revenue.

5.3.4 Notes on the Preliminary Results

If a specific sales tax is imposed on e-commerce in Thailand, these estimated potential tax revenues generated by e-commerce would be higher than the actual collected tax because of tax evasion.

According to the results in the previous sector, I roughly categorized the top five sectors, excluding agriculture, that would generate high tax losses, into two groups by chance of evasion. The first group is composed of (a) non-metallic products and (b) chemical and petroleum industries. Most of the products in this group are physical products which are difficult to be transformed into digitized goods or services. The second group is composed of (a) banking and insurance, (b) wholesale and retail trade, and (c) electronic machinery, computers and supplies. If a new e-commerce tax is imposed, the latter group would be more responsible for the difference between actual taxes collected and potential taxes than the former group. The second group is expected to generate a large amount of evasion relative to other businesses because such businesses are widely provided and are easier to deliver over electronic means.

No statistics have shown how much tax revenue would be lost because of unreported and illegal transactions (underground economy²²) over electronic means, however, Hinduja (2001) noted that it tends to increase. He found that the development of network technology, particularly high-speed online access encourages unreported and illegal activities on the Internet such as illegal downloaded music and software piracy.

²²A major characteristic of underground economy is that its activities are difficult to observe by the tax authorities, for example cash transactions in the service sector and illegal business (Rosen, 1999).

Bingi, Mir, and Khamalah (2000) mentioned that one form of illegal transaction over the network is the sale of commodities that are restricted or illegal such as pornographic material, illegal weapons, restricted chemical items, and online gambling services. In addition to the typical illegal business mentioned earlier, the unreported transactions also cause a difference between actual and potential tax base. On the e-commerce transactions, the evasion is found when sales to consumers, particularly digital products and services, are unreported or reported lower than the actual volume of transactions. A famous case in the last couple of years was Napster, which was the most popular software for MP3 file searching. One can easily download free music with this software. This lowers total sales and taxes reported from music companies which legally distribute the music. Another example is unreported software sales and illegal software downloads. Despite being illegal to download, upload, or transmit through the Internet, today many sellers are still setting up their web sites and distributing illegal software (including other digital contents) to global customers. Statistics from the Software and Information Industry Association (SIIA, 2000) showed that in the year 1999, global software piracy²³ totaled \$12.16 million, an increased of around 20% from a year before. For Thailand, software piracy totaled \$82,184 in 1999 or around 81% of total software sales values in that year. SIIA forecasted that the growth of the e-commerce in Thailand would increase software piracy rates to more than 95%. This number indicates that the total tax evasion over e-commerce in Thailand would be large enough to cause concern.

²³SIIA defines software piracy as the unauthorized copying of computer software, which constitutes copyright infringement, for either commercial or personal use. Software piracy includes purchasing a single licensed copy of software and loading onto several computers, making unauthorized copies of copyrighted software available to others electronically, and installing unauthorized copies of software onto other computers, for example.

The other factor that could make projected potential tax losses different from the performed calculation is the substitution effects. Since e-commerce transactions are easy to relocate and this facilitates domestic buyers to choose to buy the same products from sellers around the world if the price is relatively cheaper than domestic. In countries in which demand for e-commerce has high elasticity, the total domestic e-commerce sales could be significantly decreased after imposing a tax. This reduction may cause (1) a switch from domestic e-commerce to foreign e-commerce and (2) a switch from e-commerce to traditional commerce. Therefore, for more accuracy we need to include these two effects into the total tax losses calculation (if any data is available to perform more details of calculation). However, in developing countries, Thailand for example, the elasticity of demand for domestic e-commerce is small. Consequently, after compensating for these effects with tax losses from e-commerce, the net effect is expected to be small in the projected sales tax losses from e-commerce.

CHAPTER 6

CONCLUSION AND POLICY IMPLICATIONS

6.1 Conclusion

The objectives of this study are to explore the status of e-commerce, to assess the effect of a policy of imposing a new sales tax on e-commerce, and to estimate the tax revenue losses if e-commerce is exempted from sales tax in Thailand. This study found that even though e-commerce in Thailand is in its infancy, it has grown rapidly in recent years. This is because e-commerce facilitates reduction of information costs and production costs. ITU reported that the e-commerce market in Thailand in 1998 was \$9 million and was forecasted to grow to \$2,300 million in 2004. Sectors most likely to be affected by e-commerce are sectors where their products are in intangible forms such as financial and information services sectors. A number of studies reported that e-commerce not only benefits individual businesses and consumers, but also improves national output. Nevertheless, the security problem, lack of payment method (particularly credit card) and culture are the main problems hampering e-commerce in Thailand.

E-commerce transactions are different from conventional transactions because sellers can easily relocate due to the low cost of setting up a web-server to sell goods and services. Moreover, some products sold via electronic means can easily be transformed into digital forms and can also easily be delivered over the electronic

environment. However, there is a difficulty in including e-commerce transactions in the general sales tax base, if agents and products dealing with e-commerce are in digital forms. Because of these complications, several new potential means of taxing, such as Bit tax and new tax remitting agents, are introduced to apply to e-commerce instead of the ordinary tax. The Bit tax is a method in which taxes are calculated from the volume of digital bits transferred over electronic media instead of from the value of sale products. The new tax remitting agents is a method through which tax is remitted by an intermediary dealing with electronic transactions instead of by sellers in the traditional transactions.

The large expansion and special characteristics of e-commerce also caused the Thai government to be concerned about fiscal revenue losses (such as consumption taxes, income taxes, and tariffs) from e-commerce transactions because it is difficult to identify locations of taxable activities and transaction values if sellers intend to avoid remitting taxes. Therefore, significant questions investigated by this study are (1) whether the Thai government should impose a new specific tax on e-commerce transactions to prevent tax revenue losses and (2) how much the tax revenue losses would be if e-commerce in Thailand is exempted from sales tax (like the US).

In order to impose a new tax, the government needs to consider the trade offs among efficiency, equity, and administrative costs based on economic rationale. The results from this study illustrated that imposition of a new tax could improve equity and have low a level of distortion, but at the same time it would generate high administrative costs for the government.

On equity issues, the government should be concerned about the equal treatment between traditional and electronic commerce. Tax should not favor electronic stores and punish traditional stores. If e-commerce is exempted from the tax, the higher income people who have greater opportunities to access the Internet or other electronic means will have an incentive to make their purchase online to avoid tax. On the other hand, the lower income people who have less chance to shop online have to pay taxes for purchasing from conventional stores. E-commerce is only a new medium for exchange and it should be subject to the same rules and regulations as traditional commerce (i.e. an equivalent treatment).

On the matter of efficiency, imposition of a new tax would generate a distortion in terms of the foregone welfare from a reduction in e-commerce consumption and production. However, it is expected that there is not much distortion to be found since it is evident that e-commerce shopping in Thailand had low sensitivity to taxation (particularly relative the US). Imposition of a tax would not cause a substantial decline in e-commerce demand if the tax rate is equal to the existing sales tax rate. Therefore, e-commerce should not be tax-free under the equity and efficiency perspectives.

Nevertheless, on the administrative costs side, the government must find the right balance between the costs of collection and the amount of foregone tax revenue. Imposition of a new type of tax to prevent tax losses from e-commerce, however, would require the Thai government to invest in the latest technology and spend a lot of collection costs relative to additional expected tax revenue.

Consequently, after assessing the economic effects of the imposition of a new tax on e-commerce, this study recommended that the Thai government should not

impose a new tax on e-commerce transactions within the next few years. This is because there is only a small amount of revenue lost in recent years and the equity argument is not strong enough, given the present size of e-commerce. There is a small number of people and businesses trading over electronic media. Based on current data, the potential sales tax losses from all e-commerce transactions would only be approximately 1.9 billion Baht or account for 0.31 % of total tax revenues only. However, the data suggested that the potential losses tend to increase over the next several years, so the Thai government needs to prepare itself for the future.

6.2 Policy Recommendation: Revising the Existing Tax Rules

Although this study found that no new specific tax should be imposed on e-commerce, it does not mean that the Thai government should exempt e-commerce transactions from the existing VAT, like the United States. E-commerce does not need a whole new system of taxation in the next few years. This is because in developing countries like Thailand, e-commerce trade volumes are small relative to developed countries and e-commerce is not much different from traditional forms of commerce. Therefore, the Thai government should not exclude it from existing taxes. The exemption of VAT would lead to discrimination between e-commerce and non-electronic commerce. However, current VAT rules do not work well under the electronic environment. Consequently, in this section, there are some recommendations for improving the existing VAT system to keep pace with e-commerce.

A. Validity of Electronic Paper

Since sales over the Internet, particularly the digitized goods and services, do not need physical delivery, it is convenient for sellers to issue electronic receipts to customers instead of traditional receipts (hard copy documents). The question for every country is whether tax authorities accept these electronic documents equal to the traditional documents which are used as evidences for reporting tax.

For Thailand, the Revenue Department has been concerned about this issue but up until now it is unclear that electronic receipts are legally valid equal to conventional receipts under the VAT rules. If businesses issue electronic receipts, they need to keep the electronic records and such data have to be approved by the Revenue department on case by case basis to be valid. This complicated and confusing situation may cause a tax loss even among sellers who would like to remit taxes to the government. Therefore, the government should review and modify the existing tax system to treat the tax report and receipts from electronic transactions (i.e. electronic documents) as traditional transactions.

B. Apply Existing Tax Rules to All Digitized Products

The tax rules in Thailand are mainly applied to software programs only. However, currently many products could be transformed into digital forms²⁴ and

²⁴Moorhouse (2001) explained that the array of goods and services that can be transformed into digital forms and delivered via the Internet fall into three categories: information goods, professional services, and entertainment goods. Information goods include books, journals, magazines, pictures, image, data and software provided over the Internet. Professional services include brokerage, financial analysis, banking, education, medical, legal, and travel and reservation services. Finally, entertainment goods include movies, videos, music, game and gambling.

delivered over electronic means, especially the Internet. Therefore, besides software programs, all digital goods and services sold via electronic means and delivered in digital forms (such as music, data, and photographs) should be subjected to VAT when they are purchased.

In practice, it is easier for the Thai tax authority to extend the tax base to cover all digital products than the EU countries. This is because Thailand does not have different tax rates between goods and services as experienced in the EU countries. Therefore, the Thai tax authority does not need to develop definitions and classifications between digital goods or services.

C. Make a Clear Definition of Electronic Stores

A number of tax commentators agree that electronic stores that have permanent establishments may be taxed as physical stores for keeping neutrality between electronic and traditional stores. Generally, the Revenue Department of Thailand agrees that electronic stores are required to remit VAT in the same manner as physical stores. However, there is no clear definition as to what kind of sales over electronic means should be taxed.

The problem arises when web-server owners and products owners are not the same (like patrol-websites²⁵ and action-websites), then it is unclear that who should remit the tax to the government. Until recently, this problem has not been extreme for domestic e-commerce since most Thai web-servers are for advertisement rather than sale. However, it would be serious in the future when trading web-servers have

²⁵Patrol-websites are websites that bring a number of firm websites together.

increased. For cross-border e-commerce, it might be a significant problem because there are many web-servers worldwide which take advantage of this unclear situation to avoid paying taxes. Therefore, we need a clear definition of who has the responsibility of remitting VAT to the Revenue Department. To do so, the Revenue Department can use OECD's guidelines²⁶ to define which web-servers are required to remit tax.

D. Agreement on Uniform Tax for Cross Border Transaction

The easy mobility of e-commerce and its geographic sensitivity to different tax rates would cause tax loss to the Thai government. There is evidence that e-commerce enhances an opportunity of shifting from buying in high sales tax areas to low sales tax areas. By e-commerce, it is easy for businesses to set their companies in a lower tax rate location and ship their products cross-border, particularly digital products which have very low or zero shipping costs.

The tax authorities sometimes ignore tax losses from cross-border trade because it is costly to monitor all imports at the border compared with the additional tax revenue. The United Nation (2001) has shown that a potential of global fiscal loss (including VAT, tariffs and other import duties) from border trading was around \$2 billion. This amount was small relative to total government tax revenue. However, I do believe that these fiscal losses will increase in the future because of the growth of

²⁶OECD's members agreed that web-servers that have the following characteristics have permanent establishments (PE) and can be treated similar to physical stores.

- (1) The server is owned or leased by the enterprise.
- (2) The server is operated by the enterprise.
- (3) The server is located in a fixed location. That is it has not actually been moved.
- (4) The enterprise is wholly or partly carried on in the jurisdiction where the server or other equipment must be an essential and significant part of the business activity (a core function), not preparatory or auxiliary activities.

electronic trading over e-commerce. Consequently, we need to collaborate with other countries to reach an agreement regarding unifying tax rates to prevent shifting the trade and tax to other countries.

E. Improving Tax Services

Besides revising the tax regulations as mentioned above, the Revenue Department has to modernize the tax administration system in order not to lose tax revenues. It is a good chance for the Revenue Department to use the information technology to improve tax services and reduce complication. Presently, Thai businesses can report and remit taxes over the Internet (called E-taxation), however, these services are required to be promoted to public. At the same time, the Revenue Department needs to train its staffs to be more familiar with e-commerce.

In conclusion, Thailand does not need a new type of tax for e-commerce but the Revenue Department requires improving the existing tax to keep pace with the changing business environment due to the advancement of information technology. The improvement will lead to an equality between e-commerce and the traditional commerce, no matter what forms of products are sold and by whom. Many studies (such as Goolsbee, 1999; Jones&Basu, 2002) agreed that non-neutral tax treatment of e-commerce transactions may reduce rather than expand the economy. At the same time, the government should use the information technology as a tool to provide a better service to taxpayers.

6.3 E-Commerce Official Statistics Recommendation

A. Official Statistics are Required

Due to my experience of doing this study, I found that a lack of data is an important problem obstructing my study. The lack of data leads to a limitation of this study. The results from the model in this study, for example, provide only an approximate estimation of tax revenue losses under some assumptions but the study cannot predict exactly how much it would be. This is because data were available only in a short period and had few details. Therefore, in this section I have suggestions on the development on official statistics of e-commerce for Thailand.

The official statistics on e-commerce are required by researchers and policy makers in order to study and recommend policies regarding e-commerce. Two types of data that we need to know about e-commerce are (1) values of sales made through e-commerce: the values of e-commerce sales associated with the size and characteristics of e-commerce and how it distributes over business, industries, regions, and time, and (2) the productivities of e-commerce: the productivities of e-commerce associated with the impacts of e-commerce on the performance of individual businesses and the overall economy. This information would not only be useful for exploring e-commerce tax issues but also for investigating the other impacts of e-commerce on the whole economy.

At the present time, Thailand has gathered few of these data. Thailand has several surveys on e-commerce but they have focused mainly on the size of e-commerce sales and products sold over electronic means. None of those surveys has collected data and analyzed the impacts of e-commerce on the firms or the whole

economic performance such as investments or productivities. Moreover, the data are available only one period of time when study or survey projects were assigned. They are not collected continuously. In addition to the lack of information mentioned above, the available e-commerce data in Thailand are less confident and accurate because of several problems such as unclear definitions, estimation method, small sample size, and respondents unfamiliar with the questionnaire.

Because of these quantitative and qualitative problems, we need a systematic and consistent data which could be developed by the government or private organizations to be used as official reference statistics. The US Census Bureau is a good example of government organization that has developed methodologies to collect e-commerce data and published them at www.census.gov/econ/www/ebusiness614.htm.

To develop official statistic information on e-commerce in Thailand, first, the organization which takes the responsibility needs to define e-commerce clearly. A number of studies have published estimates of e-commerce transactions, however, they vary widely because of different definitions of e-commerce being used. The definitions of e-commerce used in the surveys varied from narrow to broad definitions. I found that there are roughly four definitions used in measuring e-commerce (Table 6.1). The narrowest definition includes only commercial transactions over the Internet (Definition 1). The widest definition includes all transactions over all electronic networks (Definition 4). Several studies dealing with e-commerce such as UN (2001), Vehovar and et al (2001), and US census, agreed that there is need to define e-commerce clearly. In my opinion, it does not matter which definition is used but we need to define it clearly before collecting the data and make the respondents and data users understand it.

Table 6.1 E-Commerce Definitions Used in Survey

| | | |
|--|--|---|
| Types of Transactions Types of Media | All commercial transaction (Purchase or Sale of a product or service) | All commercial transaction and Any transfer of business document (Including forms, money order, bill and advertising.) |
| Transaction over Internet | (Definition 1) | (Definition 2) |
| Transaction over all electronic networks ²⁷ . | (Definition 3) | (Definition 4) |

Second, to obtain a more accurate estimation of e-commerce market size, the survey would have to go into more detail within sectors. The fact is that not every sub-sector has generated the same amount of e-commerce values. Then it is possible that a sector has an overall high value of e-commerce, but some of its sub-sectors may have low e-commerce transactions and some sub-sectors may have high values.

The data from sub-sectors are useful to analyze the impact of e-commerce on the whole economy. If we can collect data on e-commerce in the same way and same categories as current traditional commerce does and show them in the Input-Output table, it would be an advantage since it could be comparable with traditional economic activities. Such data are also useful in measuring the impact of e-commerce to economic performance such as productivity, labor distribution, and investment related to e-commerce. Lemugkadej's survey (2000) was a good example for e-commerce survey since it was based on the Input-Output categories but the categories in his survey

²⁷Mesenbourg (2001) explained that "networks include the Internet, intranet (internal network within an enterprises' or organization's firewall), extranets (networks using Internet/intranet technology that permit businesses to securely share information with selected suppliers, paying customers, or other businesses), Electronic Data Interchange (EDI - a proprietary electronic system used for exchanging business data over networks), and telecommunication networks."

were composed of a few rough categories and there was a small of sample relative to the number of existing businesses. However, we can add more sub-sectors in the future data collected parallel to the conventional trading.

B. How to Gather Data

The information can be collected by adding questions to the existing surveys, or developing new surveys. In my opinion, the Thai government should add questions on e-commerce to the Economic Census which surveys yearly. The advantage of this approach is cost saving. We will collect additional e-commerce data with low additional costs. The data should be collected from e-commerce used by private sectors and the government. Atrostic, Gates, and Jarmin (2000) suggested that such additional questions should ask about whether the businesses conduct transactions through e-commerce, the value of the transactions traded by e-commerce, and the specific technology used such as EDI, Internet, Extranet, etc.

An easy start for Thailand is to apply the questionnaire and statistic methodology developed by inter-organization, such as UN, OECD, APEC, or from developed countries like the US to gathering data on e-commerce²⁸. At the beginning, we will obtain data on size, characteristics, and distribution of e-commerce in various sectors year by year continuously as with conventional transactions. This information is more valuable if it can be compared with traditional commerce. Furthermore, they can also use the data to indicate the status of e-commerce in Thailand comparative to other

²⁸Appendix C shows a sample of questionnaires provide by he United Nation (2001) which can be used as a guideline for collecting data in developing countries. Moreover, the US Census survey questionnaires on multisector are available at www.census.gov/eos/www/forms.html.

countries. In the advance stage, we need to develop a methodology which allows us to assess the long-run impacts of e-commerce on the production productivities. However, to measure the long run impact it might require more knowledge about electronic businesses, data about information infrastructure, budget, and time. Therefore, at this time the most important is the development of a basic statistic which is reliable enough to use as an official reference to indicate e-commerce activities.

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APPENDIX A
METHODOLOGY AND CALCULATION OF TAX LOSSES

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METHODOLOGY AND CALCULATION OF TAX LOSSES

Even though tax losses from e-commerce have been concerned by the Thai government, there are few studies done on it, especially in term of quantitative analysis. Therefore, one may expect that output from this study is an estimation of potential sales tax revenue losses from e-commerce if the sales tax is absent from e-commerce sales. In order to estimate how much taxes would be lost, I performed a calculation as follows.

STEP I: E-Commerce Estimation

To estimate sales tax losses from e-commerce between 1997 and 2004, we need to know the values of e-commerce sales. However, I am not able to conduct my own survey to gather the values of e-commerce transactions in Thailand because of the cost concern. So I will use the e-commerce market size surveyed by Lemugkadej (2000)²⁹ for the Department of Commerce, Thailand. His estimated e-commerce market size was based on intensive interviews with 175 executives of Thai corporations categorized into 17 sectors as shown in Table A1. The survey gathered the values of e-commerce

²⁹This survey is more advanced than the ITU's study in the way that it surveyed the values of e-commerce by sector, while the ITU estimated the total values of e-commerce only. Then I chose to perform the calculation of tax revenue losses using Lemugkadej's data instead of the ITU's data. However, the ITU's data is more useful in term of analyzing the big picture of e-commerce because its data covered more years than that of Lemugkadej's. Therefore, in this research, I will refer to the ITU data in some parts.

Table A1 Number of Interviewed Thai Corporations

| Sectors | Number of corporations |
|---|------------------------|
| Agriculture | 5 |
| Mining and Quarrying | 3 |
| Manufacturing | |
| Food and Beverage Manufacturing | 18 |
| Textile Industry | 8 |
| Saw Mills and Wood Products | 3 |
| Lethal Products | 3 |
| Paper Products and Printing | 6 |
| Rubber, Chemical and Petroleum Industries | 9 |
| Non-metallic Products | 4 |
| Metal and Metal Products | 6 |
| Electrical Machinery and Apparatus | |
| Electrical Machinery | 7 |
| Computer and Accessories | 11 |
| Motor Vehicles and Repairing | 2 |
| Other Manufacturing | 6 |
| Construction | 8 |
| Wholesale and Retail Trade | 35 |
| Services | 41 |
| Total | 175 |

Source: Lemugkadej (2000)

in 1998 and forecasted the value of e-commerce for 1999. The results are shown in Table A2.

Since the study by Lemugkadej focused on year 1998 and 1999 only, I have to forecast e-commerce market sizes after those years up to 2004. The growth of e-commerce market sizes is attributed to several factors, such as income, numbers of sellers and buyers and their accesses to the Internet (or other networks), and capabilities of

Table A2 The Value of E-Commerce in Thailand
(Unit: Millions of Baht)

| Business | 1998 Estimated | 1999 Forecasted |
|---|-------------------|--------------------|
| Agriculture | 3,268 | 3,353 |
| Mining and Quarrying | 0 | 0 |
| Manufacturing | | |
| Food and Beverage Manufacturing | 350 | 368 |
| Textile Industry | 384 | 409 |
| Leather Products | 0 | 0 |
| Saw Mills and Wood Products | 0 | 0 |
| Paper Products and Printing | 369 | 372 |
| Rubber, Chemical and Petroleum Industries | 1,050 | 1,084 |
| Non-metallic Products | 2,716 | 2,858 |
| Metal and Metal Products | 0 | 0 |
| Electrical Machinery | 1,254 | 1,336 |
| Computer and Accessories | 445 | 427 |
| Motor Vehicles and Repairing | 0 | 0 |
| Other Manufacturing | 561 | 591 |
| Construction | 637 | 531 |
| Wholesale and Retail Trade | 3,275 | 3,382 |
| Transportation | 0 | 0 |
| Services | 7,791 | 7,342 |
| Total E-Commerce Market Size | 22,099 | 22,053 |

Source: Lemugkadej (2000)

network infrastructure. These factors would vary the total e-commerce sales as well as the tax revenue losses from e-commerce.

Despite the fact that we can identify the factors affecting the growth of e-commerce, but in term of quantitative analysis, we cannot perform an econometric analysis to show the quantitative relation of such factors to e-commerce due to the lack of data and survey done on them in Thailand. There are some short term data available in

US to complete the analysis. Because of this reason, this study focuses on contribution of e-commerce to GDP only. The data from ITU and NESDB show that when the GDP increases, it raises the total trading in the whole economy, including e-commerce (Figure A1).

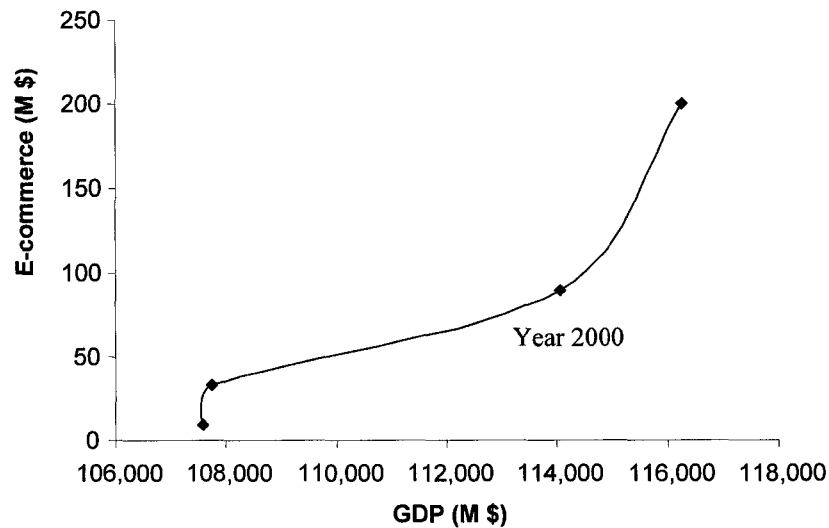


Figure A1 GDP and E-Commerce between 1998 and 2001 in Thailand

Source: ITU and NESDB

In fact, e-commerce sales have been increasing along with the GDP. Therefore, before obtaining the values of e-commerce by sector, I attempted to forecast GDP growth. I have forecasted the value of GDP by using equation [1] below. Although the Bank of Thailand (BOT) has forecasted the growth of GDP, I do not use its data because of two reasons. First, the BOT extended the forecast to 2002 which is a shorter period than this study. This study needs the data until 2004. Second, the BOT roughly categorized the sectors into Agriculture and Non-Agriculture only.

The actual GDP are available and are provided on NESDB's website between 1993 and 2000. Thus I use the linear trend model (Equation 1), which is a result of linear regression between GDP and time during 1993 and 2000 to forecast GDP. The data of actual GDP from NESDB are provided in Appendix B. Table A3 illustrates the results of forecasted GDP by sector between 1998 and 2000 based on equations shown in Figure A2.

$$GDP_t^i = a + bt + u_i \quad [1]$$

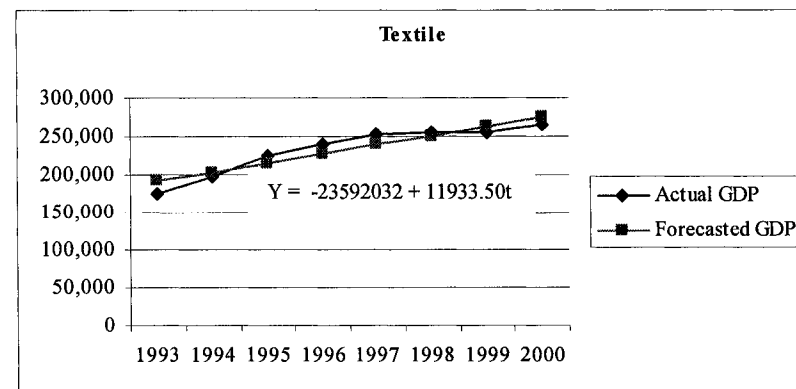
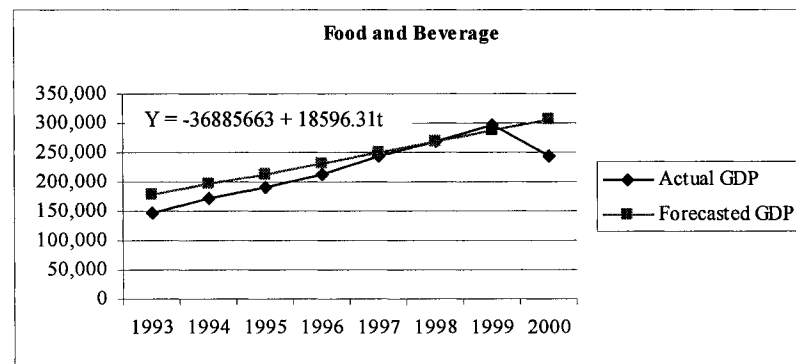
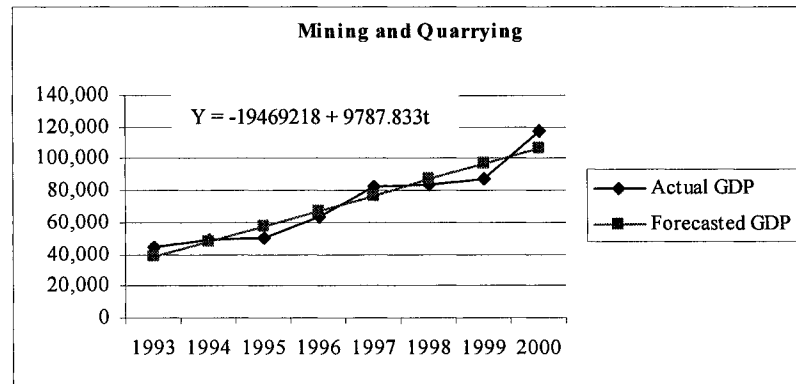
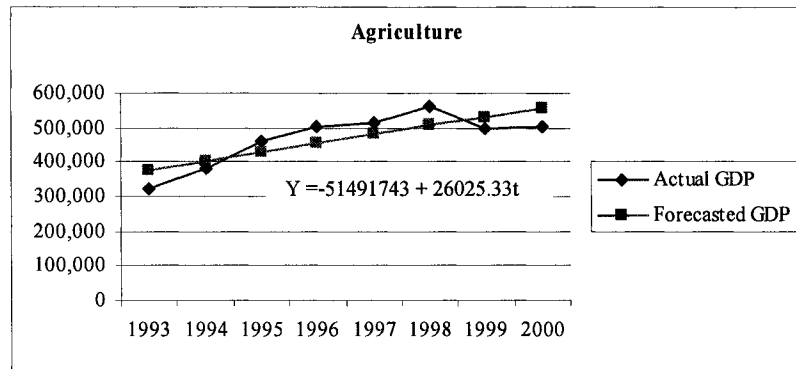
GDP_t^i = Gross domestic products of sector i at time t

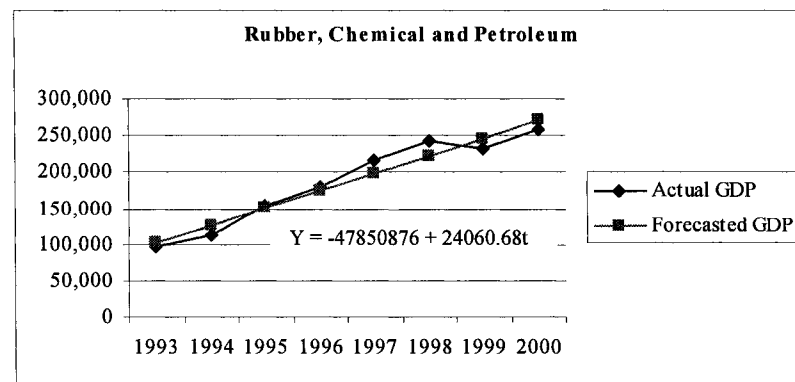
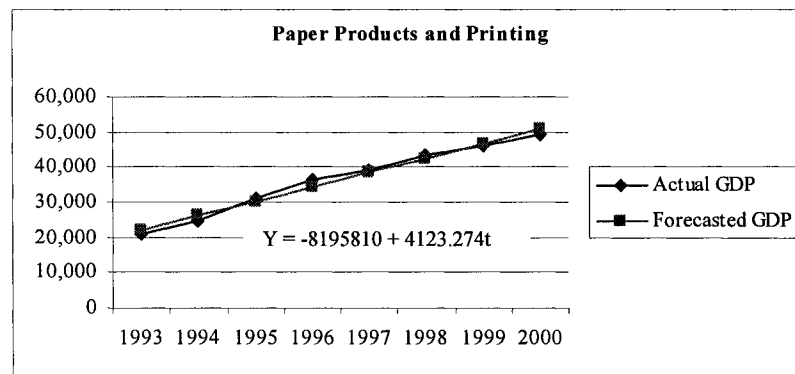
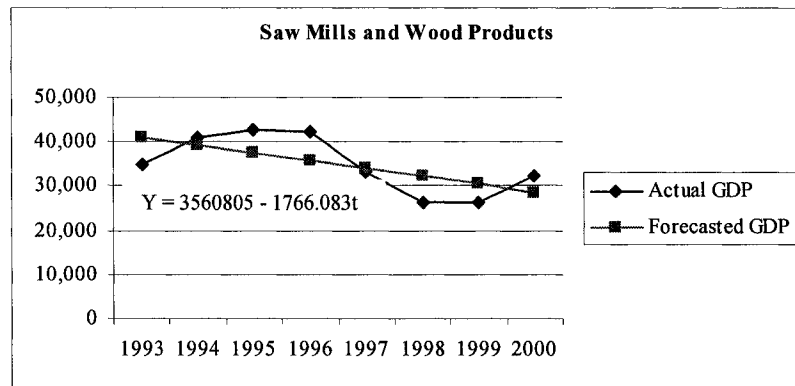
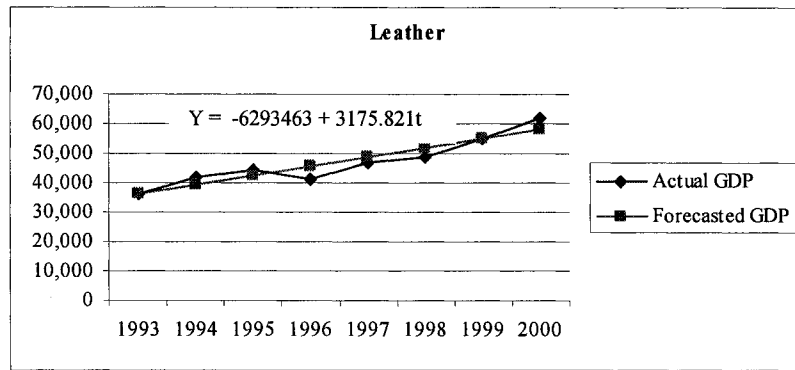
Table A3 Values of GDP by sector in Thailand
(Unit: Million of Baht)

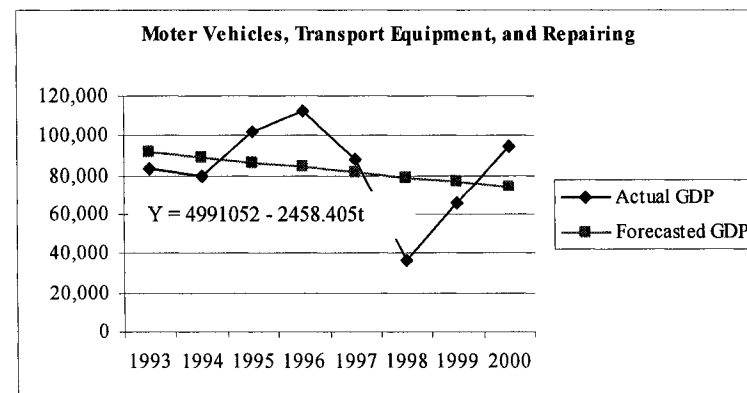
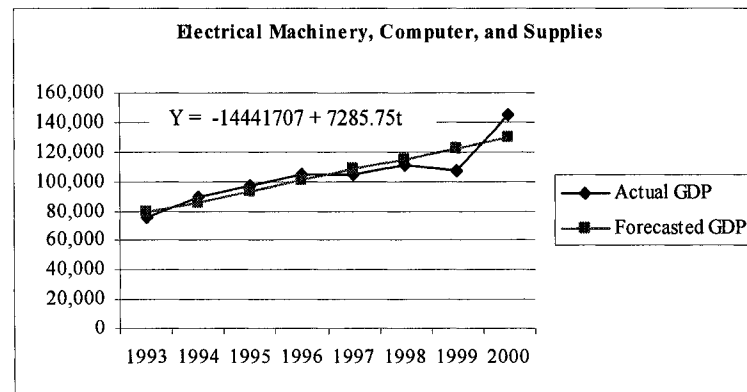
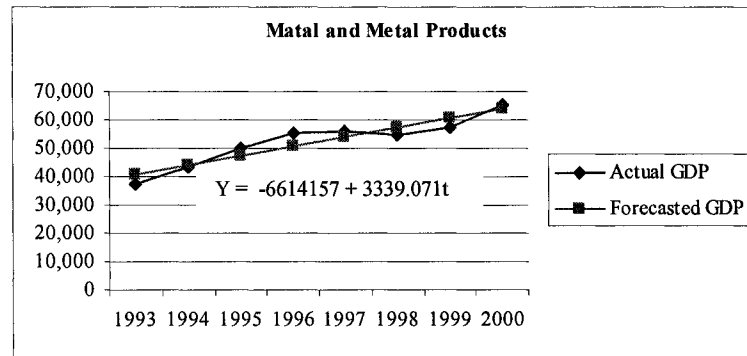
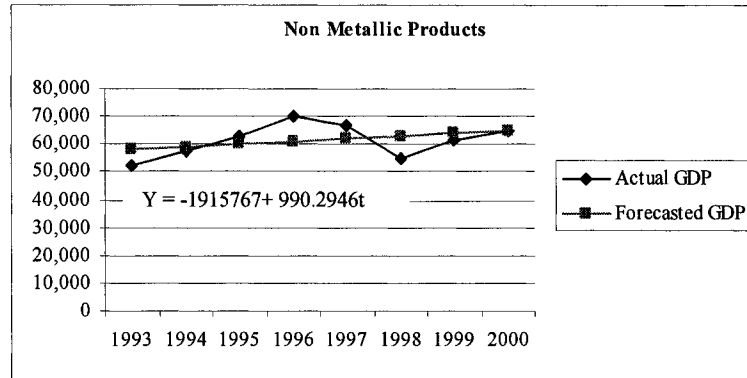
| Sector | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Agriculture | 564,449 | 497,048 | 503,365 | 584,942 | 610,968 | 636,993 | 663,018 |
| Mining and Quarrying | 84,318 | 87,352 | 116,798 | 116,236 | 126,024 | 135,811 | 145,599 |
| Manufacturing | | | | | | | |
| Food and Beverage Manufacturing | 269,094 | 296,468 | 243,950 | 325,553 | 344,150 | 362,746 | 381,342 |
| Textile Industry | 255,020 | 254,292 | 264,797 | 286,902 | 298,835 | 310,769 | 322,702 |
| Leather Products | 48,777 | 55,174 | 62,002 | 61,355 | 64,531 | 67,706 | 70,882 |
| Saw Mills and Wood Products | 26,461 | 26,159 | 32,290 | 26,873 | 25,107 | 23,341 | 21,575 |
| Paper Products and Printing | 43,453 | 46,076 | 49,260 | 54,861 | 58,985 | 63,108 | 67,231 |
| Rubber, Chemical and Petroleum Industries | 241,411 | 230,937 | 259,215 | 294,545 | 318,605 | 342,666 | 366,727 |
| Non-metallic Products | 54,864 | 61,654 | 64,802 | 65,812 | 66,803 | 67,793 | 68,783 |
| Metal and Metal Products | 54,775 | 57,272 | 65,009 | 67,324 | 70,663 | 74,002 | 77,341 |
| Electrical Machinery, Computer, and Supplies | 110,352 | 106,803 | 145,326 | 137,079 | 144,365 | 151,650 | 158,936 |
| Motor Vehicles, Transport Equipment, and Repairing | 36,309 | 66,086 | 94,973 | 71,784 | 69,325 | 66,867 | 64,408 |
| Other Manufacturing | 101,059 | 111,833 | 132,395 | 130,262 | 135,945 | 141,628 | 147,311 |
| Construction | 178,680 | 166,332 | 150,333 | 160,238 | 143,071 | 125,905 | 108,739 |
| Wholesale and Retail Trade | 732,248 | 743,185 | 784,478 | 837,260 | 869,134 | 901,009 | 932,883 |
| Services, Banking and Insurance | 885,740 | 857,202 | 897,416 | 981,545 | 1,011,512 | 1,041,478 | 1,071,445 |
| Total GDP | 4,626,447 | 4,632,132 | 4,904,725 | 4,858,819 | 5,080,637 | 5,302,456 | 5,524,274 |

Source: NESDB (1998-2000) and Forecast (2001-2004)

Note: Total GDP does not equal to the round up because this table does not include Transportation, Utility, Ownership of Dwelling, and Public Administration and Defense.







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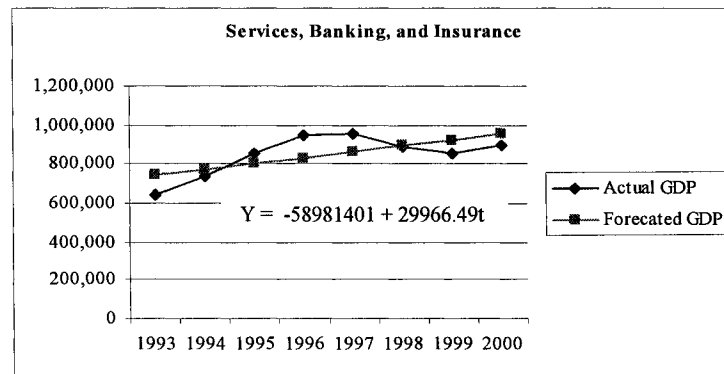
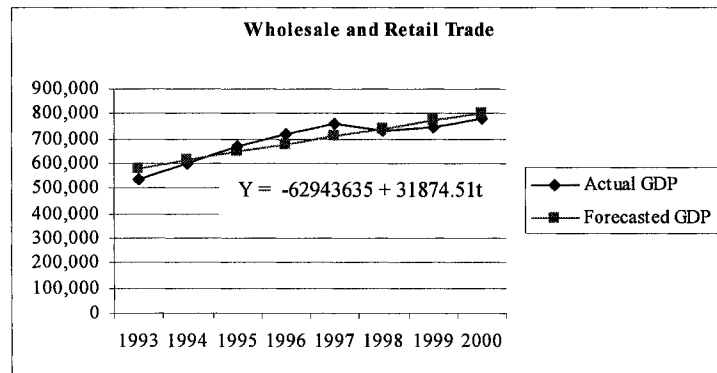
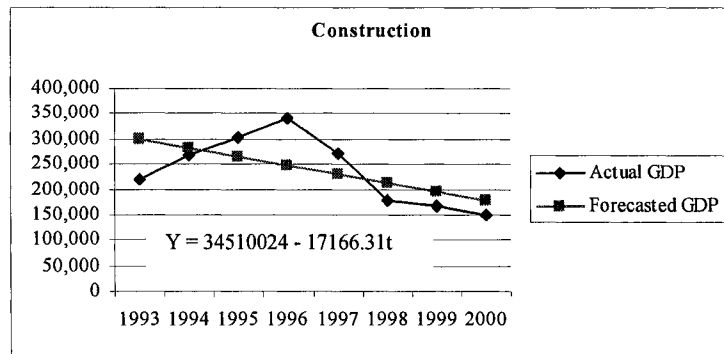
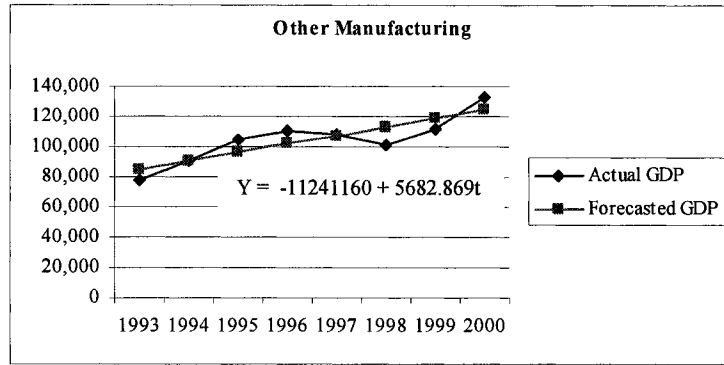


Figure A2 Actual and (Linear) Forecasted GDP

After obtaining the GDP, the next step is an estimation of e-commerce sales. In order to estimate the values of e-commerce beyond 1998, I assumed that the contribution of e-commerce to GDP remains unchanged over the period of study. With the actual and forecasted GDP from earlier process, I estimated the e-commerce market size of each sector by multiplying the GDP to the proportion of e-commerce for each sector in every single year as stated by the Equation [2]³⁰.

$$E-Commerce^i = GDP_t^i * \theta_{98}^i \quad [2]$$

GDP_t^i = Gross domestic products of sector i at time t

θ_{98}^i = Proportion of e-commerce to total sales in sector i for the base year (1998).

The proportion of e-commerce to total sales in each sector (represented by θ_{98} in the Equation [2]) is calculated from the Lemugkadej's survey. The proportions of e-commerce to total sales (θ_{98}) are shown in the last column of Table A4.

³⁰In order to estimate the value of e-commerce, instead of multiplying the proportion of e-commerce to total sales (θ_{98}) with the volume of GDP as calculated in this analysis, we can also estimate the value of e-commerce directly from factors that have impacts on the growth of e-commerce such as per capita GDP, the number of Internet users, the number of Internet hosts, the number of computers, and the education level. Therefore, another way to estimate the values of e-commerce beyond 1998 is to include the above mentioned variables as endogenous variable, so that:

E-commerce value (t) = f [per capita GDP (t), #Internet users(t), #Internet Hosts (t), #computer, average education level (t)]

However, this method is constrained by the lack of data at present time.

Table A4 Proportions of E-Commerce to Total Sales in 1998
(Unit: Millions of Baht and Percent)

| Sector | GDP ^{1/} 1998 | E-commerce ^{2/} 1998 | Percentage of e-commerce in GDP (θ ₉₈) |
|--|---------------------------|----------------------------------|---|
| Agriculture | 564,449 | 3,268 | 0.58% |
| Mining and Quarrying | 84,318 | 0 | 0.00% |
| Manufacturing | | | |
| Food and Beverage Manufacturing | 269,094 | 350 | 0.13% |
| Textile Industry | 255,020 | 384 | 0.15% |
| Leather Products | 48,777 | 0 | 0.00% |
| Saw Mills and Wood Products | 26,461 | 0 | 0.00% |
| Paper Products and Printing | 43,453 | 369 | 0.85% |
| Rubber, Chemical and Petroleum Industries | 241,411 | 1,050 | 0.43% |
| Non-metallic Products | 54,864 | 2,716 | 4.95% |
| Metal and Metal Products | 54,775 | 0 | 0.00% |
| Electrical Machinery, Computer, and Supplies | 110,352 | 1,699 | 1.54% |
| Motor Vehicles and Repairing | 36,309 | 0.00 | 0.00% |
| Other Manufacturing | 101,059 | 561 | 0.56% |
| Construction | 178,680 | 637 | 0.36% |
| Wholesale and Retail Trade | 732,248 | 3,275 | 0.45% |
| Services, Banking and Insurance | 885,740 | 7,791 | 0.88% |

Source: ^{1/} NESDB and ^{2/} Lemugkadej

After preparing the GDP and proportion of e-commerce to total sales as show in Table A3 and A4, I have matched the GDP and proportion of e-commerce sector by sector (i.e. multiply the GDP in Table A3 to the proportion of e-commerce in Table A4) to obtain the e-commerce market sizes (Table A5).

Table A5 Estimate the Values of E-Commerce by Sector
(Unit: Millions of Baht)

| Sector | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 |
|--|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Agriculture | 3,267.99 | 2,877.76 | 2,914.33 | 3,386.64 | 3,537.32 | 3,688.00 | 3,838.68 |
| Mining and Quarrying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Manufacturing | | | | | | | |
| Food and Beverage Manufacturing | 349.99 | 385.59 | 317.29 | 423.42 | 447.61 | 471.80 | 495.98 |
| Textile Industry | 383.74 | 382.64 | 398.45 | 431.71 | 449.67 | 467.63 | 485.58 |
| Leather Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Saw Mills and Wood Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paper Products and Printing | 369.11 | 391.39 | 418.44 | 466.02 | 501.04 | 536.07 | 571.09 |
| Rubber, Chemical and Petroleum Industries | 1,049.52 | 1,003.98 | 1,126.92 | 1,280.52 | 1,385.12 | 1,489.72 | 1,594.32 |
| Non-metallic Products | 2,715.91 | 3,052.03 | 3,207.87 | 3,257.89 | 3,306.91 | 3,355.93 | 3,404.96 |
| Metal and Metal Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electrical Machinery, Computer, and Supplies | 1,698.84 | 1,644.20 | 2,237.26 | 2,110.29 | 2,222.45 | 2,334.62 | 2,446.78 |
| Motor Vehicles and Repairing | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other Manufacturing | 561.10 | 620.92 | 735.08 | 723.24 | 754.80 | 786.35 | 817.90 |
| Construction | 636.52 | 592.53 | 535.54 | 570.82 | 509.67 | 448.52 | 387.37 |
| Wholesale and Retail Trade | 3,275.12 | 3,324.04 | 3,508.73 | 3,744.80 | 3,887.37 | 4,029.93 | 4,172.50 |
| Services, Banking and Insurance | 7,791.41 | 7,540.38 | 7,894.12 | 8,634.16 | 8,897.76 | 9,161.36 | 9,424.96 |
| Total E-commerce Market Size | 22,099.25 | 21,815.47 | 23,294.02 | 25,029.52 | 25,899.72 | 26,769.92 | 27,640.12 |

Source: Calculation from Table A3 * θ_{98} in Table A4

STEP II: Tax Revenue Loss Calculation

After obtaining the e-commerce total sales volume (or potential tax base), sales tax revenue loss calculations are performed with two scenarios. Case 1: the Thai government levies 7% sales tax on e-commerce until 2004. Case 2: the government levies 7% sales tax until 2003, and then increases to 10% in 2004. Tax rates in both cases are based on the VAT rates³¹ currently used in Thailand to avoid unequal treatment between conventional and electronic commerce.

Table A6 illustrates the tax revenues that would be lost due to absence of taxes on e-commerce for Case 1 and Case 2. It shows that the potential tax revenue losses from e-commerce would be 1,935 million Baht and 2,764 million Baht by year 2004 if the tax rates are 7% and 10%, respectively.

Potential tax losses are, in fact, greater than actual tax losses due to erosion from exemption, avoidance, and evasion. Several categories, for example, book, agriculture, and food, are exempted under the Thai VAT. In addition, some products, such as software, music or electronic services, can easily escape sales tax because they can easily be converted and delivered in digital form which are difficult for tax authorities to audit. As explained in Chapter 4, the digitized products do not need the address of destination so tax authorities have difficulties to trace them. But physical products, such as computer hardware, require an address for sending the product. For this reason, physical products have less chance to evade taxes relative to digitized products. However, until now there is

³¹ Now Thailand has 7% VAT and it tends to increase to 10% in 2004. Hence I will simulate the second case to support this change.

Table A6 Estimated E-Commerce Sales Tax Losses
(Unit: Millions of Baht)

| Sector | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | | | Tax Rate =7% | Tax Rate=10% |
| Agriculture | 228.76 | 201.44 | 204.00 | 237.06 | 247.61 | 258.16 | 268.71 | 383.87 |
| Mining and Quarrying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Manufacturing | | | | | | | | |
| Food and Beverage Manufacturing | 24.50 | 26.99 | 22.21 | 29.64 | 31.33 | 33.03 | 34.72 | 49.60 |
| Textile Industry | 26.86 | 26.79 | 27.89 | 30.22 | 31.48 | 32.73 | 33.99 | 48.56 |
| Leather Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Saw Mills and Wood Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paper Products and Printing | 25.84 | 27.40 | 29.29 | 32.62 | 35.07 | 37.52 | 39.98 | 57.11 |
| Rubber, Chemical and Petroleum Industries | 73.47 | 70.28 | 78.88 | 89.64 | 96.96 | 104.28 | 111.60 | 159.43 |
| Non-metallic Products | 190.11 | 213.64 | 224.55 | 228.05 | 231.48 | 234.92 | 238.35 | 340.50 |
| Metal and Metal Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electrical Machinery, Computer, and Supplies | 118.92 | 115.09 | 156.61 | 147.72 | 155.57 | 163.42 | 171.27 | 244.68 |
| Motor Vehicles and Repairing | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other Manufacturing | 39.28 | 43.46 | 51.46 | 50.63 | 52.84 | 55.04 | 57.25 | 81.79 |
| Construction | 44.56 | 41.48 | 37.49 | 39.96 | 35.68 | 31.40 | 27.12 | 38.74 |
| Wholesale and Retail Trade | 229.26 | 232.68 | 245.61 | 262.14 | 272.12 | 282.10 | 292.07 | 417.25 |
| Services, Banking and Insurance | 545.40 | 527.83 | 552.59 | 604.39 | 622.84 | 641.30 | 659.75 | 942.50 |
| Total | 1,546.95 | 1,527.08 | 1,630.58 | 1,752.07 | 1,812.98 | 1,873.89 | 1,934.81 | 2,764.01 |

Source: Calculation from Table A5 * Tax Rate

no evidence or study that shows how much the erosion has occurred in e-commerce transactions.

STEP III: The Sensitivity Analysis

The values of sales tax revenue losses from e-commerce depend on the growth of e-commerce total sales. The more the e-commerce market size increases, the greater the sales tax loss from e-commerce would be. As mentioned before, the important factor that would affect e-commerce market size is GDP and it is possible that the growth of GDP is different from the base case (i.e. linear pattern) previously demonstrated. Consequently, the highest growth rate and the lowest growth rate between 1993 and 2000 are used to forecast GDP for comparison with the base case. Then other methods to forecast GDP are shown in equation [3]. The advantage of this process is the approximated range of tax revenue that would be lost from e-commerce.

$$GDP_t^i = GDP_{t-1}^i * g^i \quad [3]$$

$$g^i = \text{Growth rate of GDP in sector } i \text{ between 1993 and 2000}$$

The growth rates for GDP (g^i) are based on available data during 1993 – 2000 from NESDB, in Thailand as shown in Table A7.

Table A7 The Lowest, Highest, and Average Growth Rates of GDP 1993 - 2000

| Sector | Lowest (%) | Highest (%) | Average (%) |
|--|------------|-------------|-------------|
| Agriculture | -11.94 | 19.79 | 7.22 |
| Mining and Quarrying | 2.33 | 33.71 | 15.56 |
| Manufacturing | | | |
| Food and Beverage Manufacturing | -17.71 | 17.07 | 8.11 |
| Textile Industry | -0.29 | 13.95 | 6.11 |
| Leather Products | -6.33 | 15.03 | 8.21 |
| Saw Mills and Wood Products | -21.84 | 23.44 | 0.22 |
| Paper Products and Printing | 6.04 | 24.70 | 13.36 |
| Rubber, Chemical and Petroleum Industries | -4.34 | 34.72 | 15.48 |
| Non-metallic Products | -18.23 | 12.38 | 3.77 |
| Metal and Metal Products | -2.03 | 17.71 | 8.60 |
| Electrical Machinery, Computer, and Supplies | -3.22 | 36.07 | 10.35 |
| Motor Vehicles and Repairing | -58.75 | 82.01 | 11.32 |
| Other Manufacturing | -6.86 | 18.39 | 8.38 |
| Construction | -34.27 | 21.30 | -3.43 |
| Wholesale and Retail Trade | -4.03 | 12.93 | 5.78 |
| Services, Banking and Insurance | -7.30 | 15.60 | 5.30 |
| Total GDP | -2.24 | 15.34 | 6.65 |

Source: Calculation from NESDB's data

After obtaining the forecasted GDP by multiplying the growth rate of each sector to the actual GDP since 2000, I repeat the process in Step II to obtain the total amount of tax losses for both the lowest and the highest growth GDP. After that I obtain the upper and the lower boundary of tax that would be lost shown in Table A8 and A9.

In short, current sales tax revenue losses from e-commerce are not expected to be large. They are less than 1% of total tax revenue by the year 2004 (Table A10). However, future losses could be substantial and therefore, more of a concern.

Table A8 Upper Boundary of E-Commerce Sales Tax Losses
(Unit: Millions of Baht)

| Sector | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| | | | | | | | Tax Rate =7% | Tax rate=10% |
| Agriculture | 228.76 | 201.44 | 204.00 | 244.37 | 292.74 | 350.67 | 420.06 | 600.09 |
| Mining and Quarrying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Manufacturing | | | | | | | | |
| Food and Beverage Manufacturing | 24.50 | 26.99 | 22.21 | 26.00 | 30.44 | 35.63 | 41.71 | 59.59 |
| Textile Industry | 26.86 | 26.79 | 27.89 | 31.78 | 36.22 | 41.27 | 47.02 | 67.18 |
| Leather Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Saw Mills and Wood Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paper Products and Printing | 25.84 | 27.40 | 29.29 | 36.53 | 45.55 | 56.80 | 70.84 | 101.20 |
| Rubber, Chemical and Petroleum Industries | 73.47 | 70.28 | 78.88 | 106.27 | 143.17 | 192.88 | 259.85 | 371.22 |
| Non-metallic Products | 190.11 | 213.64 | 224.55 | 252.34 | 283.57 | 318.67 | 358.10 | 511.58 |
| Metal and Metal Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electrical Machinery, Computer, and Supplies | 118.92 | 115.09 | 156.61 | 213.10 | 289.96 | 394.54 | 536.85 | 766.93 |
| Motor Vehicles and Repairing | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other Manufacturing | 39.28 | 43.46 | 51.46 | 60.92 | 72.12 | 85.38 | 101.07 | 144.39 |
| Construction | 44.56 | 41.48 | 37.49 | 45.47 | 55.16 | 66.91 | 81.17 | 115.95 |
| Wholesale and Retail Trade | 229.26 | 232.68 | 245.61 | 277.37 | 313.24 | 353.75 | 399.50 | 570.71 |
| Services, Banking and Insurance | 545.40 | 527.83 | 552.59 | 638.78 | 738.41 | 853.58 | 986.71 | 1,409.59 |
| Total Tax Losses from E-commerce | 1,546.95 | 1,527.08 | 1,630.58 | 1,932.93 | 2,300.57 | 2,750.08 | 3,302.90 | 4,718.42 |

Source: Author's calculation

Table A9 Lower Boundary of E-Commerce Sales Tax Losses
(Unit: Millions of Baht)

| Sector | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
| | | | | | | | Tax rate =7% | Tax rate =10% |
| Agriculture | 228.76 | 201.44 | 204.00 | 179.64 | 158.19 | 139.30 | 122.67 | 175.24 |
| Mining and Quarrying | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Manufacturing | | | | | | | | |
| Food and Beverage Manufacturing | 24.50 | 26.99 | 22.21 | 18.28 | 15.04 | 12.37 | 10.18 | 14.55 |
| Textile Industry | 26.86 | 26.79 | 27.89 | 27.81 | 27.73 | 27.65 | 27.57 | 39.39 |
| Leather Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Saw Mills and Wood Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paper Products and Printing | 25.84 | 27.40 | 29.29 | 31.06 | 32.93 | 34.92 | 37.03 | 52.90 |
| Rubber, Chemical and Petroleum Industries | 73.47 | 70.28 | 78.88 | 75.46 | 72.19 | 69.06 | 66.06 | 94.37 |
| Non-metallic Products | 190.11 | 213.64 | 224.55 | 183.61 | 150.13 | 122.76 | 100.38 | 143.39 |
| Metal and Metal Products | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Electrical Machinery, Computer, and Supplies | 118.92 | 115.09 | 156.61 | 151.57 | 146.70 | 141.98 | 137.41 | 196.30 |
| Motor Vehicles and Repairing | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Other Manufacturing | 39.28 | 43.46 | 51.46 | 47.92 | 44.63 | 41.57 | 38.72 | 55.31 |
| Construction | 44.56 | 41.48 | 37.49 | 24.64 | 16.20 | 10.65 | 7.00 | 10.00 |
| Wholesale and Retail Trade | 229.26 | 232.68 | 245.61 | 235.71 | 226.21 | 217.09 | 208.34 | 297.63 |
| Services, Banking and Insurance | 545.40 | 527.83 | 552.59 | 512.26 | 474.88 | 440.22 | 408.10 | 583.00 |
| Total Tax Losses from E-commerce | 1,546.95 | 1,527.08 | 1,630.58 | 1,487.97 | 1,364.83 | 1,257.57 | 1,163.45 | 1,662.08 |

Source: Author's calculation

Table A10 E-Commerce Tax Revenue Losses with Different Assumptions on GDP Growth Rate (Millions of Baht)

| | Low GDP Growth | Base Case | High GDP Growth |
|--|-------------------|-------------------|--------------------|
| Tax Loss for Tax Rate is 7% in 2004 | 1,163 (0.127%) | 1,935 (0.212%) | 3,303 (0.361%) |
| Tax Loss for Tax Rate is 10% in 2004 | 1,662 (0.182%) | 2,764 (0.302%) | 4,718 (0.516%) |

Note: The number in parenthesis is the percentage of tax losses form e-commerce to the estimated total tax revenue

Source: Calculation

APPENDIX B
GROSS DOMESTIC PRODUCT OF THAILAND

From

National Economic & Social Development Board (NESDB), Thailand.

http://www.nesdb.go.th/Main_menu/Macro/gdp_data

Retrieved 19 January 2003

APPENDIX B

GROSS DOMESTIC PRODUCT OF THAILAND

Gross National Product and National Income at Current Market Prices by Industrial Origin

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|---|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Agriculture | 320,051 | 383,198 | 458,975 | 505,031 | 513,991 | 564,879 | 497,149 | 504,513 |
| Crops | 156,857 | 199,533 | 250,557 | 284,482 | 287,811 | 326,861 | 263,456 | 265,248 |
| Livestock | 32,189 | 35,675 | 42,475 | 43,956 | 43,925 | 43,914 | 49,702 | 41,174 |
| Fisheries | 67,410 | 76,152 | 84,184 | 87,947 | 95,202 | 107,983 | 97,316 | 105,313 |
| Forestry | 6,458 | 6,021 | 8,016 | 8,291 | 7,037 | 6,239 | 5,619 | 5,308 |
| Agricultural Services | 11,149 | 12,463 | 12,697 | 13,443 | 13,201 | 13,590 | 13,717 | 12,184 |
| Simple Agricultural Processing Products | 45,988 | 53,354 | 61,046 | 66,912 | 66,815 | 66,292 | 67,339 | 75,286 |
| Mining and Quarrying | 44,259 | 48,667 | 50,322 | 63,410 | 82,402 | 84,318 | 87,352 | 116,798 |
| Manufacturing | 892,363 | 1,019,007 | 1,190,456 | 1,303,526 | 1,360,842 | 1,362,031 | 1,446,554 | 1,570,842 |
| Construction | 220,771 | 267,801 | 302,635 | 341,518 | 271,824 | 178,680 | 166,332 | 150,333 |
| Electricity, Gas and Water Supply | 77,311 | 84,793 | 101,231 | 106,833 | 118,958 | 142,277 | 130,378 | 146,155 |
| Transportation and Communication | 237,757 | 269,704 | 302,970 | 341,051 | 369,949 | 360,918 | 376,777 | 396,667 |
| Wholesale and Retail Trade | 534,274 | 603,366 | 671,372 | 718,698 | 763,006 | 732,248 | 743,185 | 784,478 |
| Banking, Insurance and Real Estate | 232,191 | 280,595 | 315,514 | 346,263 | 322,733 | 243,096 | 164,109 | 157,306 |
| Ownership of Dwellings | 81,247 | 88,795 | 99,338 | 109,279 | 115,076 | 120,099 | 123,101 | 125,008 |
| Public Administration and Defence | 117,682 | 127,523 | 157,555 | 171,329 | 181,095 | 195,257 | 204,102 | 212,515 |
| Services | 407,316 | 455,892 | 535,844 | 604,103 | 632,734 | 642,644 | 693,093 | 740,110 |
| Gross Domestic Product, (GDP) | 3,165,222 | 3,629,341 | 4,186,212 | 4,611,041 | 4,732,610 | 4,626,447 | 4,632,132 | 4,904,725 |
| Plus : Net Factor Income Payment from the Rest of the World | -45,929 | -55,791 | -68,202 | -102,084 | -123,375 | -160,044 | -126,436 | -76,874 |
| Gross National Product, (GNP) | 3,119,293 | 3,573,550 | 4,118,010 | 4,508,957 | 4,609,235 | 4,466,403 | 4,505,696 | 4,827,851 |
| Less : Indirect Taxes less Subsidies | 380,861 | 437,043 | 498,821 | 561,176 | 540,698 | 476,207 | 471,582 | 484,251 |
| Provision for Consumption of Fixed Capital | 335,857 | 395,952 | 469,320 | 553,798 | 630,817 | 679,148 | 703,867 | 728,287 |
| National Income, (NI) | 2,402,775 | 2,740,555 | 3,149,869 | 3,393,983 | 3,437,720 | 3,311,048 | 3,330,247 | 3,615,313 |
| Per Capita GDP (Baht) | 54,563.39 | 61,814.95 | 70,473.76 | 76,846.84 | 78,093.3 | 75,594.3 | 74,946.32 | 78,593.81 |
| Per Capita GNP (Baht) | 53,771.64 | 60,864.71 | 69,325.6 | 75,145.53 | 76,057.47 | 72,979.25 | 72,900.62 | 77,361.97 |
| Population (1,000 Heads) | 58,010 | 58,713 | 59,401 | 60,003 | 60,602 | 61,201 | 61,806 | 62,406 |

Gross Domestic Product Originating from Crops at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|--------------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Paddy | 38,232 | 53,086 | 63,109 | 82,966 | 98,261 | 117,542 | 83,314 | 80,465 |
| Cassava | 8,168 | 9,801 | 14,734 | 11,534 | 8,189 | 15,906 | 7,977 | 6,148 |
| Cotton and Kapok | 705 | 1,184 | 1,557 | 1,047 | 737 | 843 | 491 | 647 |
| Kenaf and Jute | 543 | 555 | 784 | 801 | 395 | 175 | 189 | 217 |
| Tobacco | 2,147 | 1,580 | 1,295 | 1,840 | 2,175 | 2,112 | 2,261 | 1,610 |
| Sugarcane | 9,621 | 13,849 | 17,161 | 19,506 | 20,408 | 16,939 | 18,762 | 19,072 |
| Maize | 5,366 | 6,248 | 10,292 | 11,638 | 8,598 | 9,316 | 9,986 | 9,726 |
| Other Field Crops | 3,949 | 5,325 | 5,579 | 6,506 | 6,352 | 7,060 | 5,486 | 6,436 |
| Fruits | 26,182 | 29,298 | 33,368 | 39,638 | 44,809 | 42,004 | 40,659 | 41,786 |
| Vegetables | 24,742 | 26,915 | 29,717 | 36,872 | 31,455 | 37,968 | 35,029 | 37,104 |
| Coconut | 2,914 | 3,124 | 2,351 | 3,402 | 2,685 | 4,166 | 5,545 | 1,986 |
| Palm Bean | 3,685 | 4,397 | 6,597 | 7,281 | 7,276 | 11,062 | 8,068 | 5,038 |
| Coffee Bean, Tea Leaf and Cocoa Bean | 1,257 | 2,399 | 3,326 | 2,455 | 2,458 | 3,960 | 2,684 | 1,881 |
| Rubber | 24,162 | 38,107 | 56,639 | 54,095 | 47,901 | 50,955 | 36,322 | 45,384 |
| Other Crops | 5,184 | 3,665 | 4,048 | 4,901 | 6,112 | 6,853 | 6,683 | 7,748 |
| Total Value Added | 156,857 | 199,533 | 250,557 | 284,482 | 287,811 | 326,861 | 263,456 | 265,248 |

Gross Domestic Product Originating from Livestock and Livestock Products at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|--------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Cattle and Buffaloes | 11,702 | 11,272 | 11,047 | 10,302 | 8,820 | 6,744 | 7,404 | 9,623 |
| Swine | 6,172 | 7,115 | 11,651 | 12,934 | 12,439 | 8,016 | 12,975 | 9,044 |
| Poultry | 7,618 | 10,260 | 12,919 | 12,206 | 13,770 | 17,552 | 17,556 | 13,995 |
| Poultry's Products | 4,953 | 5,086 | 4,440 | 5,815 | 6,136 | 8,095 | 7,826 | 4,338 |
| Dairy Products | 681 | 904 | 1,467 | 1,823 | 1,912 | 2,498 | 2,875 | 3,075 |
| Others | 1,063 | 1,038 | 951 | 876 | 848 | 1,009 | 1,066 | 1,099 |
| Total Value Added | 32,189 | 35,675 | 42,475 | 43,956 | 43,925 | 43,914 | 49,702 | 41,174 |

Gross Domestic Product Originating from Fisheries at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|--------------------------|---------------|---------------|---------------|---------------|---------------|----------------|---------------|----------------|
| Marine Fish | 61,085 | 68,643 | 76,821 | 79,062 | 86,965 | 97,723 | 86,744 | 94,796 |
| Freshwater Fish | 6,325 | 7,509 | 7,363 | 8,885 | 8,237 | 10,260 | 10,572 | 10,517 |
| Total Value Added | 67,410 | 76,152 | 84,184 | 87,947 | 95,202 | 107,983 | 97,316 | 105,313 |

Gross Domestic Product Originating from Forestry at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|---------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Teak | 68 | 82 | 33 | 163 | 185 | 171 | 152 | 145 |
| All Other Timbers | 94 | 184 | 121 | 139 | 150 | 164 | 129 | 112 |
| Afforestation and Reforestation | - | - | 2,314 | 2,470 | 1,462 | 802 | 613 | 684 |
| Charcoal and Firewood | 5,314 | 4,999 | 4,875 | 4,911 | 4,560 | 4,333 | 3,949 | 3,568 |
| Other Forest Products | 982 | 756 | 673 | 608 | 680 | 769 | 776 | 799 |
| Total Value Added | 6,458 | 6,021 | 8,016 | 8,291 | 7,037 | 6,239 | 5,619 | 5,308 |

Gross Domestic Product Originating from Agricultural Services and Simple Agricultural Processing Products at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|---|--------|--------|--------|--------|--------|--------|--------|--------|
| Total Value Added in Agricultural Services | 11,149 | 12,463 | 12,697 | 13,443 | 13,201 | 13,590 | 13,717 | 12,184 |
| Total Value Added in Simple Agricultural | | | | | | | | |
| Processing Products | 45,988 | 53,354 | 61,046 | 66,912 | 66,815 | 66,292 | 67,339 | 75,286 |

Gross Domestic Product Originating from Mining and Quarrying at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|----------------------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|----------------|
| Lignite | 6,241 | 6,870 | 7,268 | 6,901 | 8,902 | 7,422 | 6,845 | 6,121 |
| Natural Gas | 18,124 | 19,465 | 20,008 | 27,282 | 42,631 | 51,974 | 53,297 | 71,672 |
| Crude Oil | 3,050 | 2,956 | 2,788 | 3,666 | 4,696 | 4,601 | 5,642 | 18,075 |
| Metallic Minerals | 2,012 | 1,604 | 740 | 1,125 | 569 | 1,454 | 1,476 | 1,313 |
| Non-Metallic Minerals | 13,843 | 16,887 | 18,538 | 22,735 | 23,581 | 17,441 | 18,376 | 17,792 |
| Chemical and Fertilizer Minerals | 113 | 96 | 87 | 117 | 70 | 161 | 133 | 98 |
| Salt | 552 | 464 | 432 | 626 | 712 | 678 | 659 | 788 |
| All Other Minerals | 324 | 325 | 461 | 958 | 1,241 | 587 | 924 | 939 |
| Total Value Added | 44,259 | 48,667 | 50,322 | 63,410 | 82,402 | 84,318 | 87,352 | 116,798 |

Gross Domestic Product Originating from Manufacturing at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|---|----------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Food | 72,127 | 84,605 | 91,000 | 102,346 | 110,244 | 133,811 | 129,308 | 141,428 |
| Beverages | 55,781 | 63,419 | 76,113 | 81,252 | 98,408 | 102,721 | 136,455 | 70,411 |
| Tobacco | 19,281 | 24,285 | 24,781 | 27,800 | 34,274 | 32,562 | 30,705 | 32,111 |
| Textiles | 76,644 | 80,960 | 91,491 | 87,463 | 88,861 | 100,876 | 98,451 | 105,909 |
| Wearing Apparel Except Footwear | 99,526 | 117,124 | 134,223 | 151,769 | 163,438 | 154,144 | 155,841 | 158,888 |
| Leather, Leather Products and Footwear | 36,254 | 41,702 | 44,227 | 41,429 | 46,952 | 48,777 | 55,174 | 62,002 |
| Wood and Wood Products | 7,402 | 10,109 | 8,813 | 8,345 | 7,554 | 5,539 | 5,734 | 7,391 |
| Furniture and Fixtures | 27,373 | 30,766 | 33,689 | 34,029 | 25,567 | 20,922 | 20,425 | 24,899 |
| Paper and Paper Products | 11,518 | 14,155 | 17,243 | 21,338 | 24,853 | 29,991 | 31,255 | 33,990 |
| Printing, Publishing and Allied Industries | 9,206 | 10,662 | 13,705 | 14,850 | 14,128 | 13,462 | 14,821 | 15,270 |
| Chemicals and Chemical Products | 19,844 | 22,135 | 39,636 | 45,643 | 53,160 | 59,044 | 63,208 | 84,348 |
| Petroleum Refineries and Petroleum Products | 56,293 | 63,561 | 76,222 | 98,672 | 125,556 | 140,301 | 125,517 | 121,548 |
| Rubber and Plastic Products | 21,510 | 27,775 | 37,011 | 34,402 | 37,166 | 42,066 | 42,212 | 53,319 |
| Non-metallic Mineral Products | 51,996 | 57,625 | 62,716 | 70,144 | 67,098 | 54,864 | 61,654 | 64,802 |
| Basic Metal Industries | 14,365 | 17,812 | 19,466 | 19,512 | 19,274 | 15,497 | 13,529 | 16,003 |
| Fabricated Metal Products | 22,647 | 25,753 | 30,241 | 35,634 | 36,636 | 39,278 | 43,743 | 49,006 |
| Machinery | 53,880 | 66,596 | 86,997 | 100,288 | 106,360 | 120,456 | 133,800 | 156,823 |
| Electrical Machinery and Supplies | 75,958 | 89,831 | 96,499 | 104,783 | 104,791 | 110,352 | 106,803 | 145,326 |
| Transport Equipment | 83,431 | 79,290 | 101,775 | 112,897 | 88,015 | 36,309 | 66,086 | 94,973 |
| Other Manufacturing Industries | 77,327 | 90,842 | 104,608 | 110,930 | 108,507 | 101,059 | 111,833 | 132,395 |
| Total Value Added | 892,363 | 1,019,007 | 1,190,456 | 1,303,526 | 1,360,842 | 1,362,031 | 1,446,554 | 1,570,842 |

Gross Domestic Product Originating from Construction at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Private Construction | 151,335 | 175,767 | 192,274 | 199,201 | 103,013 | 52,678 | 41,276 | 48,575 |
| Public Construction | 69,436 | 92,034 | 110,361 | 142,317 | 168,811 | 126,002 | 125,056 | 101,758 |
| Total Value Added | 220,771 | 267,801 | 302,635 | 341,518 | 271,824 | 178,680 | 166,332 | 150,333 |

Gross Domestic Product Originating from Electricity, Gas and Water Supply at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|----------------------------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Electricity | 61,671 | 69,622 | 83,954 | 88,506 | 96,939 | 119,144 | 105,075 | 118,434 |
| Water Supply | 11,024 | 10,903 | 12,861 | 14,240 | 16,659 | 17,858 | 19,898 | 22,348 |
| Gas Manufacture and Distribution | 4,616 | 4,268 | 4,416 | 4,087 | 5,360 | 5,275 | 5,405 | 5,373 |
| Total Value Added | 77,311 | 84,793 | 101,231 | 106,833 | 118,958 | 142,277 | 130,378 | 146,155 |

Gross Domestic Product Originating from Wholesale and Retail Trade at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|--------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Import | 210,703 | 233,522 | 262,252 | 255,864 | 253,219 | 214,020 | 201,277 | 210,898 |
| Domestic | 323,571 | 369,844 | 409,120 | 462,834 | 509,787 | 518,228 | 541,908 | 573,580 |
| <i>Agriculture</i> | 75,539 | 87,468 | 104,660 | 116,911 | 126,974 | 127,114 | 125,668 | 133,774 |
| <i>Mining</i> | 2,459 | 2,819 | 3,175 | 3,701 | 3,482 | 2,948 | 2,937 | 2,632 |
| <i>Manufacturing</i> | 245,573 | 279,557 | 301,285 | 342,222 | 379,331 | 388,166 | 413,303 | 437,174 |
| Total Value Added | 534,274 | 603,366 | 671,372 | 718,698 | 763,006 | 732,248 | 743,185 | 784,478 |

Gross Domestic Product Originating from Banking, Insurance and Real Estate at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|--|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Banks and Other Financial Institutions | 184,772 | 229,339 | 259,578 | 285,977 | 275,962 | 201,128 | 127,461 | 112,096 |
| Insurance and Real Estate | 47,419 | 51,256 | 55,936 | 60,286 | 46,771 | 41,968 | 36,648 | 45,210 |
| Total Value Added | 232,191 | 280,595 | 315,514 | 346,263 | 322,733 | 243,096 | 164,109 | 157,306 |

Gross Domestic Product Originating from Ownership of Dwellings and Public Administration and Defence at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|---|---------|---------|---------|---------|---------|---------|---------|---------|
| Total Value Added in Ownership of Dwellings | 81,247 | 88,795 | 99,338 | 109,279 | 115,076 | 120,099 | 123,101 | 125,008 |
| Total Value Added in Public Administration and Defence | 117,682 | 127,523 | 157,555 | 171,329 | 181,095 | 195,257 | 204,102 | 212,515 |

Gross Domestic Product Originating from Services at Current Market Prices

(Millions of Baht)

| | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000p |
|------------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Education | 101,721 | 110,349 | 137,252 | 149,224 | 163,467 | 181,699 | 186,652 | 196,272 |
| Medical and Health | 42,990 | 49,217 | 61,151 | 68,848 | 76,417 | 83,165 | 90,914 | 96,873 |
| Recreation and Entertainment | 17,096 | 20,681 | 24,199 | 31,671 | 33,885 | 33,763 | 38,804 | 42,949 |
| Hotels | 33,715 | 35,223 | 39,851 | 42,824 | 40,799 | 43,748 | 46,628 | 52,196 |
| Restaurants | 136,755 | 156,892 | 180,115 | 206,136 | 205,073 | 187,173 | 209,023 | 223,167 |
| Personal Services | 22,326 | 23,079 | 25,078 | 27,684 | 28,678 | 25,782 | 28,290 | 30,592 |
| Domestics | 5,066 | 5,439 | 5,800 | 6,163 | 6,650 | 6,976 | 6,920 | 7,028 |
| Business Services | 18,365 | 20,490 | 22,320 | 24,963 | 25,857 | 23,549 | 24,074 | 25,002 |
| Non-profit | 1,377 | 1,645 | 1,981 | 2,390 | 2,700 | 3,109 | 3,296 | 3,483 |
| Repairs | 27,905 | 32,877 | 38,097 | 44,200 | 49,208 | 53,680 | 58,492 | 62,548 |
| Total Value Added | 407,316 | 455,892 | 535,844 | 604,103 | 632,734 | 642,644 | 693,093 | 740,110 |

APPENDIX C
NORDIC MODEL QUESTIONNAIRE
From
E-Commerce and Development Report 2001
United Nation

APPENDIX C

NORDIC MODEL QUESTIONNAIRE

NORDIC MODEL QUESTIONNAIRE



- A1. Does the enterprise use personal computers, workstations or terminals? (Filter question)**
- | | | | | |
|--|-----|------|-------------------|--|
| | Yes | No → | Go to question E3 | |
|--|-----|------|-------------------|--|
- A2. Does the enterprise use or plan to use ICT in the following areas?² (Multiple choice)**
- | | | | | |
|--|---------------------|--------|----------|----------------------------------|
| | Year t-1 or earlier | Year t | Year t+1 | Do not know/ not relevant now |
|--|---------------------|--------|----------|----------------------------------|
- E-mail (including e-mails reached by any means)
 Internet (access to www)
 Intranet³
 Extranet⁴
 Computer-mediated networks other than Internet (e.g. EDI, Minitel, interactive telephone systems)
 WAP (The enterprise as supplier of WAP services)
- A3. The share of the total no. of employees using in normal work routine:**
- | | |
|---|------|
| Personal computer, workstation or terminal | ___% |
| Personal computer connected to the Internet/www | ___% |

Module B: Use of Internet

(asking enterprises with ICT)

- B1. Does the enterprise use or plan to use Internet? (Filter question)**
- | | | | | |
|--|----------|-------------------|-----------|----------------------------------|
| | Year t-1 | Year t or earlier | Year t+1 | Do not know/ not relevant now |
| | | | →Go to B3 | →Go to D1 |
- B2. Type of external connection to the Internet in year t? (Multiple choice)**
- Modem (analog)
 ISDN
 xDSL (ADSL, SDSL etc.)
 Other fixed connection < 2Mbps (Frame relay or other broadband network service)
 Other fixed connection ≥ 2Mbps (Frame relay or other broadband network service)
 Do not know
- B3. For what purposes does the enterprise use or plan to use Internet?**
- B3-1. General activities (Multiple choice)**
- | | | | | |
|--|---------------------|--------|----------|----------------------------------|
| | Year t-1 or earlier | Year t | Year t+1 | Do not know/ not relevant now |
|--|---------------------|--------|----------|----------------------------------|
- information search
 Monitoring the market (e.g. prices)
 Communication with public authorities
 Banking and financial services
 Information about employment opportunities (recruitment and search)
- B3-2. Activities related to purchasing goods and services (Multiple choice)**
- | | | | | |
|--|---------------------|--------|----------|----------------------------------|
| | Year t-1 or earlier | Year t | Year t+1 | Do not know/ not relevant now |
|--|---------------------|--------|----------|----------------------------------|
- Information search on homepages
 Receiving purchased digital products
 Receiving free digital products
 Obtaining after sales services

1 As proposed to the OECD in April 2001.
 2 The ICT-indicators such as Internet and EDI should not be asked if they are used as filter-questions in other modules.
 3 An internal company communications network using the same protocol as the Internet allowing communications within an organization.
 4 A secure extension of an Intranet that allows external users to access some parts of an organization's Intranet.

B4. Does the enterprise have or plan to have a Web site? (Filter question)

| | Year t-1 | Year t | Year t+1 | Do not know/ not relevant now →Go to C1 |
|--|----------|--------|----------|---|
|--|----------|--------|----------|---|

B4-1. Activities related to selling goods and services (Multiple choice)

| | Year t-1 or earlier | Year t | Year t+1 | Do not know/ not relevant now |
|--|------------------------|--------|----------|----------------------------------|
|--|------------------------|--------|----------|----------------------------------|

- Marketing the enterprise's products
- Inquiry/contact facility
- Customized page for repeat clients (e.g. customized presentation of product preferences)
- Facilitating access to product catalogs, price lists etc.
- Delivering sold digital products
- Capability to provide secure transactions (e.g. firewalls or secure servers)
- Integration with back end systems
- Providing after sales support

Module C: E-commerce via internet

(asking enterprises with Internet access)

- C1. Purchases via Internet**
- Has the enterprise purchased products via the Internet in year t? (Filter question)
- | | Yes | No → | Do not know → | Go to C4 |
|--|-----|------|---------------|----------|
|--|-----|------|---------------|----------|
- What percentage of the total purchases (in monetary terms) do the Internet purchases represent?⁵
- | | ___% | Do not know | | |
|--|------|-------------|--|--|
|--|------|-------------|--|--|
- Has the enterprise paid on-line⁶ for products purchased on the Internet?
- | | Yes | No | Do not know/
not relevant now | |
|--|-----|----|----------------------------------|--|
|--|-----|----|----------------------------------|--|
- C2. Has the enterprise purchased products via specialized Internet market places⁷ in year t?**
- | | Yes | No | Do not know/
not relevant now | |
|--|-----|----|----------------------------------|--|
|--|-----|----|----------------------------------|--|
- C3. Expected benefits from Internet purchases (Multiple choice)**
- | | No
importance | Some
importance | Much
importance | Do not know/
not relevant now |
|--|------------------|--------------------|--------------------|----------------------------------|
|--|------------------|--------------------|--------------------|----------------------------------|
- To reduce costs
 - Increased access to, and awareness of, suppliers
 - To speed up business processes
- C4. Sales via Internet**
- Has the enterprise received orders via the Internet in year t? (Filter question)
- | | Yes | No → | Do not know → | Go to D1 |
|--|-----|------|---------------|----------|
|--|-----|------|---------------|----------|
- What percentage of the total turnover (in monetary terms) do the Internet sales represent?⁸
- | | ___% | Do not know | | |
|--|------|-------------|--|--|
|--|------|-------------|--|--|
- Has the enterprise received on-line⁹ payments for Internet sales in year t?
- | | Yes | No | Do not know/
not relevant now | |
|--|-----|----|----------------------------------|--|
|--|-----|----|----------------------------------|--|
- C5. Breakdown of Internet sales**
- Please break down the Internet sales in year t into the following customer groups/destination of sales (estimate in percentage):
- | | ___% | ___% | ___% | Do not know |
|--|------|------|-------------|-------------|
| 1) Other enterprises 2) Households 3) Others (1+2+3= 100 %) | | | | |
| 1) Homemarket (domestic sales) 2) Exports (non domestic sales) (1+2=100 %) | | | Do not know | |

5 Depending on decision concerning definition of e-commerce. This module includes EDI over the Internet.
 6 The proposal is to ask about percentage of total purchases and sales instead of accurate money values. The reason is the experiences from the Nordic surveys where respondents have preferred this option. In case, a country wants to ask directly for money values this can be done as well. As total amounts of purchases and sales are asked in module X, the percentages can be converted into money values or vice versa.
 7 On-line is defined as an integrated ordering-payment transaction.
 8 More than one enterprise is represented at the website. The market sells either certain goods/services or is addressed towards limited customer groups.
 9 See note 6.
 10 See note 7.

| | | | | |
|---|---------------|-----------------|----------------------------------|----------------------------------|
| C6. Has the enterprise sold products to other enterprises via a presence on specialized Internet market places¹¹ in year t? | Yes | No | Do not know/ not relevant now | |
| C7. Motivations for Internet sales (Multiple choice) | No importance | Some importance | Much importance | Do not know/ not relevant now |
| Company image considerations | | | | |
| To reduce business costs | | | | |
| To speed up business processes | | | | |
| To improve quality of services | | | | |
| To reach new customers | | | | |
| To expand the market geographically | | | | |
| To launch new products | | | | |
| To keep pace with competitors | | | | |

Module D: E-commerce via EDI or other computer-mediated networks (asking enterprises with ICT)

| | | | | |
|---|---------------------|--------|----------|--|
| D1. Does the enterprise use or plan to use EDI or other computer-mediated networks? (Filter question) | Year t-1 or earlier | Year t | Year t+1 | Do not know/ not relevant now → Go to E1 |
| D2. Is EDI or other computer-mediated networks used in relation to: | Year t-1 or earlier | Year t | Year t+1 | Do not know/ not relevant now |
| Customers | | | | |
| Suppliers | | | | |
| Other cooperating partners | | | | |
| Banks/Financial institutions | | | | |
| Public organisations/institutions | | | | |
| D3. Purchases via EDI or other computer-mediated networks If the enterprise orders products via EDI, what percentage of the total purchases (in monetary terms) does this represent in year t? ¹³ ___% | | | | Do not know |
| D4. Sales via EDI or other computer-mediated networks If the enterprise receives orders via EDI, what percentage of the total turnover (in monetary terms) does this represent in year t? ¹⁴ ___% | | | | Do not know |

Module E: Barriers on the use of Internet and ICT in general

(Asking enterprises with ICT, general barriers also asking enterprises without ICT)

What significance does the following barriers have for the present and future use of ICT?

| | | | | |
|--|---------------|-----------------|-----------------|----------------------------------|
| E1. Barriers on Internet sales | No importance | Some importance | Much importance | Do not know/ not relevant now |
| The products of the enterprise not applicable for Internet sales | | | | |
| Customers not ready to use Internet commerce | | | | |
| Security problems concerning payments | | | | |
| Uncertainty concerning contracts, terms of delivery and guarantees | | | | |
| Cost of developing and maintaining an e-commerce system | | | | |
| Logistical problems | | | | |
| Considerations for existing channels of sales | | | | |

¹¹ See note 6.

¹² Depending on decision concerning definition of e-commerce, EDI over the Internet is included in module C.

¹³ See note 6.

¹⁴ See note 6.

| E2. Barriers on use of Internet | No importance | Some importance | Much importance | Do not know/ not relevant now |
|---|------------------|--------------------|--------------------|----------------------------------|
| Security concerns (e.g. hacking, viruses) | | | | |
| Technology too complicated | | | | |
| Expenses of development and maintenance of websites too high | | | | |
| Lost working time because of irrelevant surfing | | | | |
| Data communication expenses too high | | | | |
| Data communication is too slow or unstable | | | | |
| Lack of perceived benefits | | | | |
| E3. Barriers on the use of ICT in general | No importance | Some importance | Much importance | Do not know/ not relevant now |
| ICT expenditure too high | | | | |
| New versions of existing software introduced too often | | | | |
| Supply of ICT-technology not matching the ICT needs of the enterprise | | | | |
| The level of ICT skills is too low among the employed personnel | | | | |
| Difficult to recruit qualified ICT personnel | | | | |
| Existing personnel reluctant to use ICT | | | | |
| Lack of an updated ICT strategy | | | | |
| Lack of perceived benefits | | | | |

Module X: Background information

- X1. Name and address of the enterprise**
- X2. Activity of the enterprise**
- X3. No. of employees end of year t**
- X4. Total purchases of goods and services in year t (national currency)**
- X5. Total sales in year t (national currency)**

15 The information asked in this module might be available – or a number of them – from the Statistical Business Register and/or statistical registers and thus not included in the questionnaire.