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Electronic Commerce and Indirect Taxation

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1. Introduction

With the development of electronic commerce, indirect taxation have become identified as one of the focal points of discussions. In this paper, we examine the reason why indirect taxation issues arise in the context of electronic commerce, discuss relevant issues in the concrete context of the value added tax (VAT) system and of the retail sales tax (RST) system, compare these systems, and examine possible solutions of the problem. Although it is difficult to find a way out of the difficult problem that the indirect tax systems of many countries face, clarification of the issues itself may improve the situation because it could help us to avoid unnecessary, confusing arguments and misunderstanding. To have a common basis of discussions seems to be particularly important in the international discussions of the global problem.

The new contribution of the paper is as follows:

1. The paper presents a simple framework that is useful in understanding and examining the problems of indirect taxation in the international context.
2. It identifies common and different issues of the VAT system and the RST system and shows that these systems are, in principle, compatible, although difficult problems do arise in the practical context.
3. It demonstrates that an emerging solution proposed in the context of the VAT system can be affected with difficult problems that were regarded to be problems of the RST system and calls for the need to study issues on the RST system.
4. A model to compare the level of tax compliance under the VAT and RST systems is presented and this model is used to examine the potential solution (in the Appendix).

2. Indirect Tax Issues Caused by Electronic Commerce

Taxation issues discussed in the context of electronic commerce are broadly classified into two categories: international taxation issues and issues on tax administration. The development of electronic commerce generally increases international transactions in a variety of forms, thus causing various international taxation issues. Electronic commerce can also make it more difficult for the tax authorities to have access to information that is necessary for fair and efficient tax administration. (At the same time, it should also be emphasized that the technologies underlying electronic commerce might be used to make tax administration more effective and to reduce the compliance cost for taxpayers, as discussed in OECD(1998a).) In many cases, both issues on international taxation and tax administration arise simultaneously in the context of electronic commerce.

Indirect tax issues raised by electronic commerce are also caused by both factors of international taxation and tax administration, which emerge simultaneously. Because indirect tax issues related to electronic commerce are more apparent and easier to understand, compared to direct tax issues, indirect tax issues are being actively discussed all over the world[1]. Traditionally, international taxation issues on a global basis have been almost always confined within the area of direct taxation, although international discussions on indirect tax issues have a long history within Europe. However, electronic commerce has made it clear that there are some cross-border transactions to which the current systems of indirect taxation are difficult to apply. A global perspective is required to address these difficulties.

The major difficulties in indirect taxation arise for transactions conducted between different jurisdictions. Here, the word "jurisdiction" means the area in which an indirect tax is imposed and collected by the specific tax author-

ities. In the case of the Japanese consumption tax (VAT), the jurisdiction is Japan as a whole. In the case of the state retail sales tax (RST) in the United States, the jurisdiction is each state[2]. The European Union (EU) can be regarded as a jurisdiction for VAT of the EU member countries. The globalization of economic activities naturally increases economic transactions conducted over different jurisdictions. In this paper, we call these transactions "cross-border transactions".

The difficulties caused by cross-border transactions stem from the basic nature of indirect taxes, whose economic burden is assumed to be shifted from the direct taxpayers (taxable persons) or the venders who bear the obligation to collect the tax[3] to other persons who are supposed to bear the economic burden of the tax. In the case of indirect taxes on consumption, it is usually assumed that the economic burden is shifted from businesses to consumers. (Here we do not explicitly discuss the issue if the concept of "indirect taxes" is relevant in the economic sense or the issue of economic "incidence" of these taxes.) Assume a simple case of a transaction from a business to a consumer (B to C). In this case, the taxable person or the person who bears the obligation to collect the tax is the business and the economic burden of the tax is supposed to be shifted to the consumer. The tax authorities have access to information on taxable transactions by the business through checking tax returns and auditing. As long as both the business and the consumer are located within the same jurisdiction, no problem arises: the consumer pays the price that includes the indirect tax to the business and the business pays the tax to the tax authorities. This mechanism can be briefly described as follows.

$$[B \text{ to } C]; \ (G \text{ on } B) \qquad (1)$$

In (1), [B to C] means a transaction from a business to a consumer and (G on B) means that the tax authorities can collect the indirect tax on that transaction by having access to the information of the business.

However, this mechanism does not necessarily work smoothly for cross-border transactions. Suppose a cross-border B to C transaction from a business in Country 1 ($B1$) to a consumer in Country 2 ($C2$). As long as one applies the destination principle in indirect taxes, which is consistent with the idea of an indirect tax as a consumption tax, taxation should take place in Country 2. In order that the same mechanism as in the case of a domestic transaction is to be applied to the cross-border transaction, the business in Country 1 would be required to add the tax to the price and the tax authorities of Country 2 ($G2$) would have to collect the tax from the business in Country 1. However, the implementation of such a system seems to be quite difficult because the business ($B1$) is not located within the jurisdiction of the tax authorities in Country 2. There are at least two problems. First, the tax authorities in Country 2 do not have direct access to the transaction record of the business in Country 1, thus they are unable to obtain accurate information on the amount of its sales to the consumer in Country 2. Second, even if such information is obtained, the tax authorities of Country 2 cannot necessarily enforce the collection of the tax because the business is located out of the jurisdiction. In short, the following mechanism is not feasible under the current indirect tax system because $B1$ is out of the jurisdiction of $G2$.

$$[B1 \text{ to } C2]; \ (G2 \text{ on } B1) \qquad (2)$$

The problem associated with the difficulty of the application of indirect taxes to cross-border transactions has not become apparent until recent times because a large part of cross-border transactions has been conducted as transactions of goods. In the case of a cross-border transaction of goods, the customs office of Country 2 can monitor the transaction of goods that go through the customs procedure and can collect the tax from the consumer when the consumer receives the goods from the customs. Therefore, the traditional indirect tax system, especially the VAT system, has been regarded as a system that can be smoothly applied to international trade[4]. In fact, the VAT system, with an export exemption and a proper border tax adjustment, has been praised for its neutrality toward international trade of goods.

It should be noted, however, that the taxation of VAT on the imported goods as described above depends on a mechanism that is quite different from the taxation of domestic transactions. In the domestic B to C transactions, the tax is collected from the business. In the mechanism that is applied to cross-border $B1$ to $C2$ transactions of goods, the tax authorities, strictly speaking, the customs authorities, of the importing country ($G2$) impose VAT on the imported goods without having an access to the information of the business that sells the goods. The customs authorities

can enforce the VAT on imported goods because they can check the goods going through the customs procedure and can retain the goods at the customs office as long as the importer does not pay the VAT. This mechanism is quite different from the general mechanism of indirect taxes, in which the supplier, not a buyer, collects and pays the tax. The mechanism of the VAT system on goods imported by a consumer can be described as follows.

[$B1$ to $G2$ and $G2$ to $C2$]; ($G2$ on $C2$) (3)

Note that in (3) the tax authorities can directly collect a tax from the consumer because the tax authorities are involved in the transaction from $B1$ to $C2$ by physically keeping the goods in the process of the transaction. Thus, $G2$ need not have access to $B1$. Of course, the same mechanism as (3) can be applied when the importer is a business. In any case, the mechanism by which VAT is imposed on imported goods is utterly different from the mechanism for domestic transactions.

With the globalization of economic activities and the development of the Internet, cross-border transactions of services and intangible products have increased. In particular, the increase in cross-border transactions of digitized products and the potential of that type of transactions have attracted a lot of attention. The above-mentioned mechanism for imposing VAT on imported goods at customs, as described in (3), does not work in the case of transactions of services and intangible products, including digitized products, and the basic problem of the infeasibility of (2) has clearly emerged. In fact, under the current VAT system, VAT is seldom collected from cross-border B to C transactions of services and intangible products. This issue has become a serious problem in the context of taxation of electronic commerce[5]. The RST system is also faced with a serious challenge from cross-border transactions. We discuss concrete issues of VAT and RST in the following two sections.

3. Issues on the VAT System

As discussed in the previous section, issues in the VAT system arise only in cross-border B to C transactions of services and intangible products. For other kinds of cross-border transactions, the VAT system generally works effectively. In this section, we discuss issues related to three types of cross-border transactions: transactions of goods, B to B transactions of services and intangible products (with a reference to the reverse charge system), and B to C transactions of services and intangible goods.

The basic mechanism used to impose VAT on cross-border transactions of goods was explained in the previous section. Because the customs of Country 2 (importing country) collect VAT on imports of goods, supplier of Country 1 (exporting country) need not obtain information on the tax system of Country 2 or on the status of the customer in Country 2 (whether the buyer is a business or a consumer) for tax purposes. At the same time, the tax authorities of Country 2 need not have access to books or records of the supplier in Country 1. As indicated in (3), we can regard cross-border B to C (or B to B) transactions of goods as a combination of B to B and G to C (or B to G and G to B) transactions.

The above argument is not intended to suggest that electronic commerce does not produce any difficulties for cross-border transactions of goods. In fact, the development of electronic commerce can increase cross-border transactions of goods substantially, and countries should make efforts to make their customs clearance procedure as efficient as possible to make sure that the procedure does not "unduly impede revenue collection and the efficient delivery of products to customers" (OECD(1998a)). Also, the level of tax-exempt threshold for small parcels might need reexamination. However, it should be confirmed that it is possible to maintain the basic VAT system on imports of goods regardless the degree of development of electronic commerce[6].

For cross-border $B1$ to $B2$ transactions of services and intangible products, no immediate problems arise as long as the business in Country 2 ($B2$) is a taxable person of VAT in Country 2. If no VAT is collected from the cross-border transaction, the $B2$ cannot claim a refund for VAT on that transaction. Thus, it is possible not to introduce any new measure on cross-border B to B transactions. However, many countries have introduced a reverse charge system in which the business importing services or intangible goods is required to pay VAT for that transaction. The reverse charge system can be directly described as follows.

[$B1$ to $B2$]; ($G2$ on $B2$)

However, because the VAT revenues do not accrue from $B1$ to $B2$ transactions as long as $B2$ is a VAT taxpayer, it might be better to describe

the reverse charge system as follows.

[*B*1 to *B*2 and *B*2 to *C*2]; (*G*2 on *B*2) (4)

If we compare (4) and (1), the reverse charge does not seem to add essentially new elements to the basic indirect taxation mechanism indicated in (1).

Then, is the reverse charge system useless? No. The reverse charge system seems to have at least two merits. First, the reverse charge system can be useful when the country wants to impose VAT on imports of services and intangible goods by VAT-exempted businesses or other institutions [7]. Because VAT-exempt businesses purchase services with VAT-inclusive prices from domestic suppliers, the introduction of the reverse charge system might be desirable from the viewpoint of equalizing competitive conditions between domestic and foreign suppliers. Second, because the reverse charge system enables the tax authorities to collect information on imports of services, the authorities might be able to use this information to cope with some other tax problems including problems related to transfer pricing[8]. Because transfer pricing technique by multinational firms will become more and more sophisticated with the development of e-commerce, particularly on interrelated company transactions of services and intangible goods, the tax authorities might be interested in information-collecting aspects of the reverse charge system[9]. Thus, countries that do not have a reverse charge system might take these merits into account, together with possible increase in administrative and compliance costs, when considering whether or not to introduce the reverse charge system.

The current VAT system cannot capture cross-border *B* to *C* transactions of services and intangible products. Although the volume and amount of these transactions are still limited, it does not follow that no measure is necessary to cope with this problem. On the contrary, this issue is potentially quite serious because it tests the long-term viability of the current VAT systems in the global economy that is becoming more and more borderless. In order to impose VAT on these transactions, however, some new measures are needed. We will investigate possible solutions in Section 6 after discussing issues related to the RST system in Section 4 and examining the compatibility between the VAT and the RST systems in Section 5.

4. Issues on the RST System

Not all the countries have introduced the VAT system as yet. In particular, the United States has the RST system. The actual US RST system is implemented as state and local taxes and the system is very different from state to state. (Some states do not impose any RST.) As state and local taxes, the US RST system consisting of sales and use taxes is faced with difficulties in implementation when it is to be applied to interstate or international transactions. Also, services are taxed only on a selective basis[10]. However, before discussing issues caused by these actual characteristics of the US RST system, we investigate general issues under a hypothetical assumption that a country has an "ideal" RST system that is implemented as a national tax, covers all goods and services, and is to be imposed on imports of goods and services.

Economists tend to insist that the "ideal" VAT system and the "ideal" RST system are equivalent in an economic sense. Even if this "equivalence" idea is valid in theoretical investigations, we have to recognize several differences between these systems when we consider actual policy issues. First, under the RST system, it is necessary for the supplier to distinguish between *B* to *B* and *B* to *C* transactions because RST should be imposed only on *B* to *C* transactions (or "retail" transactions). In reality, however, it is difficult to distinguish "retail" transactions and other transactions, often resulting in taxation on business inputs[11]. Second, the RST system is generally more difficult to enforce, compared with the VAT system because the former lacks in the "self-enforcement" mechanism that the latter has. Thus, RST might be more easily evaded and this problem could become particularly serious when the tax rate becomes high[12]. This problem is examined in the Appendix. The issues associated with cross-border transactions are discussed in the next section.

5. The Compatibility of VAT and RST Systems

In this section, we examine theoretically if there are difficulties that can arise between a country with the VAT system and a country with the RST system before making some comments on the actual recent developments in the United States. It is assumed that Country 1 has an "ideal" RST system and Country 2 has an "ideal" VAT system. In short, as long as the VAT system

follows the destination principle and the tax authorities of Country 1 can properly distinguish *B* to *C* transactions from *B* to *B* transactions, no fundamental problem arises between Country 1 and 2. In the actual context, however, various problems could come out because no VAT or RST system is "ideal".

The current VAT system generally follows the destination principle, but it was sometimes suggested that the origin principle, where VAT is applied at the place of exporters, not at the place of importers, could work if this principle is globally adopted and that the origin principle had an advantage of having no need for border tax adjustment (see Berglas (1981), for example). Indeed, if the origin principle were adopted, there would be no difficulties in taxing cross-border transactions of services and intangible products. However, because no VAT is imposed uniformly on all goods and services, particularly because VAT generally exempt investment goods, the application of the origin principle would cause price distortions (see Sinn (1990)). In addition, the origin principle cannot be applied to the RST system anyway. Thus, the destination principle is the only viable option on a global basis[13].

As long as the destination principle is adopted, no major problem should arise for cross-border transactions of goods. For domestic transactions, it has to be possible for tax authorities of Country 1 to effectively distinguish between *B* to *B* and *B* to *C* transactions, possibly by adopting some proper registration system for vendors who collect the RST. (Otherwise, there would be a cascading of RST for domestic transactions and/or would be prevailing tax evasions.) Thus, the customs authorities of Country 1 should be able to identify the status of the importer by requiring some registration documents or exemption certificates, and they would be able to effectively impose RST only on imports by final consumers who do not have registration documents or exemption certificates, keeping a neutral condition of competition between domestic and foreign suppliers. Also, by distinguishing domestic *B* to *B* and *B* to *C* transactions, the tax authorities of Country 1 can make sure that exports from Country 1 are exempt from RST. In short, the mechanism of (3) can be applied to both RST and VAT systems[14].

The difficulties in taxing cross-border *B* to *C* transactions of services and intangible products are common for VAT and RST systems and all of the potential solutions examined in the next section could be applied both to VAT and RST systems. Of course, international cooperation between countries with different tax systems would generally be more difficult, but more basic difficulties in international cooperation could stem from the difference in policy stance and judgment on the urgency of coping with the issues on cross-border transactions of services and intangible products.

In reality, the US RST system is quite different from the "ideal" RST system. First, the US RST covers services only for a selected basis. Therefore, it might be difficult for some people in the United States to understand that the VAT system usually covers all services and intangible products, including digitized products. Although the US authorities and tax experts clearly understand the VAT system implemented in Europe and other places, it would be desirable for people in US industries, who are not tax experts, to deepen their understanding in the VAT system. Second, the US RST is implemented as state and local taxes and often is not applied to imported goods and services. The current system cannot be applied smoothly to interstate transactions, either. It is doubtful whether any "local" RST is viable in the long run provided that the weight of cross-border transactions is destined to increase steadily. Economists tend to insist on some radical reforms of the current US RST system[15]. Actually, active discussions to streamline the RST system are going on in the United States and if the US RST system becomes more simplified and modernized, it will be more comfortably compatible with VAT systems of the world. Also, as discussed in the next section, the outcome of the project to streamline the RST system could have important implications on the issue of how to apply VAT on cross-border transactions of services and intangible goods, although the project basically aims at streamlining taxation on interstate transactions of physical goods.

6. Possible Solutions ?

As discussed in Section 2, the essential difficulties in taxing cross-border *B* to *C* transactions of services and intangible products stem from the basic nature of indirect taxes. If the tax authorities try to apply indirect taxes to these transactions in a traditional way as described in (1), they are faced with difficulties because the businesses from which the tax is to be collected are located

outside their jurisdiction. Theoretically, there could be three lines of solutions: First, the indirect tax could be implemented as a direct tax, which is collected directly from consumers. Second, the basic mechanism of the indirect tax could be maintained and the tax could be implemented over different jurisdictions, with strengthened international cooperation in tax administration. Third, the indirect tax could be transformed into a transaction tax, which is imposed on each transaction by using appropriate technologies. This section examines these theoretical options. As in the previous section, we examine a case of two countries: Country 1 with the "ideal" RST system and Country 2 with the "ideal" VAT system.

First, we consider if the indirect tax could be implemented like a direct tax. Such a system is sometimes called as a "self-assessment" system. The mechanism of this system is described as follows.

$$[B1 \text{ to } C2];\ (G2 \text{ on } C2) \quad \text{or}$$
$$[B2 \text{ to } C1];\ (G1 \text{ on } C1) \qquad (5)$$

One merit of the self-assessment system is that taxation could take place within each country because the tax authorities of the importing country impose tax liability on consumers in the importing country and require the consumers to pay the tax directly to the tax authorities. There are actually some examples of such systems, as the Canadian GST (VAT) system for imports of services[16]. These actual systems, however, do not seem to work effectively enough. As long as the tax authorities do not have direct access to information of consumers and a chance to audit the consumers, such a tax system is not enforceable. Any tax system that is not enforceable is not desirable: that system cannot yield any revenue if it does not work at all, and even it somehow happens to work, the system would be criticized as imposing a "penalty on honesty."

In the long run, it might be possible to consider a direct tax whose tax base is consumption. For example, some theorists proposed an "expenditure tax". If VAT or RST were replaced with a tax like the expenditure tax, the issues associated with cross-border B to C transactions of services or intangible products would disappear. However, new problems including problems of privacy might come out for the "direct tax" approach. In any case, it seems to be unrealistic for the tax authorities to have a full access to information on the consumption of each consumer, although it could become technologically possible in the context of e-commerce [17]. It should be noted that an important merit of the current indirect taxes on consumption is that the tax can be implemented without specific information on consumers. In fact, all the information that the tax authorities need to implement VAT or RST is information on sales amount of the supplier and no information on the purchasing by consumers is necessary.

Second, we examine the line on which the basic mechanism of the indirect tax is maintained but implementation of the tax is conducted over different jurisdictions. This option seems to be more realistic than the first option. There are two variations in this option: in Variation 1, the tax authorities have direct access to foreign suppliers, and in Variation 2, the tax authorities of both countries have direct or indirect access to suppliers of both countries. The mechanisms of Variations 1 and 2 are described as follows.

$$[B1 \text{ to } C2];\ (G2 \text{ on } B1) \quad \text{or}$$
$$[B2 \text{ to } C1];\ (G1 \text{ on } B2) \qquad (6)$$
$$[B1 \text{ to } C2];\ (G2 \text{ on } (G1 \text{ on } B1)) \quad \text{or}$$
$$[B2 \text{ to } C1];\ (G1 \text{ on } (G2 \text{ on } C2)) \qquad (7)$$

In both variations, strong international cooperation between the tax authorities is required to implement the system effectively.

In Variation 1, suppliers in Country 1 (2) are generally required to register or report to the tax authorities in Country 2 (1) in order to be identified by the tax authorities. Although this variation is a natural extension of the current indirect tax system in which the supplier has an obligation to collect the tax and to pay the tax to the relevant tax authorities[18], it is not certain whether the tax authorities can enforce the tax on suppliers that are located outside their jurisdiction. For example, if a supplier of Country 1 that does not have any physical establishment in Country 2 refuses to pay VAT to Country 2, what can the tax authorities of Country 2 do without some kind of assistance from the tax authorities of Country 1? Also, the tax authorities of Country 2 might need assistance from the tax authorities of Country 1 to identify taxpayers. International cooperation among tax authorities is an essential element in Variation 1, although even stronger cooperation is required for Variation 2.

Variation 1 could be implemented for cross-border B to C transactions along with a reverse charge system in Country 2 for transactions from

the business in Country 1 ($B1$) to the business in Country 2 ($B2$)[19]. In this case, $B1$ has to be able to identify the status of the customer in Country 2: is the customer $B2$ or $C2$? Then $B1$ has to collect VAT only when the customer is a consumer ($C2$), who cannot present a VAT registration number. The same mechanism is needed for $B2$ to collect RST only when the customer is a consumer ($C1$), who cannot indicate a RST registration number. Thus, in order for the system to work in an ideal manner, an internationally common database of taxpayers of indirect taxes and some mechanism to verify the number indicated during the transaction are necessary. If $C1$ (or $C2$) uses the number of $B1$ (or $B2$), is it possible for $B2$ (or $B1$) to detect that misuse? As discussed in the Appendix, the difficulties to implement the RST system, the need to identify the status of the customer and the lack in self-enforcing mechanism of VAT, arise for the option of registration and reverse charge mechanism. It is important to note that these difficulties arise even if both countries adopt the VAT system (see the Appendix).

Another related issue is the identification of location of consumers. In the case of on-line transactions of digitized products, it is difficult for suppliers to identify the location of consumers[20]. Suppose that the VAT rate of Country 2 is 20% and that the RST rate of Country 1 is 10%. Then, some $C2$ has an incentive to say that he/she is $C1$. If 50% of consumers are dishonest when it pays to be dishonest, tax revenue of Country 2 could be halved while tax revenue of Country 1 might be larger than the case in which all consumers are honest. The risk of false declaration by consumers could arise not only for cross-border transactions, but also for transactions of digitized products in general. (Note that even if suppliers and consumers are located in the same jurisdiction, it is not always easy for the supplier to know the true location of the consumer.) This issue can also be a potential source in tax competition in the indirect taxes. Thus, rather than just trusting the reported location of the consumer, some mechanism to check the reported information should be invented.

In Variation 2, the tax authorities of both countries cooperate very closely to collect indirect taxes. The tax authorities of Country 2 could collect RST from $B2$ for Country 1, and the tax authorities of Country 1 could collect VAT from $B1$ for Country 2 (see (7)). Because tax authorities collect taxes from the suppliers within each jurisdiction, the mechanism of (7) seems to be effective. The procedural mechanism of Variation 2 is somewhat similar to the origin principle, with the resulting economic effect being the same as the destination principle. There are several difficulties in Variation 2, however.

First, for Variation 2 to work, extremely strong cooperation between tax authorities of both countries is needed and it seems to be unrealistic to achieve this level of strong cooperation on the global basis because it still looks very challenging to achieve that even within the European Union. Under Variation 2, it is not certain whether countries have sufficient incentive to collect taxes for foreign countries. Thus, although the way in which Variation 2 is implemented is apparently similar to the origin principle, the underlying incentive for the tax authorities is utterly different. Second, as in Variation 1, it is necessary for the suppliers to identify the status and the location of their customers, which is far from easy. Moreover, the supplier does not necessary have an incentive to report the correct information to the authorities unless considerable penalties are imposed in the case of false or incorrect reporting. Note also that the authorities do not necessarily have a strong incentive to check the report by the supplier.

Now we examine the third possibility: to transform indirect taxes to transaction taxes. Using appropriate technologies, it might be possible, in the long run, to impose and collect indirect taxes directly from each transaction, without referring to the books or record of suppliers. The mechanism of this option is described as follows.

$$[B1 \text{ to } C2];\ (G2 \text{ on } [B1 \text{ to } C2]) \quad \text{or}$$
$$[B2 \text{ to } C1];\ (G1 \text{ on } [B2 \text{ to } C1]) \qquad (8)$$

Here, the word "transaction tax" is used to indicate the mechanism with which the tax system works. Unlike the traditional transaction tax, the tax discussed here does not cause tax cascading[21]. It is also conceivable that some trusted third party (TTP) is used to manage and maintain the system[22].

We need to be cautious enough toward this approach. First, the possibility of developing a technology does not mean the practical feasibility of using the technology. For example, even if some engineer develops some software that covers the indirect tax systems all over the world,

it is far from certain whether many people actually use that software as long as they do not have any incentive nor are they forced to use that software. Second, the technology itself cannot resolve the problem of tax liability and enforcement. For example, how can the tax authorities recover the tax when there is tax revenue because of an error in the computer system to collect taxes or when there is no money in the bank account from which to collect taxes? Thus, under any technological solution, someone, either the supplier or the consumer or TTP, has to bear the ultimate tax liability.

From the above examination, it seems that it is not possible to adopt the first (self-assessment or direct tax) option or the third (technology or transaction tax) option sometime in the near future. The Variation 2 of the second (international cooperation or indirect tax) option also seems to be far too ambitious at this stage. Thus, the remaining option, Variation 1 of the second option, is likely to be the only realistic "solution" in the near future, although serious difficulties would arise in its implementation.

Finally, it is necessary to note that the use of technology and some third party could be examined also in the context of the first (self-assessment) option and the second (international cooperation) option. While the technology alone cannot provide a final solution, it can help the tax authorities to make the administration more efficient and effective, and at the same time can reduce the compliance cost of taxpayers. Therefore, the possibility of the use of new technologies, with possible use of the third party, should be investigated, although it will take some time to come to a workable solution along this line.

7. Concluding Remarks

Indirect tax issues have attracted a lot of attention in the context of global transactions of digitized products. This paper has attempted to propose a framework of discussions on these issues. There are several points to be emphasized:

First, indirect tax systems are quite different from country to country, therefore, it is essential to accurately understand the different system of other countries when conducting international dialogues and to avoid unnecessary frictions caused by mere ignorance. It is also important to note that as an indirect tax system on consumption, both VAT and RST systems are viable and compatible with each other as long as they are properly designed and implemented.

Second, any international discussion on tax policy and administration should be conducted from a viewpoint of tax policy and taxation principles of neutrality and fairness. While some trade issues are inevitably involved, we should never confuse tax policy consultations with trade policy debates. For example, it is not appropriate to start the discussion only from the viewpoint of exporting country (or of importing country) of digitized products.

Third, we should not underestimate the seriousness of the problem because of the very limited volume and amount of cross-border B to C transactions of services and intangible products, including digitized products. Actually, this type of transactions might increase rapidly and substantially in the near future. Above all, the issues associated with this type of transactions relate with the problem of long-term viability of the current indirect tax systems in the borderless economy. Thus, we should continue to address these issues.

Fourth, while there can be several potential solutions to the above problem, all of the "solutions" seems to involve huge difficulties in implementation. Although Variation 1 of the second option is likely the only realistic "solution" in the near future, that "solution" brings about new elements in the VAT system and difficulties associated with the RST system arise (see the Appendix). Therefore, it is important for the international community to look closely the discussion to streamline the RST systems in the United States. At the same time, it is necessary to continue efforts to come to the more comprehensive and effective solution of the problem, paying due attention to positive elements in other options.

Fifth, it is important to recognize that the issues on indirect taxes are just a small part of various taxation problems and opportunities caused by the development of electronic commerce. Further discussions among tax experts on these huge problems and opportunities should be promoted on a global basis. In this context the on-going process of OECD, where tax experts from both government and private sectors are having discussions and dialogues from detailed and technical perspectives, should continue to play the leading role in formulating a new strategy for taxation of electronic commerce.

Appendix : A Model of Tax Compliance under VAT and RST Systems

In this appendix, we use a simple model to compare the mechanism of VAT and RST systems, focusing on the aspect of tax compliance. After discussing the difference of two systems in the context of domestic transactions, we use the result to examine its implications on issues of cross-border transactions.

Theoretically, economic effects of VAT and RST are identical, but these systems operate quite differently from a practical point of view. We present a simple model in the context of electronic commerce to compare these systems. We assume that a company produces software and sells it at a constant price P, which is lower than the monopoly price. Although the company is a monopolist it cannot increase the price above P because to do so would cause a new entry to the market of the software and the profit of the company would vanish. The price P includes indirect taxes and the tax authorities can observe P because it is just a market price of the software. Customers of the company (both businesses and consumers) purchase the software through the Internet. The sales volume of the company is Q (>0) and

$$Q = Q_b + Q_c. \tag{A1}$$

Q_b is the sales volume of the software to the businesses and Q_c, to the consumers. The sales volume that the company reports to the tax authorities is $q(>0)$ and

$$q = q_b + q_c \tag{A2}$$

The cost for developing the software is C[23] and once developed, the marginal cost to produce and sell another unit is assumed to be constant (c), which reflect some minor input needed. (We can assume that c is close to zero.) Let v and r tax rates of VAT and RST. Πv and Πr indicate the company's profits under VAT and RST systems, respectively.

$$\Pi v = (P-c)Q - C - (P-c)vq - F(q-Q_b) \tag{A3}$$

$$\Pi r = (P-c)G - C - rPq_c - F(q_c) \tag{A4}$$

In (A3) and (A4), F indicates a penalty function. If the company reports a low q or q_c, the tax burden is lower but the probability of being audited increases, raising the value of F. We assume that $F'<0$ and that $F''>0$. In (A3), it is assumed that the tax authorities know Q_b because they can check the invoice of the business customers of the company. (Although the perfect matching of transactions is impossible even under the VAT system, relaxing this assumption does not change the substance of the argument.) The term vcq indicates the input tax credit that the company can claim.

The company chooses ${q^*}_v$ and ${q_c}^*_r$ to maximize Πv and Πr, respectively. If $r=v$ and if both ${q^*}_v$ and ${q_c}^*_r$ are interior solutions, then it is easily confirmed that

$${q_c}^*_r < {q^*}_v - Q_b. \tag{A5}$$

There is another reason why qc reported under the RST system tends to be small compared with the reported volume under the VAT system. Under the RST system, the company has to know whether its customer is a business or a consumer. Consumers have an incentive to evade RST by presenting a false exemption certificate[24][25]. Even if a severe penalty is imposed on the company that fails to detect the false identification, the company does not detect it perfectly because the cost to do that would be enormous. Therefore, the inequality (A5) holds even if c is close to zero. Thus, we demonstrated that the compliance level of the company tend to be lower under the RST system, compared with the VAT system. Even if we introduce reputation effects or other factors that influence the compliance level of the company, there would not be a substantial change.

Next, we examine the case of the corner solution where ${q^*}_v$ or ${q_c}^*_r$ is zero. These cases would emerge if

$$v > -F'(-Q_b)/(P-c) \tag{A6}$$

$$r > -F'(0)/P. \tag{A7}$$

Comparing (A6) and (A7), we can understand a reason why it is more difficult to set the high RST rare (for example, more than 10%), compared with VAT whose rate often exceeds 20%. We can also suppose that it is quite difficult not to submit any returns under the VAT system because the tax authorities could easily detect that the company has some sales from information obtained from the business customer of the company even if the tax authorities do not get accurate information on Q_b.

Now we investigate cross-border issues. It is assumed that a VAT country adopts the Variation 1 of the second option (registration scheme), together with the reverse charge system and that a RST country imposes RST on the imports of the software imported by consumers. The software is sold through the Internet, so the customs offices

cannot check the cross-border transactions.

We examine the case where a company in Country 1 sells software to customers in Countries 1 and 2. (It is assumed that only the company can sell the software and no resale by the customers is possible because, for example, regulations on property right work effectively.) Q and q indicate the true and reported sales amount.

$$Q = Q_1 + Q_2 = (Q_{1b} + Q_{1c}) + (Q_{2b} + Q2_c) \quad \text{(A8)}$$

and

$$q = q_1 + q_2 = (q_{1b} + q_{1c}) + (q_{2b} + q_{2c}). \quad \text{(A9)}$$

The notations in (A8) and (A9) should be obvious.

First, we see the case where both countries adopt the VAT system. Then,

$$\Pi_{vv} = (P-c)Q - C - (P-c)v_1 q_1 - F_1(q_1 - Q_{1b}) - v_2 P q_{2c} - F_2(q_{2c}) + v_{1c}Q_2. \quad \text{(A10)}$$

The company maximizes Π_{vv} by choosing q_1 and q_{2c}. In choosing q_1, the self-enforcing mechanism of VAT works. However, in choosing q_{2c}, this mechanism does not work and the conditions are the same as Country 2 ($G2$) tries to impose RST on the company for the following reasons. First, VAT of Country 2 is imposed only on the company's sales to consumers in Country 2 ($C2$). For sales to businesses in Country 2 ($B2$), the reverse charge is applied and the company need not care about VAT on the sales to $B2$. Second, input tax credit is provided from $G1$ through the export exemption procedures and $G2$ does not have any leverage through this channel[26]. Thus, the compliance level of the company to $G2$ could be low as the case in which $G2$ imposes RST on the company.

Actually, the situation is even worse than the domestic RST case. Compare (A10) with (A4). The level of penalty to be imposed on misconducts with cross-border transactions (F_2) is likely to lower than the level of F in (A4). Moreover, v_2 in (A10) could be substantially higher than r. Remember that experience shows that it is difficult to implement the RST system with a high tax rate because the incentive to evade is too strong. Higher tax rate and weaker enforcement make the implementation of Variation 1, which has similar problems of the RST system, even more difficult than the implementation of the RST system. Therefore, the actual mechanism of Variation 1 should be very carefully constructed and it seems necessary for VAT countries to study problems of the RST system more seriously.

Second, we see the case in which Country 1 is a RST country and Country 2, a VAT country.

$$\Pi_{rv} = (P-c)Q - C - r_1 P q_{1c} - F_1(q_{1c}) - v_2 P q_{2c} - F_2(q_{2c}) \quad \text{(A11)}$$

The situation for $G2$ is the same as (A10)[27]. $G2$ will have a lot of difficulties in collecting VAT from the company. For $G1$, the situation is the same as (A4).

Third, we check the case in which Country 1 is a VAT country and Country 2, a RST country.

$$\Pi_{rv} = (P-c)Q - C - (P-c)v_1 q_1 - F_1(q_1 - Q_{1b}) - r_2 P q_{2c} - F_2(q_{2c}) + v_{1c}Q_2 \quad \text{(A12)}$$

In this case, the situation is about the same as (A3) for $G1$ and as (A4) for $G2$. However, the enforcement will be more difficult for $G2$ compared with the domestic case of (A4) because of the weaker penalty ($F2$) compared with F in (A4).

Finally, it should be reconfirmed that even if it is so difficult to come to the solution, the defects of the current indirect tax systems that fail to capture cross-border B to C transactions of services and intangible goods should be rectified. The argument above is to encourage, not to discourage, the efforts to achieve the objective.

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Notes

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1) It should be noted, however, that indirect tax issues are just a part of a set of various taxation issues caused by electronic commerce.

2) Local governments in the United States, e.g. cities and counties, often impose retail sales taxes in addition to the state tax, although the local taxes tend to be identical to the state-level tax and amount in substance to a simple rate increase for the consumer.

3) Note that in U.S. RST, the "taxpayer" is often

the customer ; the vendor is simply the collector of the tax. In the case of European or Japanese VAT, the vendor is the "taxpayer". In this paper, we focus on the basic mechanism on which tax systems work and do not explicitly discuss issues that may arise from the difference in legal structure related to status to the "taxpayer". However the latter issues may be also important because the difference of the legal structure could make international dialogues more difficult.

4) The same argument can be applied to the RST system as long as the RST is imposed on imports although the customs office has to identify the status of the importer ($B2$ or $C2$) to impose the RST only when the importer is $C2$. Of course the actual U.S. RST might be difficult to be collected by U.S. Customs that belong to the Federal Government. Also, were the U.S. RST applied to interstate transactions, this mechanism is not feasible because there is no customs controls between states. Thus, the U.S. RST suffers from the problem of the infeasibility of (2) also in the context of cross-border transactions of goods.

5) Note that besides the issue of digitized products, the "disintermediation" effects of electronic commerce also tend to increase (cross-border) B to C transactions.

6) This argument is not intended to preclude the possibility that a new and more efficient mechanism, particularly by using e-commerce technologies, might be developed with a view to facilitating the customs clearance procedure.

7) Financial institution is an important example.

8) Suppose that the business in Country 1 sells an intangible product to both its subsidiary in Country 2 and another independent company in Country 2. Also, suppose that the corporate tax rate in Country 2 is higher than that in Country 1. Under such circumstances, the business in Country 1 might want to set a higher price of the intangible products to its subsidiary than the market price. If there is a reverse charge system in Country 2, both the subsidiary and the independent company are required to submit information on the imports of the intangible goods for VAT purposes, and it might easier for the tax authorities of Country 2 to detect the transfer pricing. Thus, the reverse charge system might have some deterrent effects on transfer pricing of services and intangible goods.

9) Another related merit of the reverse charge system might be that it can have some deterrent effects against abuses of the current defects of the VAT system. Under the current VAT system, suppliers of digitized products could totally escape from VAT by setting up an overseas subsidiary and sell digitized products directly to consumers in the home country from the overseas subsidiary. The reverse charge system might be used as a tool to detect such unfair operations between the supplier and its subsidiary as long as the both countries adopt the reverse charge system.

10) Sales of digitized products are seldom taxed under the current RST system in the United States, except in some states.

11) McLure (1997) cites an estimate that 40% of the US RST revenue comes from business, suggesting substantial cascading of the tax. In the case of the US RST, taxing "business consumption" is the main reason of such a large share of tax burden born by the business sector.

12) As cited in Slemrod and Bakija (2000), Tait (1988) mentions on the RST system that "at 10 percent, evasion is more attractive, and at 15–20 percent, it becomes extremely tempting."

13) Another risk of adopting the origin principle is that it could lead to harmful tax competition among countries.

14) The reverse charge mechanism (4) is not applicable to the "ideal" RST system because the tax should not be imposed on B to B transactions. In fact, the US RST employs a "direct pay" mechanism, which is a kind of the reverse charge system, applicable for some business purchases.

15) See McLure (undated) and Varian (1999). These are papers presented to the Advisory Commission on Electronic Commerce.

16) US use tax is not generally self-assessed, either. US use tax is collected by a vendor who has "nexus" in the state ; otherwise it is not collected. It should also be noted that the notion of use tax on the interstate sales of services has traditionally been a relatively unexplored subject because of the difficulty of enforcement, as discussed in McLure (1997).

17) The expenditure tax can be imposed on income minus net saving and no detailed information on consumption would be necessary in that case. The discussion of the feasibility of the expenditure tax is beyond the scope this paper. However, to obtain information on "net saving" seems to be also difficult. In any case, this type of expenditure tax captures the total expenditure and cannot focus on the treatment of cross-border transactions of services and intangible products

18) Note that the mechanism of (6) is exactly the same as (2).

19) As for transactions from $B2$ to $B1$, no reverse charge system is applicable because Country 1 adopts the "ideal" RST system.

20) Although $B2$ has an incentive to identify the location of consumers in order to claim the VAT refund for exports, $B1$ has no such incentive because no refund system for exports exists in the RST sys-

tem.

21) It is assumed that the refund of input tax is granted for VAT and that only B to C transactions are subject to taxation for RST.

22) In that case, the mechanism could be described as follows.

[$B1$ to $C2$]; ($G2$ on [$B1$ to $C2$] through TTP)

23) For simplicity, C is assumed to be a constant wage paid to the developer of the software.

24) Slemrod and Bakija (2000) refers to a study by the Florida Department of Revenue on the RST, which estimated that 5 percent of tax-free business purchases involved abuse or misuse of business exemption certificates and recounts how "paper" businesses are created solely as a means of obtaining business exempt certificates and avoiding taxes on purchases intended for personal use.

25) Under the VAT system, it is more difficult for consumers to pretend to be businesses because consumers have to register and to be able to present invoices to the tax authorities in order to enjoy merits of tax evasions by pretending as businesses.

26) One could argue that because the company has incentive to reveal Q_2 to $G1$ for claiming export tax credit and $G2$ has an access to information on Q_{2b} through auditing on the reverse charge, $G2$ can calculate Q_{2c} (true value) by obtaining the value of $Q2$ from $G1$. A perfect enforcement ! However, this is no longer Variation 1, but such mechanism very close to Variation 2, together with a perfect monitoring on Q_{2b}, which seems extremely unrealistic even in the case of the two-country model.

27) In the case of (A11), $G1$ does not have an effective tool to get information on Q_2. It seems that even if $G1$ agrees to adopt Variation 2, it will very difficult to implement it because it is next to impossible for $G1$ to have an access to information on Q_{2c}.

References

Advisory Commission on Electronic Commerce (2000) *Report to Congress*.

Berglas, Eitan (1981) "Harmonization of Commodity Taxes : Destination, Origin, and Restricted Origin Principles," *Journal of Public Economics*, 16, pp. 377-387.

Cnossen, Sijbren (1987) "VAT and RST : A Comparison," *Canadian Tax Journal*, Vol. 35, No. 3, pp. 559-615.

Das-Gupta, Arindam and Ira N. Gang (1996) "A Comparison of Sales Taxes," *Public Finance* Vol. 51(2), pp. 217-225.

Das-Gupta, Arindam and Ira N. Gang (1998) "Value Added Tax Evasion, Auditing and Transaction Matching," Rutgers University Department of Economics Working Paper, New Brunswick NJ.

Due, John F. and Ann F. Friedlaender (1981) *Government Finance : Economics of the Public Sector*. Homewood, Illinois : Richard D. Irwin, Inc.

European Commission (1999) *Indirect Taxes and e-commerce*, Working Paper by Working Party No. 1 on Harmonization of Turnover Taxes, Brussels.

European Commission (2000) *Proposal for a Council Directive amending Directive 77/388/EEC as regards the value added tax arrangements applicable to certain services supplied by electronic means*, COM (2000) 349 final, Brussels.

Gillis, Malcolm, Peter Mieskowsky, and George R. Zodrow (1996) "Indirect Consumption Taxes," *Tax Law Review*, Vol. 51, No. 4, pp. 725-774.

Marrelli, Massino (1984) "On Indirect Tax Evasion," *Journal of Public Economics* 25, pp. 181-196.

McLure, Charles E., Jr. (1997) "Taxation of Electronic Commerce: Economic Objectives, Technological Constraints, and Tax Laws," *Tax Law Review*, Vol. 52, No. 3, pp. 269-423.

McLure, Charles E., Jr. (undated) "Radical Simplification of State Sales and Use Taxes : The Prerequisite for an Expanded Duty to Collect Use Tax on Remote Sales," Paper submitted to the ACEC.

OECD (1988) *Taxing Consumption*, Paris.

OECD (1998a) *Electronic Commerce : Taxation Framework Conditions*, Report of the Committee of Fiscal Affairs, Paris.

OECD (1998b) *Electronic Commerce : A Discussion Paper on Taxation Issues*, A Discussion Paper Prepared by the Committee of Fiscal Affairs, Paris.

Sinn, Hans-Wener (1990) "Tax Harmonization and Tax Competition in Europe," *European Economic Review*, 34, pp. 489-504.

Slemrod, Joel and Jon Bakija (2000) *Taxing Ourselves : A Citizen's Guide to the Great Debate over Tax Reform*, 2nd edition, The MIT Press.

Tait, Alan A. (1988) *Value Added Tax : International Practice and Problems*, Washington, D.C.: International Monetary Fund.

Varian, Hal R. (1999) "A Proposal to Eliminate Sales and Use Taxes," Paper submitted to the ACEC.

Watanabe, Satoshi (2000) "Electronic Commerce, International Taxation, and Tax Administration," *Hitotsubashi Journal of Economics*, Vol. 41, No 1, pp. 53-64.