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Electronic Commerce in an International Environment - A Tax Perspective

by

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Electronic Commerce in an International Environment - A Tax Perspective

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Abstract

The rapid development of information and communication technology should increase the potential of manufacturers/vendors to do business abroad employing electronic commerce concepts. Currently, international transactions are often times linked to permanent establishments or subsidiaries of suppliers in the customer's country. Electronic commerce, however, will increasingly enable direct „cross-border“ transactions between supplier and customer. In this paper, a general model is used to analyze electronic commerce strategies with respect to international taxation. We show

- 1) under which conditions suppliers should try to forgo permanent establishments/subsidiaries and rather establish direct (electronic) marketing channels,*
- 2) how the advent of electronic commerce will affect the suitable choice between sale and leasing/rental transactions.*

As a result, we develop decision rules depending on the characteristics of the traded good as well as the contract parties. It will get evident, how fiscal considerations in an international environment might contribute to shape innovative „go-to-market“ models of suppliers of industrial or consumer goods.

1 Introduction

The advances of information and communication technology and the development of new market concepts¹ [Malone et al., 1987; Reimers, 1996] should further enable companies to exploit international business opportunities. The emergence of electronic commerce will also substantially change the intensity of competition in individual industries in a variety of ways: customers and suppliers get easier access to the markets, products might get more standardized to fit electronic trading, new competitors might enter the market without having to surmount significant entry barriers [Porter, 1980], e.g., represented by costly global marketing and sales forces². In order to retain or even improve its competitive position in the industry, any manufacturer or vendor facing this changing environment has to strategically position himself with regard to international electronic commerce - in business terms: to revise his „go-to-market“ model in order to fully take advantage of the potential of electronic commerce³. This comprises the evaluation of the marketing channel „electronic commerce“ as such as well as the selection of customer offerings marketed through this channel.

As a contribution to this question from a financial point of view, we will in this paper examine the fiscal aspects of international electronic commerce strategies. The basic consideration is that electronic commerce increasingly enables suppliers to globally market products without the need to establish a foreign location as, e.g., sales offices in the customer country. We demonstrate under which conditions the avoidance of permanent establishments or subsidiaries⁴ will cause fiscal advantages that can be shared by supplier and customer. Furtheron, we examine whether and how the type of transaction (here the choice of sale vs. leasing/rental contracts) should change if the domestic supplier is able to directly close the business with the customer abroad. The following results should contribute to successful development and application of competitive electronic commerce concepts:

- While decision criteria for employing direct (electronic commerce) *sales* channels can generally be derived from the characteristics of the supplier, corresponding criteria for *leasing* channels are far more sophisticated: in this case, the proper decision is additionally dependent on the characteristics of the product and the customer, thus requiring a differentiated marketing strategy.

- Introducing electronic commerce and, thus, avoiding foreign locations, usually affects the suitable choice of transaction type (sale vs. leasing). With leasing being preferable in a variety of business situations, we should observe a future trend towards leasing contracts so that the problem of defining tailored electronic commerce strategies (see above) becomes even more important.

Obviously, these results cover just one facet of the supplier's electronic commerce decisions. However, application of tax minimization efforts along with the introduction of electronic commerce should prove promising:

- The avoidance of permanent establishments has for quite some time been recognized as an important tool to reduce the tax burden of suppliers. So, e.g., IBM has recently set up the International Center for Asset Management (ICAM) - a Swiss-based⁵ leasing company serving pan-European customers without running permanent establishments/subsidiaries in other countries. While - in the absence of electronic commerce - a foreign location may be avoided by using independent commission agents (or a „travelling“ salesforce), this effect could more easily be achieved using electronic commerce concepts - at the same time saving considerable amounts of transaction costs - as the well-known success stories of Amazon Bookstores or Dell Computers may illustrate⁶.
- The buy vs. lease decision has long been a source of financial, tax-based savings [Heaton, 1986; Franks/Hodges, 1987; Gao, 1994] - with particularly interesting options in an international setting. While advantageous leasing contracts were - for practical reasons - predominantly applied in large-scale transactions (involving, e.g., airplanes or ships), electronic commerce might provide an efficient way to extend these options to a variety of lower-value products (as, e.g., cars or personal computers).
- While there is a controversial debate as to the fiscal treatment of „digital“ products [CNEC, 1997] that are not just contracted, but also „shipped“ across the net (e.g. software, information from databases and so forth) [Gigler et al., 1996], the trade of physical products does generally not pose unsolved fiscal problems: the source of income of physical products traded electronically usually defaults to the supplier's country. For a predictable tax environment, however, we should be reminded that tax minimization „...compared to market competition is a far less uncertain source of profits“ [Schneider, 1985, p. 353]⁷.

In section 2, we will first briefly cover some aspects of international taxation relevant to the problem addressed here, before we formally model the problem. Section 3 deals with the choice of transaction type given „traditional“ institutional structures (relying on foreign locations) which will serve as a reference point for the analysis of „direct“ transactions made possible via electronic commerce (section 4). Section 5 will discuss some limitations of the model as well as prospects for further research, before section 6 concludes the paper with a summary of the results obtained and links to observations in business practice.

2 Modeling taxation aspects of electronic commerce

Using a formal model we want to analyze transactions between a domestic supplier and a foreign customer *either* performed "traditionally" through a foreign location (PE or subsidiary) within an international supplier group *or* performed "directly", i.e. avoiding these foreign locations. Since neither the total complexity of international taxation lends itself to analytical modeling nor fiscal details should be the focus of this paper, we restrict ourselves to only model the basic traits of international income taxation that will provide us with some insight as to the financial, tax-induced impacts of electronic commerce strategies. Before we formulate the model, we briefly sketch the taxation concepts applied.

2.1 International taxation concepts

In order to motivate the model to follow, a few comments on some concepts of international taxation seem to be appropriate. As stated above, we only focus on some issues relevant to the problem addressed.

While direct business transactions to customers are usually not subject to *taxation in the customer country*, the transactions performed by PEs or subsidiaries (as legal entities) are. This raises the question as to which activities actually constitute a PE. While the definition of PEs does vary internationally, it can generally be understood as a fixed site of business in a country used to partially or fully perform business transactions. For leasing activities in

particular, the physical location of the rented object does usually *not* constitute a PE⁸: "...leasing assets into a jurisdiction will usually not formulate a permanent establishment unless there are auxiliary activities being carried on in the jurisdiction" [Gao, 1994, p. 124].

Double taxation of earnings in the (foreign) PE or subsidiary and the (domestic) supplier company is usually avoided by means of bilateral double taxation treaties. The prevailing methods of eliminating/alleviating double taxation are either the exemption of foreign earnings from domestic taxation or the crediting of taxes paid abroad towards the domestic tax payment. From a supplier *group* point of view⁹, the *effective* tax rate (considering foreign *and* domestic taxation) imposed on foreign dividends or earnings must be taken into account¹⁰.

"*Internal*" transactions between supplier and PE/subsidiary must be priced as if the contract parties would be independent entities („dealing at arm's length“-principle). Thus, market prices are one of the main criteria to fiscally check the validity of transfer prices. However, prices charged internally could be lower than generally observable retail prices either because wholesale prices are used or since the PE/subsidiary performs marketing or sales activities.

2.2 A formal model

The following assumptions describe the model for analyzing "direct" and "traditional" transactions via a foreign location. Figure 1 illustrates the model.

(A1) *Contract conditions*: The customer C either purchases an industrial good at price $P > 0$ or leases¹¹ it at constant annual rates of $r > 0$ for T periods. The supplier S provides the good either directly or via a permanent establishment/subsidiary (within an international supplier group) that receives the good cross-border at a - fiscally acceptable - transfer price of $(a * P)$ with $a \in (0;1]$. After T periods, the good is sold at a residual value of $R_T \geq 0$.

(A2) *Contract parties*: Both parties (C and S) maximize their after-tax net present value. While the customer's corporate income tax rate is given by t_c , the applicable tax rate for the supplier has to be split: for income earned through a foreign location, an effective

tax rate of t_f is relevant¹², while earnings in the home state of S are taxed with t_s . The respective cost of capital is denoted by i_c , i_f , and i_s - with all tax and interest rates being limited to the intervals $(0;1]$ and $(0;1)$, respectively.¹³

(A3) *Asset*: Production of the good causes costs of $Y > 0$ in $t = 0$. In the following periods t , depreciation and (resulting) residual book value shares of the capitalized value lower the taxable income of the contract party capitalizing the asset¹⁴ - their net present value being denoted by d_c and d_s .¹⁵

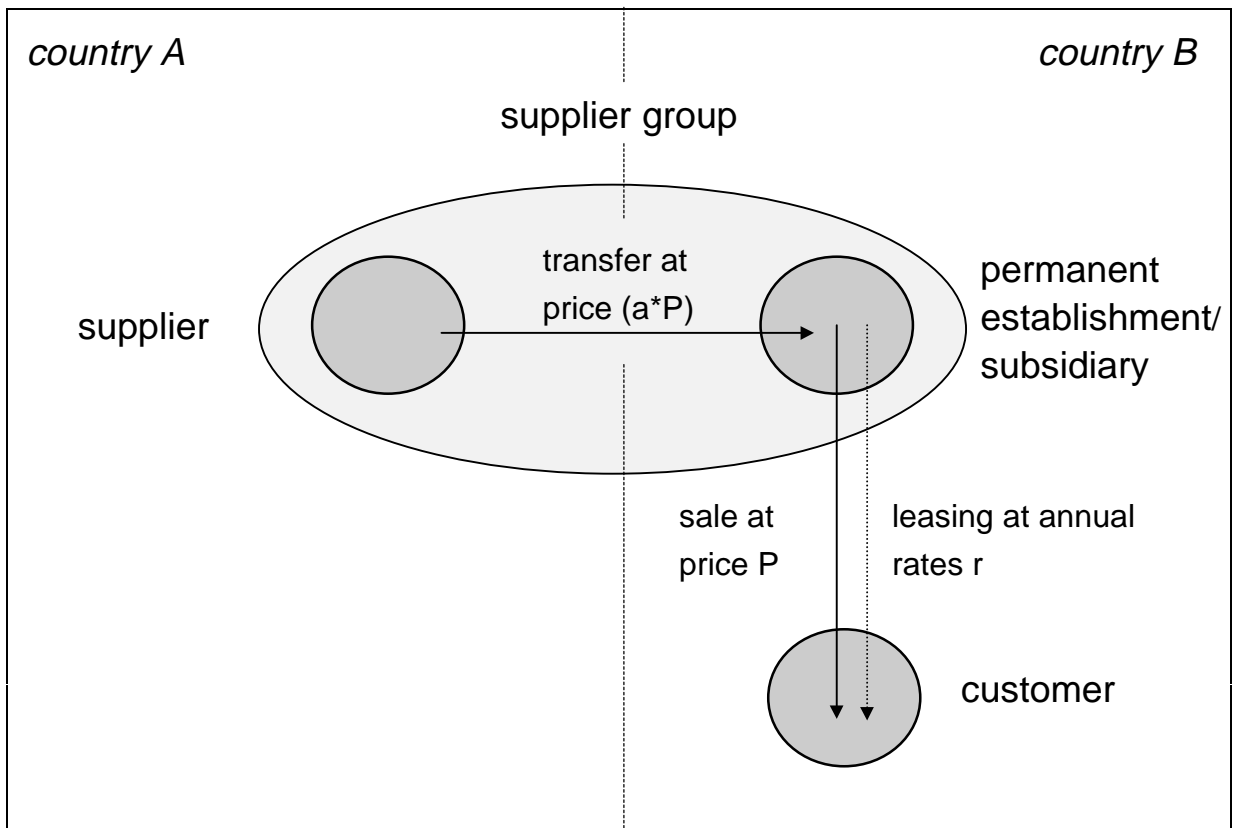


Figure 1: "Traditional" transactions between supplier and customer in the absence of electronic commerce.

3 "Traditional" transactions via foreign locations

In this section, we are going to analyze "traditional" transactions relying on foreign locations of the supplier, i.e. - as defined here - PEs or subsidiaries. The results of this situation illustrated in figure 1 will serve as a reference point for the evaluation of electronic commerce

concepts later on. We will here focus on the question whether - and under which conditions - sale or leasing/rental contracts should prevail in the "traditional" environment. In section 4, we will analyze whether "direct" transactions based on electronic commerce can improve the results of sales and leasing contracts - if analyzed separately - *and* whether the superiority of sale and leasing transactions will change.

Analyzing first the sale in the "traditional" environment, we find the supplier's net present value (NPV) being composed of the gains taxed at the relevant rates of the home country and the foreign location:

$$NPV_S^{\text{Sale}} = (1 - t_S)(aP - Y) + (1 - t_F)(P - aP). \quad (1)$$

The customer's NPV, however, consists of the payment of the sales price, the tax-shield due to depreciation and residual book value in T, and the after-tax revenue of the sale of the used asset¹⁶:

$$NPV_C^{\text{Sale}} = -(1 - t_C d_C)P + (1 - t_C)R_T q_C^{-T}. \quad (2)$$

If we analyze - for this situation - the potential advantage of leasing contracts, we first look at the corresponding NPVs for the contract parties and, then, search for dominance criteria. While for the customer the after-tax leasing payments make up the NPV, for the supplier the gain of the cross-border transaction, the leasing payments, the investment and depreciation allowance of the foreign location as well as the residual value contribute to the NPV:

$$NPV_S^{\text{Leasing}} = (1 - t_S)(aP - Y) + (1 - t_F) \sum_{t=1}^T r q_F^{-t} - (1 - t_F d_F)aP + (1 - t_F)R_T q_F^{-T}. \quad (3)$$

$$NPV_C^{\text{Leasing}} = -(1 - t_C) \sum_{t=1}^T r q_C^{-t}. \quad (4)$$

Obviously, a leasing contract is more attractive to the supplier than a sale if the NPV from equation (3) exceeds the one in equation (1), i.e:

$$r > r_{\min} := \frac{[(1-t_F)P + t_F(1-d_F)aP - (1-t_F)R_T q_F^{-T}] i_F}{(1-t_F)(1-q_F^{-T})}. \quad (5)$$

On the other hand, from equations (2) and (4) we conclude that the customer will prefer a leasing contract if and only if:

$$r < r_{\max} := \frac{[(1-t_C d_C)P - (1-t_C)R_T q_C^{-T}] i_C}{(1-t_C)(1-q_C^{-T})}. \quad (6)$$

If $r_{\min} < r_{\max}$ holds, then any leasing contract with an agreed-upon annual rate of

$$r \in (r_{\min}; r_{\max}) \quad (7)$$

will cause higher net present values for *both* the contract parties. This is due to the fact that in a sale the initial gain $(1-a)*P$ of the foreign location is instantly taxed, while the corresponding tax savings due to a higher tax-shield for the customer are only spread over time. This time lag between paying and saving taxes can cause a systematic advantage for leasing which is particularly evident if interest rates, tax rates, and depreciation schemes of the contract parties match each other¹⁷: The advantage achievable for the coalition of both parties then amounts to:

$$\Delta NPV_{s,C} = (1-d)t(1-a)P. \quad (8)$$

We will illustrate this in the following **example 1**: An asset could be sold at a price of $P = 1$ M\$, while production costs amount to $Y = 650,000$ \$. The asset is to be used over a 7-year period ($T = 7$) and will afterwards be sold at a residual value of $R_T = 100,000$ \$. Both the customer and the supplier's foreign location can apply the straight-line method of depreciation (over 8 years), are subject to a tax rate of $s = 35\%$ and use after-tax interest rates of $i = 6\%$ (rendering $d = 0.7660$). If the asset can be transferred within the supplier group at a price of $950,000$ \$ (i.e.: $a = 0.95$), a leasing contract results in a total advantage vs. a sale (according to (8)) of $4,095$ \$ and is advantageous for *both* parties if the rate is chosen from the interval

($r_{\min} = 192,423$ \$; $r_{\max} = 193,572$). Would the total advantage, e.g., be allocated to the supplier (i.e. $r = r_{\max}$), this would improve his after-tax NPV by 1.8%¹⁸.

In this example, we note that leasing advantages are fairly small so that in real business situations other considerations - not included in the model - as, e.g., risk considerations might outscore the leasing alternative for either or both parties. However, in the next section we will find that forgoing leasing might be increasingly detrimental if the supplier is able to manage the transaction "directly" - i.e. without a permanent establishment or a subsidiary in the customer's country.

4 "Direct" transactions: Avoiding foreign locations

Based on the model in the previous section, we would now like to focus on the changes that are caused by enabling the contract parties to do business without having to use a foreign location of the supplier in the customer's country - as would increasingly be made possible by intensive use of electronic commerce (see figure 2). We assume that the customer will not be affected by the change in the organization of the supplier and will purchase or lease the good at identical conditions as compared to the "traditional" transaction. We will first analyze under which conditions the avoidance of foreign locations positively or negatively impacts the supplier's after-tax NPV of the sale. Second, we will proceed similarly for leasing transactions. Finally, we will demonstrate how these results impact the sale-vs.-lease decision.

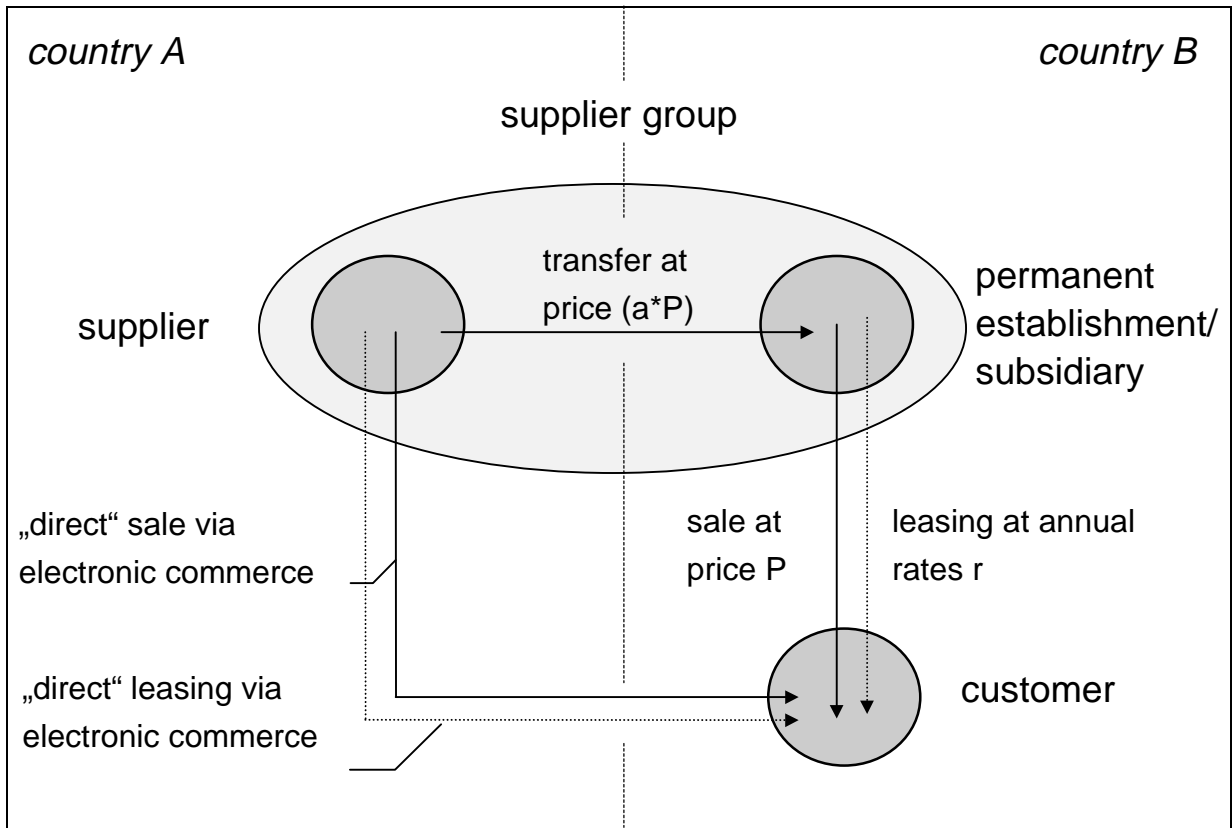


Figure 2: „Direct“ transactions between supplier and customer applying electronic commerce concepts.

4.1 Impacts on supplier

If the supplier could close a sales business with the customer without going through a foreign location in the customer country, his NPV would amount to the after-tax gain of the direct sale:

$$NPV_S^{\text{Sale}} = (1 - t_s)(P - Y). \quad (9)$$

Comparison of equations (9) and (1) yields the simple superiority condition for "direct" vs. "traditional" sales transactions:

$$t_s < t_F \quad (10)$$

Obviously, if the home country offers lower tax rates than the customer country¹⁹, then it makes sense for the manufacturer *not* to have (part of) his gain shifted to a permanent establishment or subsidiary there and, as a result, pay higher taxes abroad. We will illustrate this in the following example which will be continued shortly to also include (more sophisticated) leasing transactions.

Example 2: A domestic supplier ($s_s = 30\%$; $i_s = 7\%$; $a=95\%$) evaluates the use of electronic commerce to establish "direct" transactions with foreign customers in countries A, B and C. In all countries the supplier's foreign location and the customer are characterized by identical tax and interest rates: for countries A and B: $t_F = t_C = 35\%$ and $i_F = i_C = 6.5\%$; for country C: $t_F = t_C = 50\%$ and $i_F = i_C = 5\%$. For a product I ($P = 1$ M\$; $Y = 800,000$ \$ and $R_T = 100,000$ \$, $a = 95\%$) and a usage period of $T = 7$, the "direct" transaction renders NPV advantages for the supplier of 2,500 \$ (countries A and B) or 10,000 \$ (country C) amounting to 1.8% or 7.7 % of the relevant NPV of the "traditional" transaction.

Similarly, if we analyze the net present value of a direct cross-border lease (avoiding a foreign location), then we find:

$$NPV_S^{\text{Leasing}} = (1 - t_s) \sum_{t=1}^T r q_s^{-t} - (1 - t_s d_s) Y + (1 - t_s) R_T q_s^{-T} . \quad (11)$$

This, again, leads to a - however more complex - superiority condition for the avoidance of foreign locations (opposed to "traditional" transactions) for performing leasing contracts:

$$\left[(1 - t_s) \frac{1 - q_s^{-T}}{i_s} - (1 - t_F) \frac{1 - q_F^{-T}}{i_F} \right] r + [(t_s - t_F d_F) a P - t_s (1 - d_s) Y] + [(1 - t_s) q_s^{-T} - (1 - t_F) q_F^{-T}] R_T > 0 . \quad (12)$$

Obviously, the decision on whether to go through a foreign location or not is now harder to make: one might note that - in contrast to the sales case above - a reasonable decision is also dependent on the characteristics of the asset (e.g. P; Y), on the foreign and domestic depreciation schemes and interest rates of the supplier *and* on the leasing payments that can be

negotiated with the customer. Therefore, we conclude that suppliers heavily relying on leasing/rental transactions should apply a *differentiated strategy*: depending on

- a) the product sets,
- b) the specific conditions in the country the products are marketed in, and
- c) the customers,

"direct" sales should be promoted or not. The following example will illustrate the effects.

Example 2 (continued): Extending example 2 above, we consider the effect of "direct" transactions for leases/rentals for product I and another product II which differs from I only by virtue of its lower production cost of 650,000 \$. Assuming depreciable lives of 8 years for both products²⁰, straight-line depreciation domestically and in country A, and application of the declining balance method²¹ of depreciation in countries B and C, table 1 compares the impacts of the avoidance of foreign locations on the supplier's NPV. We learn that the advantage of "direct" transactions varies with products and/or customer countries even in this simple example: white fields in table 1 are indicating the dominance of "traditional", while grey fields are denoting the superiority of "direct" transactions. Situations in real business practice should be much more complex with individually varying parameters. As a result, we note that the use of electronic commerce to introduce "direct" leasing transactions has to be implemented carefully in order to avoid fiscal disadvantages.

[supplier's NPV impacts of "direct" transactions]	Product I	Product II
Country A	+ 12,608 \$	+ 23,791 \$
Country B	-10,536 \$	+ 647 \$
Country C	- 16,217 \$	-5,035 \$

Table 1: Implications of avoiding foreign locations in leasing contracts (example 2)²².

The results of this section - obtained individually for sales and leases - imply that also the optimal choice of sales vs. leasing contracts should be affected by the (possible) avoidance of foreign locations. This will be analyzed next.

4.2 Impacts on transactions

Decisions on sale vs. leasing transactions are also affected by the avoidance of foreign locations. The maximum leasing payment r_{\max} that the customer is willing to spend remains constant: the customer's payment stream does not differ whether he buys/leases from the supplier directly or from its foreign location. However, the minimum leasing payment r_{\min} reflecting the minimum condition that the supplier will accept has to be modified according to equations (9) and (11):

$$r > r_{\min} := \frac{[(1-t_s)P + t_s(1-d_s)Y - (1-t_s)R_T q_s^{-T}] i_s}{(1-t_s)(1-q_s^{-T})}. \quad (13)$$

Example 3: In example 1, we had observed small advantages for leasing in "traditional" transactions regardless of the tax and interest rates of the domestic supplier. Now, we additionally assume that the supplier resides in a high-tax country ($s_H = 50\%$; $i_H = 5\%$)²³ and might depreciate the asset using the declining balance method²⁴. We conclude from our findings above that avoiding the foreign location is not advantageous to the sale (since $t_s > t_p$), but significantly leverages leasing! Now, leasing is preferable to both contract parties if $r \in (175,624 \$; 193,572 \$)$. The maximum advantage for the supplier - compared to a sale - now rises to 44,427 \$. Even vs. the leasing alternative in the foreign location case, a substantial advantage of 40,332 \$ remains! Table 2 summarizes the results obtained in the example.

[NPV in \$]	Supplier (Group)	Delta to reference
<i>using permanent establishment</i>		
- Sale (reference case)	182,500	0%
- Leasing	186,595	2.2%
<i>avoiding permanent establishment</i>		
- Sale	175,000	-4.1%
- Leasing	226,927	22.1%

Table 2: NPV of supplier in different cases of example 3 with the total advantage of leasing contracts being allocated to S (i.e. $r = r_{max}$).

As the significant effects of example 3 demonstrate, the introduction of electronic commerce concepts should be accompanied by a thorough review of the transaction types used. The advantages that were allocated to the supplier in this example can be shared by both contract parties so that it might be advisable also for customers to search for contract partners offering direct transactions who - as a consequence - should be able to offer better conditions than their competitors - other parameters being equal.

5 Limitations of the model and prospects for further research

The ideas presented in this paper were based on a simple model that tried to isolate the fiscal impacts of electronic commerce strategies of suppliers. This, of course, can only be *one* facet of any decision on the application of electronic commerce and on the offerings marketed through this channel. The magnitude of the financial impacts (as shown in example 3 above), however, indicates that these effects can hardly be neglected when electronic commerce concepts can be applied. The general results obtained here might be extended along the following lines in further research:

The analysis was based on only a limited set of transactions. Adding more transaction options to the model should further sophisticate the decision rules as well as the decision to be taken

in business practice. Interesting objects for research could be the internal leasing of industrial goods within the supplier group or the variation of payments in a leasing contract - thus deviating from a linear payment stream as used here. Similarly, the inclusion of taxes other than income tax (e.g. trade or sales taxes) could significantly affect the results obtained.

The capabilities of suppliers to establish "direct" transactions by employing electronic commerce concepts might open up further possibilities for exploiting differences in international taxation. In the previous sections, we had merely focussed our analysis on existing locations. However, suppliers might as well actively search for suitable international structure of their sales organizations. In particular, the role of financial intermediaries in an international context might pose an interesting problem to be further pursued²⁵.

In recent years, several trends with respect to industrial goods marketing can be observed in business practice: on the one hand, customers tend to buy the usage of the product rather than the product itself, on the other hand, more and more integrated offerings are seen in the market. The suitable adaption to these developments by suppliers - also considering fiscal implications of the organizational options - will be another important research task for the future. For example, first results show that fiscal considerations significantly impact the evaluation of different institutional and transaction-type approaches to engage in system integration activities [Satzger, 1997a].

Finally, iuridical problems might occur in the supplier-customer relationship in an international transaction compared to a (from a customer point of view) domestic transaction with a PE or a subsidiary in his own country. Thus, a customer might not be indifferent as to the contract partner - as was assumed in the model.

6 Conclusions

The recent advances of information and communication technology will enable suppliers to increasingly employ electronic commerce concepts for international transactions. Thus, in many cases transactions could be initiated without the organization's physical presence in the

customer country. In this paper, a simplified model of international taxation was used to analyze the fiscal implications of electronic commerce strategies. In particular, we first demonstrated that avoiding foreign locations (and thus changing the institutional structure) can bear substantial financial advantages. It was further shown that fiscal considerations strongly influence the suitable choice of transaction type when "direct" cross-border transactions are possible.

Obviously, the fiscal treatment of transactions is only one (of many contributors) to decisions on the use of electronic markets and on the type of transactions offered in this market. However, we believe that successful companies will actively pursue the options outlined here to gain competitive advantages. Current strategies to exploit differential international taxation - such as avoiding PEs by agent models or international leasing models - will be supplemented by electronic commerce options that will allow for even more comprehensive and sophisticated „go-to-market“ models: „It is doubtful that the Internet will add any significant new avenues for tax evasion other than the potential resulting from the increased volume of international transactions due to efficient international trade“ [Gigler et al., 1996]²⁶.

Notes

- ¹ While Malone et al. [1987] claim that information technology should foster market-oriented cooperation activities due to decreasing transaction costs, Lockett/Holland [1996], however, emphasize empirical evidence for stable networking structures that can be explained by information economics (e.g. trust, reputation).
- ² However, sophisticated electronic commerce solutions or the access to (closed) markets could itself pose new entry barriers to potential entrants.
- ³ In the following, we assume that electronic support is available also for the core „contractual“ and „ordering“ phases of a transaction [CNEC, 1997].
- ⁴ While a subsidiary is a legal entity of its own, a permanent establishment as part of the supplier company is not. For the purpose of this paper, we will use the term foreign location to cover both.
- ⁵ More specifically, ICAM is a Swiss PE of a Dutch IBM subsidiary so that both, low Swiss tax rates and the comprehensive set of Netherland's tax treaties, can be enjoyed.
- ⁶ See e.g. the web-sites <http://www.amazon.com> and <http://www.dell.com>.
- ⁷ Translation by author.
- ⁸ Thus, cross-border leasing income is usually not subject to withholding taxes [Arthur Andersen & Co., 1991, p. 24].
- ⁹ A different effective tax rate might have to be applied from an investor's point of view when imputation mechanisms are in place as, e.g., in Germany where shareholders receive full tax credits along with their dividends for corporate income tax paid by the company. For an overview of European tax systems see, e.g., Lang [1994] or Scheuchzer [1994].
- ¹⁰ It should be noted that the treatment of international earnings might even differ depending upon whether dividends (as earnings received from subsidiaries) or earnings of permanent establishments are concerned.
- ¹¹ We assume that the leased good will be capitalized by the lessor. In accounting terms, this means an "operating lease" contract opposed to a "sales-type lease" contract which is treated like an outright sale. In the context of this model, rental contracts can be treated alike. Therefore, we do not explicitly mention this in the following.
- ¹² See also section 2.1.
- ¹³ For simplicity of notation, we also introduce the interest factors $q_c := (1+i_c)$, $q_f := (1+i_f)$, $q_s := (1+i_s)$.
- ¹⁴ Thus, we do neither consider investment tax credits (ITCs) that can be claimed by the party *not* capitalizing the asset [Smith/Wakeman, 1985] nor "double dip" situations where *both parties* can claim depreciation allowances due to inconsistent fiscal treatment of the contract [Gao, 1994; Satzger/Buhl, 1997].
- ¹⁵ If, e.g., the values $d_{c,t}$ denote the cost associated with the good in period t , d_c is calculated as:
$$d_c := \sum_{t=1}^T d_{c,t} q_c^{-t}$$
. In the final period, $d_{c,T}$ also takes into account the residual book value of the asset which (as costs of goods sold) reduces the taxable gain from the sale of the used asset.
- ¹⁶ See also note 15.
- ¹⁷ I.e.: $t := t_f = t_c$, $i := i_f = i_c$ and $d := d_f = d_c$.
- ¹⁸ This holds if we assume the domestic part of the supplier group to be characterized by the same parameters as its foreign location.
- ¹⁹ The resulting NPV advantage amounts to $(t_f - t_s)(1-a)P$ which is strictly positive unless $a = 1$ holds. In this case no part of the gain would be taxed in the foreign country so that tax discrepancies would not matter.
- ²⁰ It might be noted that this is not necessarily the case. In fact, discrepancies of national depreciation schemes is based not only on different *methods* of depreciation used, but also on varying *depreciable life* of assets.
- ²¹ For this example, we assume an initial depreciation rate of 30% and the switch to straight-line depreciation as soon as this gets advantageous.
- ²² In each case, the customer is paying the rate r_{max} which leaves him indifferent to the purchase of the asset.
- ²³ Note that all pre-tax interest rates used in our examples equal 10%. Therefore, differences in the cost of capital do not contribute to the effects in the examples.
- ²⁴ See note 21.
- ²⁵ For first results, see Satzger [1997b].
- ²⁶ It should be noted that electronic commerce does not necessarily have to rely on the internet as the communication medium.

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