

# TO TAX OR NOT TO TAX? WHAT IS IT WORTH?

by

ADRIAN MIHALACHE\*

*In the romantic years of cyberspace (1995-2000), the e-commerce was exempt from VAT. Upon the 2000 USA election, the candidate George W. Bush promised to keep the situation as such. Nowadays, "to tax or not to tax" is no longer the question. We try, based on an analysis within a mathematical framework, to answer the more meaningful question, "how much to tax?" First, we examine the issue of the origin versus the destination principle. Then, we review the various means of taxing in the EU and USA. Finally, we propose a mathematical model that provides an optimum for VAT, taking into account the gains of the suppliers, as well as the consumer surplus.*

## KEYWORDS

*Consumer surplus, destination principle, e-commerce, origin principle, producer surplus, value-added-tax*

## 1. DIRECT AND INDIRECT TAXATION

Taxation is a main jurisdiction issue with important economical and political consequences. The Boston tea-party rebellion was a reaction to the taxation of tea as it physically landed on American shores. It resulted eventually in the Independence War that is a turning point in the history of mankind. Without taxes, the state cannot fulfill its main functions: maintaining public order, ensuring national defense, providing social services, subsidizing education and culture. The question "to tax or not to tax?" is therefore not a Hamlet-like one. The problem is to find a proper, fair and reasonable type of taxation. An optimal decision is essential both in direct and indirect taxation. In emergent countries, such as Romania, the direct income tax at a unique rate, irrespective of the revenue (i.e. not a progressive one) was introduced in 2004 and maintained after the 2008 elections. Looking back, this

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\* amihalache@gmail.com

bold decision, controversial as it may have seemed at first sight, proved highly beneficial. It fostered the economic development of the country and did not deprive the government of revenues from tax money since, as an after effect, most of the grey economy came into the open. The unfairness of a unique rate for the income taxed can be compensated for by the indirect value-added tax. The rich buy more, thus they pay more taxes. Moreover, this indirect tax provides a continuous flow of cash towards the government. A tendency to increase the weight of the value-added tax compared to the one of the income tax is characteristic for the most developed economies. However, the globalization of the world economy requires a consistency in the principle of taxation. At present, there are two principles: the origin principle, and the destination principle. According to the first, taxation is applied where the products are developed; according to the second, taxation takes place where the products are consumed. The coherence of international commerce depends on the application of these principles in two different countries.

### 1.1. DESTINATION PRINCIPLE IN TWO COUNTRIES

We consider the situation where two countries apply both the destination principle (the case of EU). We make the following notations:

H = home country

F = foreign country

$p_i$  = price,  $i=H, F$

$t_i$  = tax,  $i=H, F$

$\Delta$  = shipment cost

In country H, the condition for a customer to buy an indigenous product is that its price plus taxes is less than the price of the foreign product plus the same tax, plus the shipment cost:

In H:  $p_H + t_H < p_F + t_H + \Delta$ , that is  $p_H < p_F + \Delta$

In country F, the situation is similar, so that the condition for the customer to buy an indigenous product is:

$$\text{In F: } p_F + t_F < p_H + t_F + \Delta, \text{ that is } p_F < p_H + \Delta$$

Hence, we derive an important conclusion. The decision of the customer does not depend on the level of the value-added tax, which may be different for each country. In the European Union, the VAT varies from 15% to 25%. However, such differences do not have any impact on the customer's choice, when no barriers are set in international trade.

## 1.2. ORIGIN PRINCIPLE IN TWO COUNTRIES

Suppose that both countries apply the origin principle. In this case, the condition for a customer from H to buy an indigenous product is:

$$\text{In H: } p_H + t_H < p_F + t_F + \Delta$$

Similarly, the condition for a citizen from F to buy an indigenous product is:

$$\text{In F: } p_F + t_F < p_H + t_H + \Delta$$

Consequently, the decision of the customer is influenced by the differences in the value-added tax. This accounts for the preference for the destination principle in the European Union.

## 1.3. COMBINATION OF THE DESTINATION AND ORIGIN PRINCIPLES

An interesting situation arises when the two trading countries adopt different taxation principles. Suppose that country H applies the destination principle and country F the origin principle that is:

H = destination principle

F = origin principle

Then, the customer from H buys from F if and only if:

$$p_F + t_H + \Delta < p_H + t_H, \text{ that is } p_H > p_F + \Delta$$

On the other hand, the customer from F buys from H if and only if:

$$p_{H+\Delta} < p_{F+tF}$$

A ludicrous cross-hauling situation may arise if:

$$p_{F+\Delta} < p_H < p_{F+tF} - \Delta$$

This means that, if the shipment cost is sufficiently low,  $\Delta < tF/2$  (half of the tax from country F), it is reasonable for all the citizens of one country to buy products from the other country. This result strengthens the importance for all the countries to adopt the destination principle. However, the European Union practiced, albeit for a limited time period, the origin principle, in order to undercut prices on the US market [Siliafis 2007, pp 141-155].

## 2. TAXING E-COMMERCE

Any technological development is a challenge to the method of taxation and e-commerce is a good example for this issue. At first, e-commerce was not taxed. In 1998, the US Congress passed (and the president later signed) the Internet Tax Freedom Act (ITFA) that imposed a three-year moratorium on taxing Internet access. This moratorium on Internet access taxation was renewed in 2001. At issue is whether it is fair or not for customers to have the choice of sitting in their den at their computers ordering whatever they want (or need) at effectively lower prices (because sales taxes are not due) to be delivered to their doorsteps in a matter of days versus customers getting out and buying those same goods at neighborhood stores, which of course must charge higher prices because sales taxes must be paid. Giving such a competitive advantage to e-commerce can be explained by the need to help develop the "new economy" and also by the externality effect: online offer is bound to increase the demand. Moreover, it would have been unwise to impose a taxing jurisdiction without having the means to enforce it.

The rationale for taxing e-commerce is essentially one of fairness. Store-front businesses are expected to collect local and state sales taxes, with few exceptions. Many of these businesses are small, locally owned shops that also do not benefit from the economies of scale afforded by centralized warehouses and supply-chain automation. Giving online stores a tax-free pass effectively discounts everything they sell by 5 to 10 percent. However, if the e-commerce deals with digital products, it is next to impossible to check if the taxes have been duly collected. The usual method of verifying this is the audit of the inventory of the company. The digital product can be

sold several times and still it may be “owned” by the company. The only possibility would be tracing the online transactions via the bank services. Under the present circumstances (early 2009), the banks would accept almost any arrangement, because, considering the financial crisis, they are more or less at the mercy of governments. However, they will eventually revert to their usual policy of discretion. In conclusion, it is pointless to promulgate a jurisdiction on taxation of digital products, because of the difficulties to enforce it. That is why we consider in the sequel only e-commerce with tangible products that can be ordered online. Suppose that the online offer is based in country F, and the delivery company, based in country H, levies the value-added tax on all e-commerce transactions, based on the destination principle. The correctness of the procedure can be checked by an audit of the delivery company inventory.

We propose a comparative analysis of the following situations:

e-commerce and retail are equally taxed;

e-commerce is exempt from taxation;

e-commerce is taxed less than traditional retail.

For each situation an overall welfare index will be computed, taking into account the consumer surplus, the producer surplus and the revenues from the taxes. Note that the producer surplus is taken into account only if the supplier and the retailer are based in the same country, i.e.  $H=F$ . The consumer surplus and the producer surplus are represented in figure 1, which depicts the basic condition of equilibrium between demand and offer. The consumer surplus is the sum of all the differences between the price a customer is willing to pay and the price that he or she actually pays (area of triangle CS). The producer surplus is the sum of the differences between the market price and the marginal cost of the producer (area PS). The producer surplus is considered only when the supplier is based in the same country H.

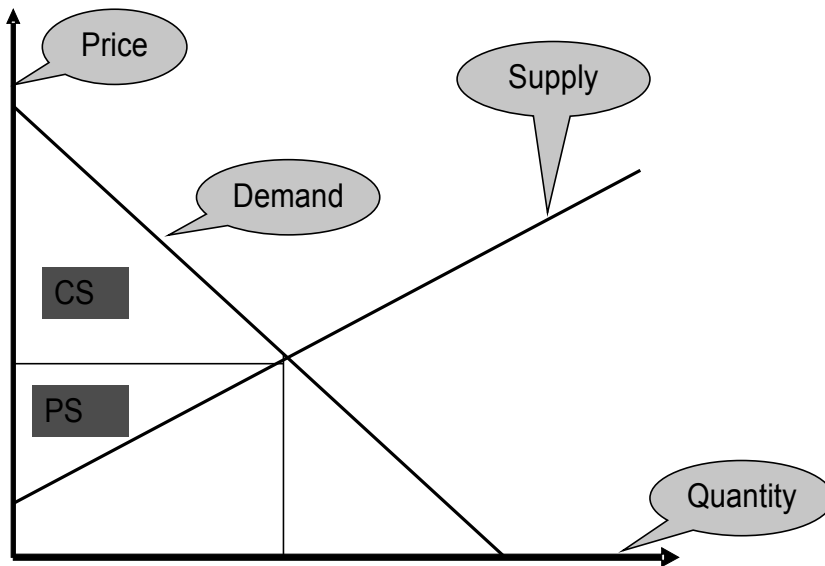


Fig. 1. Consumer surplus and producer surplus

## 2.1. EQUAL TAXATION OF E-COMMERCE AND RETAIL

Our basic assumption is that the presence of e-commerce stimulates the demand, by an externality effect: information obtained online increases the interest in the products. Consequently, the demand curve moves to the right, which implies that the price for the volume  $x_m$  rises to  $q_m$ , for the retail stores. However, the online price will be less, that is  $c+t+\gamma$ , where:

$c$  is the marginal cost;

$t$  is the value added tax;

$\gamma$  is the delivery cost.

Consequently, the additional volume of merchandise sold online will be  $x_1 - x_m$  (fig. 2)

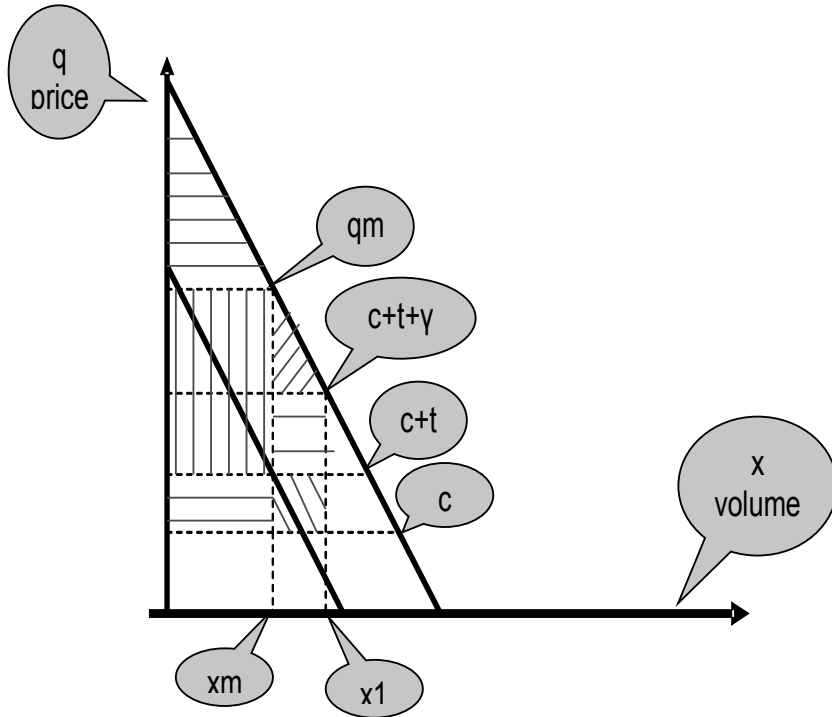


Fig. 2. Additional volume of merchandise sold online

The shaded triangles from figure 2 represent the consumer surplus for the customers who buy from the shop and online respectively. The shaded rectangles represent the producer surplus (if we deal with an internal supplier), the revenue of the delivery company and the revenues from the taxes.

**2.2. TAX-FREE E-COMMERCE**

If the e-commerce is not taxed, one should consider separately the cases when the delivery cost is less than or greater than the value-added tax. Suppose the last situation is true, that is  $\gamma > t$ . Figure 3 describes the case. The online price is  $c + \gamma$ , which implies that the additional quantity bought online is  $x_2 - x_m$ , more than in the previous case. The areas of the shaded triangles represent the consumer surplus for retail and e-commerce respectively. The areas of the rectangles give the producer surplus (if the supplier is internal), the revenue of the delivery company and the tax revenue.

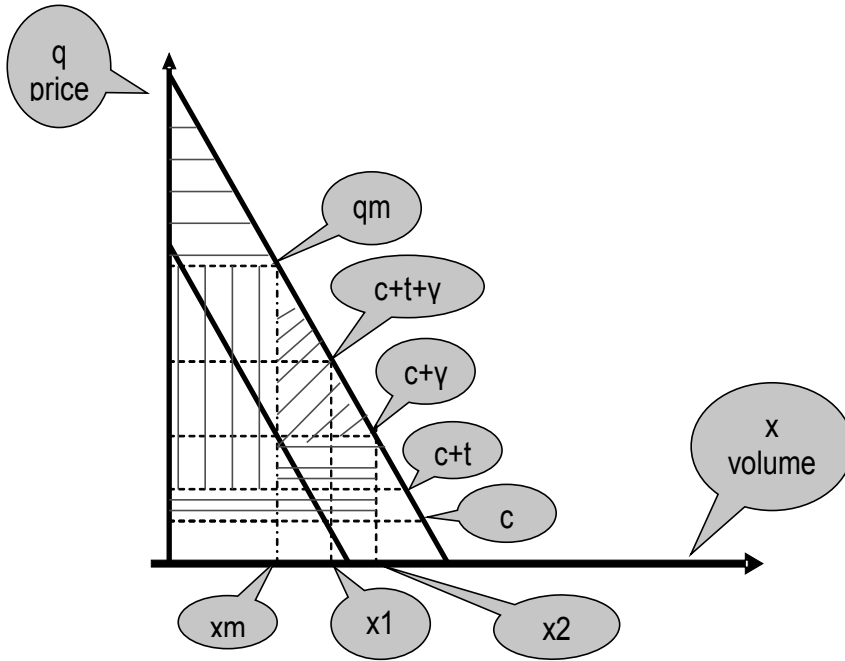


Figure 3. Tax free e-commerce with  $\gamma > t$

Suppose now that the e-commerce is not taxed and that the delivery cost  $\gamma$  is less than the tax  $t$ . The situation is described in figure 4. The online price is as low as  $c+\gamma$ , which corresponds to an additional online offer  $x_3-x_m$ . The shaded areas of the two triangles represent the consumer surplus of the retail and e-commerce respectively. The shaded rectangles are the producer surplus, the delivery company revenue and the revenue from taxes.

### 2.3. PREFERENTIAL TAXATION OF E-COMMERCE

These two situations concerning exemption of e-commerce from taxes suggest that a sensible procedure would be to tax e-commerce, but to a lesser extent than retail commerce, taking into account the delivery cost. The preferential VAT for e-commerce will be  $tE=t-\gamma$ . Although this solution seems reasonable, one should take into account the fact that the delivery costs differ from one tangible product to another, so that the value-added tax should be differentiated too. This would imply additional administrative costs, which would make taxation inefficient. The case for preferential taxation of e-commerce is presented in figure 5.



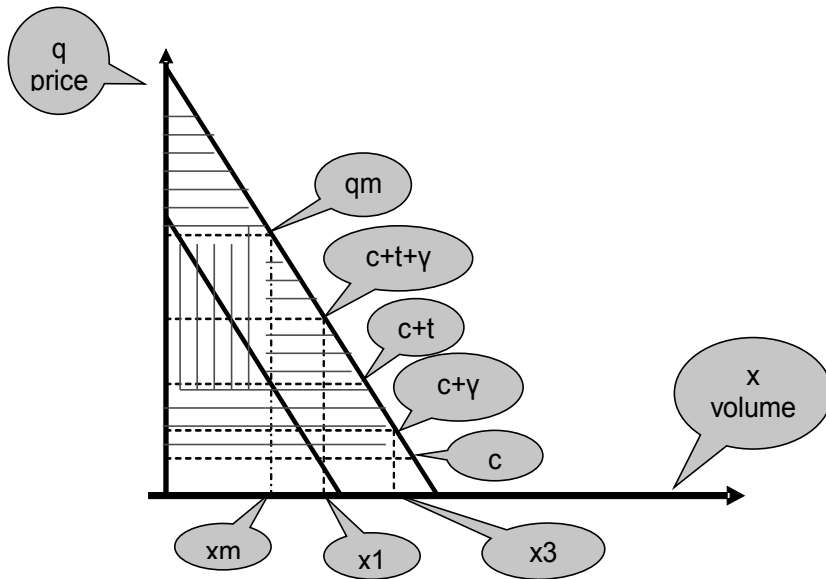


Figure 4. Free-tax e-commerce with delivery cost less than the VAT ( $\gamma < t$ )

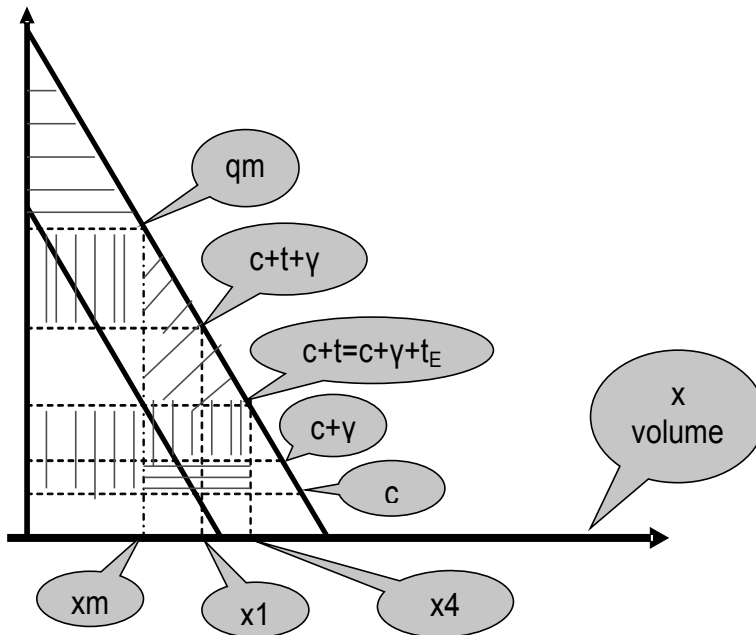


Figure 5. Preferential taxation of e-commerce ( $tE = t - \gamma$ )

### **3. CONCLUDING REMARKS**

Debates upon the taxation of e-commerce are often based on ideological reasons. Fairness is considered the clue for a reasonable decision. Our attempt is to provide a neutral, mathematical argument which can shed more light on the issue. To tax or not to tax is a dilemma which can be easily solved by taking into account the overall welfare of a community, composed of consumer surplus, producer surplus and revenues from taxes.

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