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# The Impact of Electronic Commerce on Tax Revenues in Selected Countries of the World

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#### ABSTRACT

Development of information and communication technology (ICT) has affected different areas of human life. The application of this technology in the economy in addition to the globalization, had introduced a new concept as new or digital economy which is one of the aspects of the true modern economy, electronic commerce. Electronic commerce (E-commerce) is considered as the biggest change in the world economy, after the creation of money. However, the tax is the government's fiscal policy tool for accelerating economic growth, and makes up one of the largest and most stable source of government revenue. With the development of E-commerce, there is the possibility of tax evasion and the lack of taxation on E-commerce is one of the problems for the government with this type of business. In this study the impact of E-commerce on tax revenues, using panel data and generalized method of moments (GMM) has been investigated in selected countries around the world. The results showed that during the period 2000-2008, E-commerce had negative impact on tax revenues.

**KEYWORDS**: tax income, E-commerce, panel data, generalized method of moments

JEL Classification:  $H_{20}$ ,  $O_{11}$ ,  $M_{15}$ .

#### 1. INTRODUCTION

By the third millennium, more intensive competitions will happen in government and the economic centers in the world, especially in our business. Each of economic power holders, whether businesses, states, unions and regional organizations as active micro-and macro-economic are trying to gain larger share of the privileges, facilities and opportunities in the global trade arena. Furthermore, advances in science and technology have brought the situation to the point that economic power holders does not rely on existing opportunities and create new possibilities and opportunities by creating necessary infrastructure. The use of modern Information and communication Technology (ICT) is an important opportunity to facilitate trade and increase the competitiveness in the world. Ecommerce as the main product and result of this new technology could be a good opportunity for countries to provide domestic and international transactions. Today with the increasing development and growth of modern communication tools and technology and substituting many of traditional activities in the business sector, moving from traditional trade to modern commerce (E-commerce) has been started. Statistics and values of the volume of Ecommerce and increasing share of in whole international trade and expected annual growth rate of E-commerce about 54 percent, is an evidence to prove this claim. Meanwhile, countries have been able to take this opportunity most, which have been the providers and promoters of modern technologies and believe in the principle of the competitive abilities in markets (Dejhpasand, 2005). In recent years, the advent of the Internet has affected the way to trade and economic exchanges. Internet makes it possible for businesses and commercial operators to provide new ways for marketing and selling their goods. In this regard, the government's efforts to identify companies, business, registration of online stores and using e-tools in collecting taxes and international law lead to promote trade. With the development of E-commerce, there is the possibility of tax evasion. On the other hand, if a country does not align with E-commerce it will greatly be faced with loses. Therefore, this study examines the impact of E-commerce on tax revenues and the effect of variables such as taxes on goods and services, taxes on income and profits of companies and tax on oil revenues are studied. Later in this paper, after the theoretical principles, studies will be reviewed and in the followings model structure and estimations using data from countries in the period 2000-2008 will be discussed and finally, he results estimation and analyzes are presented.

#### 2. THEORETICAL STUDIES

E-commerce is one of the objectives of the revolution in information and communication technologies in the field of economics. Due to the great benefits of this style of trade, it has been expanding rapidly. E-commerce is the buying, selling and exchanging goods, services and information via computer networks including the internet or intranet, this kind of trade is based on electronic data processing and transmission including text, voice and image. E-commerce includes activities such as trading, instant delivery of digital content, electronic funds transfer, electronic stock exchange, electronic bill of lading, commercial projects and services engineering and such cases.

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facilitating business processes, eliminating unnecessary procedures and the conduct of business, reducing costs by improving and increasing coordination, reducing administrative costs particularly the cost of correspondence, improving market access and increasing diversity of customers and saving time due to the high-speed data exchange are obvious advantages of this type of business. Meanwhile, the new communication technologies such as the use of satellite telecommunication networks, internet and intranet, e-mail, fax and land phones and cellophanes have lead to the expansion and development of electronic commerce as one of the essential forms of trade. Removing the borders, customs and intermediaries and changing to global village, is one of the implications of E-commerce. There is no boundary in E-commerce and it doesn't matter to buy those goods from a store near your home or buy them from a store in another continent. E-commerce increases the speed and volume of trade and significantly reduces the costs for the purchaser and the manufacturer, saves time, attracts more costumers, eliminates intermediaries and ultimately becomes more profitable (Niyazzadeh, 2007).

People who use electronic commerce worldwide, are faced with strange confusion in national and international tax law. For example, in online exchanges between two people from two different countries with different tax laws, determining the time and place of the transaction and the tax law governing the transaction is a question. E-commerce had made the observation of information and tax enforcement for the tax officers difficult or impossible. Taxpayers may disappear in cyberspace and no one knows where they really are. Even when the location of permanent business of an Internet business is diagnosed, taxation would be difficult because the time and location where the transaction occurs is unclear. Also, using linked servers together in the tax territories which change signals from one server to another to keep the network traffic balanced and determining which server is used at a time for each activity, is hard work and adds to the complexity.

Moreover, even if we can associate a particular domain name with a particular person or computer, all of them may be located in different countries (McLure, 2002). Facilitating electronic transactions is likely to increase tax evasion with simple proceedings such as the use of smart cards and receiving electronic cash is received (Bruce, et al., 2001). In recent years, as studies have predicted E-commerce will reduce the total tax revenues in United States of America (Ibid), And considering that tax on sales makes up about 33 percent of tax revenues in the United States of America, so some people have been opposed to this type of business (Graham, 1999). Governments are trying to minimize the tax loss of Ecommerce transactions. So new targeted taxation regimens on Internet sales can be a solution to prevent the loss of state tax revenues. Developed countries still have not been able to go along astonishing speed of electronic knowledge and get the necessary preparations. The reason is obvious, E-commerce absorbs a larger fragment of tax resources each year and if the tax organizations fail to control this type of business and get revenues from that source, they will face the problem of revenue deficit in the future (Tavakol, 2006). On the other hand, increasing electronic transactions will lead to changes in methods for collecting taxes by the governments. Countries such as Canada and the United States which have been proactive in the area of E-commerce, are committed a harmonized tax regime and an international legal framework for increasing E-commerce. In July 1997, the United States has adopted a framework for the development of E-commerce which requires the following conditions for any new taxation policy based on specific principles for the development of domestic and international tax policy:

- 1. Do not prevent trade and do not discriminate for the various types of trade or do not cause incentives to change the nature of the transaction nor its location.
  - 2. To be simple and clear and have the ability to cover a reasonable income with easy implementation.
  - 3. To be able to coordinate multiple international trading partner systems.

Based on the mentioned principles of the United States a law was passed in 1998 to prevent e-retailers from free trade, without restrictions in terms of tax concessions. With this legislation trade via the website were decreased and taxes for Internet transactions were increased, so that after that date, the government has managed to collect sales taxes from remote sellers to achieve the main objective of tax neutrality (Bruce, et al., 2001)

### 3. EXPERIMENTAL STUDIES

It should be noted that there are very few published works to assess the impact of taxes on E-commerce and in most of them only conceptual framework is presented. According to economic theories, it is expected that the sensitivity of the domestic consumer to taxes compared to people who live within the geographic boundaries, is greater. So that tax legalization costs in these areas are low and this point affects tax policies. Empirical studies on tax compliance among the people of bordering provinces, confirm this claim (Bruce,et al., 2001). In following, the findings of some studies in the field of E-commerce on tax revenues are discussed

Newman (1995) in his studies observed that many people in the United States of America do not pay sales tax on Internet purchases and that states and local officials are worried about the possibility of weakening the government

by emergence of the Internet. Although the tax on the sale of physical goods was received, but they mainly focus on other issues like international taxes via online trade.

Ernest & Young (1999) showed that, in 1998, Internet free sales taxes had over 170 million \$ damages. According to this survey, 80% of E-commerce was seller to seller business and was not related to sales tax. In addition, 63% of online purchases including services were exempted from paying taxes, such as financial services and travel. Also according to the survey, less than 1%, or 20 billion US \$, from general consumers purchases were in the form of retail

Goolsbee (1999) performed an empirical analysis on how local taxation affects consumer's decisions about Internet purchasing. Results showed that taxation plays an important role in trade. Owning qualified right about taxation will increase online purchases and the impact of taxes on Internet commerce about online products will mainly appear later, while in the past, most buyers of goods have escaped purchasing taxation. Also, the authors' solutions to avoid taxation on online purchases had let to increase E-commerce in the past few years But it has not been able to determine the future sales tax.

Bruse and et al. (1999) forecasted that spending on Internet purchases will be increased significantly over the next 5 years and to legal estimation of the revenue losses, online earnings should be predicted in advance in future.

Basu (2001) in his study observed that many of the online transactions are related to selling products and electronic services that are electronically transmitted to the consumer. These new exchanges will the cause the taxation auditors to be encountered with complex issue of online transactions as well as tax calculation based on assets and intangible assets.

Lau,Halkyard (2003) concluded that with the development of E-business, virtual environment has become a place for activities of virtual organizations. These organizations are actually web pages that receive their virtual operating environment from an Internet service provider. So many companies do not need to create branches in the real world. The transition of organizations to the virtual world has lead to serious challenges to identify and address the taxes and has provided the conditions for tax evasion for virtual companies.

Forrester (2002) in his study concluded that in 1999, the total tax loss resulting from online buying and selling, were less than 7/9 billion \$ while the average rate of tax on the sale in the United States of America were 33/6% and lost tax revenue was approximately 8/612 million \$, or 3 percent of total revenues on sales tax was 203 billion \$.

Lund & Mcguire (2005) in a study examining the role of E-commerce on economic growth, acknowledged that business by means of E-commerce have increased the profits for individuals, businesses and countries that are in the developed world. Their findings showed that E-commerce is key force in the integration of the least developed countries in the multilateral trading system and without the presence of active government in E-commerce moving forward economic growth and the rise of shares in E-commerce with solely having tools required for E-commerce is somehow impossible.

Mohammadi (2008) examined the issues, solutions and perspectives of taxes on E-commerce in Iran. Using conceptual framework, he concluded that E-commerce is still in the beginning and is not be counted as a major economic power but it is the future of international trade. However, certain tax rules that specifically are applied on direct taxation of E-commerce, are very few and a few new rules to address tax on E-commerce are emerging. At the institutional level, the Organization of Economic Cooperation and Development will work in this direction but this need to be a broader multilateral forum like WTO.

Tayyebnia and Siyavashi (2009) have discussed taxation on E-commerce in an article. Using the Delphi method and non-parametric tests like and Sign test and Friedman test, they assessed the taxes on E-commerce in Iran. The results suggested that the best kind of E-commerce tax is VAT (Value Added Tax) but the rules in Iran need to be changed and preparing secure electronic transactions database by government is economically feasible.

Arabmazar (2010) in a study using a conceptual framework examined the requirements of the tax legislation at the development of E-commerce in Iran. The results suggested that the unprecedented opportunities resulted by the computer and Internet relationship between a natural and legal persons have increasing developed the trade and economic activities and various tax issues are emerging along with.

Tax law principles and regulations have been formed based on data and conditions before development of this type of trade and gradually it is felt that those regulations do not fit these new forms of communication based on modern relations. Internet has changed the work practices, communication and exchanges of the people rapidly, so that it is not easy to navigate categories and legal concepts along with that.

## 4. MODEL STIPULATION AND VARIABLES

According to the discussed theoretical studies, to investigate the effect of E-commerce on tax revenues, the following model is used:

$$ST_{it} = \alpha_0 + \alpha_1 TGS_{it} + \alpha_2 TSS_{it} + \alpha_3 TEC_{it} + \alpha_4 EN_{it} + \mu_{it}$$

Where ST is tax revenues, TGS is tax on goods and services, TSS is tax on income and corporate profits, TEC is electronic signatures and EN is the oil revenues. i and t represent country and time, respectively, and  $\mu$  is the error term. More details about these variables are presented in the following.

Tax (ST): tax revenue is as a social cost which is required to be paid by all individual for efficiency of a country's resources and facilities to provide the ability to replace these facilities and resources. And in fact it is shifting part of the revenues of the society to government or the part of economic benefits that will be granted to the government (Mansour, 2001).

Electronic (digital) signature (TEC): Diagnosis of fraudulent e-mails in commercial activities is very important. An email contains a digital signature, indicates that the content of messages are unchanged from the time they are sent until the recipient has received them. In the case of any change in the content of the letter, the accompanied digital signature will be invalid. In fact the digital signature is an electronic tool for documentation which leads to the documentation of electronic records through encryption with a public key. Electronic signature represents the number of Internet traders per hundred people that is used as an indicator for E-commerce (Tayyebnia & Siyavashi, 2009) It is expected that these measures will have a negative relationship with tax revenues.

Taxes on goods and services (TGS): taxes on goods and services are a large share of tax revenues. These goods include tradable goods (imports) and non-tradable goods (goods produced in the country). As a result of trade liberalization and tariff reduction, domestic prices are reduced. In this case, government is able to recover declining tax revenues by reforming indirect taxes on goods and services. In addition to tradable goods, there are non-tradable goods in the economy. By Reduction in tariff rates, regarding the decline in the relative price of imported goods, consumers will switch the use of domestic non-tradable goods to imported goods. This will reduce the income from tax on non-tradable goods and will raise income taxes on imported goods and will lead to increase tax revenues which means that it is positively related to income tax (Keena& Ligtharta, 2002).

Taxes on income and corporate profits (TSS): In developing countries, taxes on income and profits, are only taken from large producers and employees of public corporations due to limited administrative capacities. Taxes on Income and benefit generally increase with increasing prosperity and economic growth, which will lead to increased tax revenues (Jin, 2006). Thus it is expected that income tax benefit would positively affect the tax revenues.

Oil revenues (EN): since oil as an important global energy source, dealing the crude oil has an international feature, although the oil revenue is related to the internal needs of communities and countries. However, the global nature of the oil income is obvious. In today's world, oil is not only as a factor of economics and industry, but it is also a political and security factor. In fact oil and oil revenues are considered as essential factor to achieve economic, industrial, political, and national security goals. Increases in oil revenues have positive impact on the government budget and the profitability of companies and is looking to increase tax revenue (Shafiee and Zaer, 2008). Thus as expected, oil revenue has a positive impact on tax revenues.

To analyze the model and the impact of E-commerce on tax revenues, econometric methods like panel data model and generalized method of moments (GMM) are used.

## 4.1. Stationary Test for Variables

Before estimating the model, it is necessary to test the stationary of all used variables because none-stationary variables will cause false regression problems in both time series and panel data. Contrary to what is customary in the case of time series data, in panel data Dickey - Fuller and Generalized Dickey - Fuller test cannot be used to test the stationary of the variables, but it is necessary to test the stationary of collective variables. For this purpose, the tests such as Hardy and Levin, Lee and Chu tests are used.

According to table (4-1) the results of Levin, Lee and Chu Common Unit Root (with the intercept and trend) indicates the stationary of all variables used in the model. In other words, all the variables are integrated from zero I(0) except EC (E-Commerce) that is stationary after two times differentiation. The stationary test results for the variables are presented in Table (4-1), the numbers in parentheses in the table represent probs.

Table 4-1 Results of Common unit root tests on the variables of the model

variable	Levin, Lee and Chu tests		
ST	-7.72		
	(0.00)		
TGS	-19.56		
	(0.00)		
TSS	-9.64		
	(0.00)		
TEC	-9.25		
	(0.00)		
EN	-6.75		
	(0.00)		

Source: research findings

#### 4.2 Model estimation

## 4.2.1 Estimating model by Panel Data method

Firstly model is estimated based on dynamic panel data models for 20 selected countries<sup>1</sup> of the world during the period 2000-2008 using the fixed and random effects estimators. So at first F-Limer test is done to choose between Pooling and Panel Data Method. H<sub>0</sub> assumption of this test represents the selection of Pooling method and its priority to Panel Data Method. In this study, the value of the F-test statistic with P-Value of zero is 263.47, so H<sub>0</sub> assumption is rejected and the panel Data method will be selected. Also for choosing between two methods of fixed effects and random effects, Hausman test is calculated. H<sub>0</sub> hypothesis indicates the selection of random effects method. Since the value of this statistic with P-Value of zero is 12.6, H<sub>0</sub> hypothesis for the selection of random effects method is rejected. Values of mentioned statistics and results of model estimation by Fixed Affects Method are available in Table 4-2.

Table 4-2 results of model estimation using panel data

Variable	Selected Countries of World	prob	
С	6.22*** 0.14***	0.00	
TGS	0.14***	0.00	
TSS	0.18***	0.00	
TEC (-2)	-0.007** 0.18**	0.02	
EN	0.18**	0.03	
F Leamer statistic	263.47	0.00	
Hausman test statistic	12.6	0.01	
$\mathbb{R}^2$	0.99		
D.W	2.001		
Number of observations	180		
Number of Countries	20		

Source: research findings (\*, \*\*, \*\*\* indicate significance at 10%, 5%, 1 % respectively)

The results of the all estimated coefficients with economic theories and arguments expressed in this study are consistent. According to these results, the effect of E-commerce on tax revenues at 1 percent level is significantly negative. So that an increase of one percentage in the electronic signature variable will decrease the tax revenues by 0.007 %. Also the effect of taxes on goods and services on tax revenues at 1 percent level is significantly positive and a one percent increase in the tax on goods and services variable will increase the tax revenue by 0.14%. the effect of tax on income and corporate profits on tax revenues at 1 percent level is significantly positive and one percent increase in the tax on income and corporate profits will increase the tax revenues by 0.18 %. The effect of tax on oil revenues on tax revenues is significantly positive and one percent increase in the oil revenues variable will increase tax revenues by 0.18 %.

## 4-3 - model estimation using Generalized Method of Moments (GMM)

The second estimator for Dynamic Panel Data Model is the GMM method. The estimation method can resolve the problem of endogenous nature of explanatory variables. Tools are the previous lagged explanatory variables. In recent empirical studies, GMM estimators have been widely used especially in macroeconomic studies. Using this method to estimate the model has many advantages. For example, Beck, Levine and Loayza (2000) suggested using this estimator to resolve the anisotropy variance in time series data. In this method, the dependent variable with one period lag is entered the model as an explanatory variable. The results of GMM estimation in this research in first difference and statistics relating to the Wald and Sargan test are given in Table 4-3.

Table 4-3 results of GMM estimation in first difference

Variable	Coefficient	Prob
ST(-1)	0.71	0.04
TG	0.26***	0.00
TSS	0.3***	0.00
TEC	-0.02**	0.03
EN	0.19	0.2
Wald Test		0.00
Sargan test statistic	0.039	-
J-statistic	16.94	

Source: research findings (\* and \*\* and \*\*\* indicate significance at 10%, 5%, 1 % respectively)

<sup>&</sup>lt;sup>1</sup> Australia - Canada - Germany - Denmark - Spain - France - India - Iran - Iceland - Italy - Sri Lanka - Norway - New Zealand - Peru - Philippines - Portugal - Aslvanya - Sudan - Tunisia - South Africa

The results of the GMM estimator are presented in Table (4-3). Results of GMM estimators provide better control on all explanatory variables with Individual Specific Effects which are not observed in the model (by introducing dependent lagged variable ST(-1); as an explanatory variable in the model). As expected, Results are significant and consistent with the results of fixed effects method. The coefficient of ST variable that was entered the model with one period lag as explanatory variable, is positive and statistically significant. The coefficient of variables of, tax on goods and services and tax on income and profits are positive and statistically significant while the impact of E-commerce on tax revenues is negative and statistically significant.

In the followings the Wald test is used to examine the simultaneous significance of estimators. Null hypothesis in this tests based on the zero value for all coefficients at one percent level is rejected. So the validity of results is confirmed. In fact Wald test is used for checking the significance of model and by examining the P-Value of this test significance of this model is confirmed Sargan test statistic is J-statistic and the null hypothesis in this test is based on the lack of correlation between instruments and error term. The results of checking the p-value of this test, indicate the validity of the estimation assumptions (estimators are independent from error term) meaning that the tools are sufficiently reliable and the validity of results for interpretation of the results is confirmed.

## 5. Summary, conclusions and recommendations

Undoubtedly globalization is the most important and most obvious distinction between the world of today and yesterday which caused great changes in many areas of economic, social, culture and politics in the international arena. On the other hand, E-commerce is one objective manifestation of globalization. Certainty it can be claimed that E-commerce has removed many upcoming constraints of traditional business and it has changed not only the content but also the appearance of traditional business. IT revolution with different characteristics from the previous revolution, like faster reduction of prices, global products, increasing efficiency with minimal physical appearance and physical degradation of transferable product, and the ability to expand indefinitely, has a huge impact on the economic performance of the world and will has in the future.

The main question of this study was that how E-commerce affects tax revenues in selected countries. In this context, the purpose of this study was to determine the impact of E-commerce on tax revenues in 20 selected countries over the period 2000-2008. Therefore, Impact of E-commerce on tax revenues in selected countries around the world was analyzed using panel data and generalized method of moments (GMM) based on a dynamic panel model. Required data for the variables were extracted from World Bank database.

The results of model estimating using panel data method implied that all the coefficients have signs consistent with theoretical studies and are statistically significant at the 99 percent level. In other words, E-commerce has negative impact on tax revenues in selected countries in the world during the studied period.

Also generalized moments method estimations in the first differences indicate significant negative impact of E-commerce on tax revenues. It can be interpreted such that the growing trend of using electronic instruments by economic organizations and lack of appropriate taxation arrangements on electronic commerce have led to great losses on tax revenues by some of the governments.

Accordingly, the tax regimes of different countries have to arrange applicable policies to identify tax revenues and taxation from E-commerce in order to reach the efficiency and ensure tax revenues and the government's economic policies. Ensuring government revenues and tax fairness are the main reasons for various countries to focus and emphasis on E-commerce taxation thus the taxation of E-commerce is essential and considering the rapid growth rate of this type of business around the world any negligence or inattention by authorities and theoreticians will lead to great losses for the governments in following years.

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