

## **\*The Construction and Verification of the Dynamic Repeated Game Model Based on Tax of “Net Goods” \***

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### **Abstract**

*With the E-commerce as representative, the new commercial civilization is calling for the civilization of tax, and that tax-paying is the cost of civilized society. At present, the marketing on-line is highly covert which has been the difficulty of tax collection. From the game perspective, the author analyzed and verified theoretically that the tax-payer may choose to conceal the revenue in the E-commerce and it exist “optimal probability of concealing incomes”. Though the tax authority checks and manages according to “optimal probability”, some tax-payers still choose to evade a tax. It can clearly be seen in the “lacking of honest tax-paying” environment, we should constantly perfect current self-reporting system, make a further refined management, optimize tax services and necessary tax inspection as a supplement.*

**Keywords:** *E-commerce; Gaming equilibrium; Fined management; Tax services; Tax inspection*

### **1. Introduction**

At present, the Network Products has gone deep into the daily life of consumers, like air in general, become an integral part of consumers shopping life. The scale of China's Internet users into development platform, mobile phone users into a new first netizens sources, the development of mobile phone applications become a bright spot, the PC application growth tends to slow, E-commerce is not only provide shopping convenience to people, but also let the traditional enterprise have more channels to access at the same time. The convenience of the mobile Internet let online shopping is ubiquitous, this multi-channel surround-style shopping is subtly changing people's shopping habits. Internet penetration in accelerating growth, which also provides another traditional retail sales methods, need to hurry through E-commerce to supplement and expand existing channels, in advance of this channel in E-commerce to seize the initiative. By the end of June 2013, the number of Chinese netizens reached 591 million, an increase of 26.56 million from the end of 2012. Internet penetration rate of 44.1%, compared with the end of 2012 improved 2%. Mobile phone internet users up to 464 million, representing an increase of 4,379 people by the end of 2012, the proportion of new Internet users use mobile Internet is as

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high as 70.0%, higher than the other devices using the proportion of Internet users; The Internet spread faster in the countryside in our country, the 6-month new rural netizens accounted for 54.4% of Internet users; The popularity of 3 G, the development of wireless network and mobile application innovation contributed to the rapid ascension of mobile Internet users in China[1]; The rapid increase in Internet applications, E-commerce application in mobile terminal applications development is rapid, the mobile phone online payment netizens size was bigger, the use of online payment netizens reached 244 million, representing an increase of 23.73 million in 2012, an increase of 10.8%. Among them, the mobile phone online payment scale of Internet users increased by 43.0% compared with 2012. In addition, mobile shopping, mobile phone shop group and purchase online bank also have increased considerably[2].

According to Taobao, is expected by the end of 2013 the cumulative number of wireless users log on Taobao will reach 200 million. In the network shopping users as well as maintain rapid expansion of scale, market structure also entering accelerate the optimization period, the main platform for B2C electronic business enterprises expand, open strategy, presents Cooperation and Competition among enterprises; Traditional enterprises has become an important part of the market, market position is strengthened, but the problems such as online shopping consumer fraud, user information leakage, corporate competition disorderly and other issues become more prominent, reflecting the industry regulatory means to a certain extent lagging behind market developments, the industry entered a conflict-prone period. From the analysis of online shoppers consumption situation and found that the ability of the consumer continue to rise, the first half of 2011 the average monthly household expenditure amounted to 3,450 yuan, up 13% month-on-month. Apparel goods purchase penetration continues to rise, reaching 89 % in 2011, and jewelry, household goods, food, travel service consumption, such as permeability and sales have increased significantly. Adapted to rising consumption ability is the rapid expansion of scale of online shopping, 2009- 2011 online shopping consumers in the rapidly growing proportion of consumers, the growth rate of the first half of 2011 rose by 6%. In addition to the rapid expansion of the scale of online shopping, the viscosity of online shoppers has also been strengthened [3].

Transaction size from a network perspective, in 2012 the scale of network transactions has exceeded 1 trillion yuan profit mark, reaching 1.304 trillion yuan. B2C accounted for 29.7%, transactions reached 386.99 billion yuan, B2C market grew 95.1 %, higher than the growth rate of 56.4% of C2C market [4]. According to Taobao data, the net purchase of heavy, moderate increase in consumer groups, the moderate population proportion for the first time more than 50% in the beginning of the second half of 2010. Taobao in 2011 amount of annual consumption was more than 10,000 yuan and the number of users rose 82.8%, the amount in 1,000 to 10,000 yuan between the ring was an increase of 64.7%, annual consumption amount users increased only 34% within 1,000 yuan[4].

At present, only 47 provincial State, Local Taxation Bureau conducted a pilot network invoices, 2.837 million taxpayers using network invoice issued 1.582 billion, accounting for approximately 10% of machine-printed invoices, covering industrial, commercial, construction, real estate and service industries etc. However, the actual situation is not the same across platforms, in terms of Tmall, Jingdong, Dangdang, Taobao, in accordance with the requirements of the network can only invoice request of the Company, not the C store (individual shop ) requirements, some invoicing, such as Tmall, but some do not invoicing, such as Taobao; At the same time, only if the invoice required by the client, consistent with offline mode. China's E-commerce transactions reached 8.1 trillion yuan in 2012, online shopping and E-commerce taxation has become an important issue[5].

Recently, the NDRC official said: "Administration of Taxation, the Ministry of Commerce and other relevant ministries to survey of home appliance business enterprise more, indeed to make unified plans on the electronic commerce tax administration measures and solutions, have not exact results.

## **2. E-commerce on Tax Collection and New Challenges**

Tax issues on E-commerce, there are currently a large number of surviving vague understanding, E-commerce without tax registration, the lack of a legal basis for the taxation of electronic commerce, online transactions without invoice, do not save paper books and so on. Many documents, points out that E-commerce is a kind of virtualization, automation, globalization, efficiency, low-cost business form, its domestic tax administration and international tax order, have had a profound impact. The current tax collection system is based on the traditional business management established. Due to the low level of information, and the way some of the tax collection birth defects, low current tax collection efficiency, high cost, which exists in the traditional business of tax loopholes also has not been solved. In E-commerce, tax collection and further increase the difficulty, making E-commerce tax collection problem is even more complex. First, the transaction actually occurred uncertain place offsite transaction tax increases caused by the tax jurisdiction of the difficulties caused by the conflict and the loss of tax revenue sources. Second, tax collection methods virtual online trading platform affected, making it difficult to determine income, tax collection and the lack of reliable audit basis, resulting in tax serious loss, difficult to collection work. Third, taxable objects obscure nature, invisible products of unknown cause applicable taxes and so on [6]. Old problem is not solved, new problems are arising, which makes E-commerce tax collection problem is even more complicated. The details are as follows:

### **2.1. Non-store Operations Lead to Can't Be timely and Accurate Tax Registration**

Tax registration is not complete. State control is held by the taxpayer linkage mechanism name registration and business registration tax, requiring only conducted after tax registration before obtaining a business license. But when an individual buyer, the seller has a business license is not sensitive, so there is a problem in the unlicensed traditional business marketing, mobile vendors is one of the most typical example. In traditional business, government depends on the tax registration system to master the taxpayers, the provisions of the enterprise in industrial and commercial registration, must first apply for tax registration, then can obtain the business license, without registration shall not be engaged in commercial business [7]. However, the characteristics of E-commerce with no shop operation, virtualization management make the effectiveness of the tax registration system is greatly weakened [8]. The reasons E-commerce tax registration system resulting in less effective are the following two points.

On the one hand, it's not easy to timely and accurate tax registration. Generally speaking, the state control information through the linkage mechanism taxpayer registration and business registration tax, only be carried out after obtaining a business license tax registration. But when an individual buyer, the seller has a business license is not sensitive, so there is a problem in the unlicensed traditional business marketing, mobile vendors is one of the most typical example. From a business tax registration of the power itself, the traditional companies have a business license, is to show their counterparties trusted identity, invoices, as well as rental space, and the recruitment of staff. In E-commerce, B2B companies or large enterprises who want to recruit more staff still need a business license, and their tax registration have no problems. However, fewer personnel and individual sales target for the B2C, C2C E-commerce, even if no business license does not affect the business. Transaction security because customers confidence to shop online from the trading system, such as third-party payment guarantees, credit evaluation. Just stick after receiving then payment, regardless of whether the merchant has a business license, if you can find the actual location of a business, even if the business identity is true, does not affect the security of customer payment. In this case, the customer is generally not concerned about the merchant's business qualifications, the

enterprise also lack the inner motive power of apply for a business license, industrial and commercial registration by the registration for tax effectiveness is greatly diminished.

On the other hand, from the tax authorities and unlicensed manners, the more traditional business is depend on a fixed place of business, and without facade is difficult to conduct business. Thus, through the operation of the site checks, to unlicensed can form a more effective deterrent. The E-commerce sales through the network without a fixed venue that it is not found by checking whether or not a tax registration. If one by one investigation each URL, because of the transaction has not been established between the platform and the tax authorities, as well as effective information sharing mechanisms between local tax authorities, not only the investigation workload, but low efficiency, even the operators are found, they may not belong to the jurisdictions. Therefore, the Local Taxation Bureaus are lack of enthusiasm tracing on the network. In particular, the creation of near-zero cost C2C online store, at the beginning of the online store business, shop popularity has yet to reveal, management effectiveness dependence on the brand is very low, the operator can turn off the old shop after being found and open another new stores, the Tax Bureau Inspection become useless. Thus, for smaller enterprises and B2C or C2C operators, traditional tax registration system is difficult to implement.

## **2.2. The Direct Model Makes More Subtle Sources of Revenue**

In domestic business operation, a prominent phenomenon in recent years is the explosive growth of network consumption. Particularly online retail, five years growth nearly 30 times.[9] According to Commerce Department statistics, in 2012 the domestic version B2C, C2C and other retail electric provider business model number nearly 25 thousand, an increase of 20 percent over the previous year, suggesting that more and more retail in the incentive competition environment, carry out the electronic commerce network of retail business has been expanded business model, and more and more retail development of E-commerce.[10]In November 21, 2013, the Ministry of Commerce website announced the "Opinions on Promoting the implementation of E-business applications", electronic commerce application put forward, to 2015 make E-commerce become an important way of social circulation of goods and services, E-commerce transaction volume of over 18 trillion yuan, the proportion of China's E-commerce applications enterprises above designated size reached more than 80%. Network equivalent to more than 10% of total retail sales of social consumer goods retail, E-commerce applications proportion of above-scale enterprises reached more than 80%.[11]Trend of the direct selling of E-commerce will aggravate the tax department on the difficulties of enterprise sales statistics. Because of the traditional multi-channel transaction intermediate links, through these middlemen invoice management can effectively Statistical their taxable income, while economic activity in E-commerce can be retail manufacturers directly to the final consumer, the consumer for their own interests consideration, it is likely to get preferential prices do not request an invoice, which would disintegrate master corporate income tax by invoice management mechanism, the formation of the root causes of tax evasion.[12] Under the current tax administration system, a large number of small-scale retailers, government lacks an effective means of monitoring tax sources, resulting in continual loss of tax revenue. One of U.S. research shows that in 2011 E-commerce sales resulting from the loss of up to \$ 50 billion tax. This paper argues: Retail invoicing not only in E-commerce, but also the traditional business common phenomenon. E-commerce, due to flat sales channels, the ratio will be higher than the traditional retail business, the sales invoicing problems may be more serious.

### **2.3. Transaction link dispersion makes tax jurisdiction conflict**

Trading links decentralization refers to the composition of the various elements of the transaction from the traditional business of gathering in one place, instead of E-commerce throughout the sub-office environment, thus forming the seat of government of the elements of the tax jurisdiction dispute intensifies or coordination failures, and multinational avoidance intensified. Decentralized trading process there are three main forms: First, The buyer in one place, the seller in another place. Second, tax payer registration in one place, operating in another place. Third, signing in one place, in a manner of delivery, settlement accounts and in another place, and so on. Trading links scattered on international tax jurisdictions propose the two challenges: One is the trading process proceeds blurred decentralized sources, exacerbated by tax jurisdiction conflicts. With the globalization of the economy emerging multinationals, according to the order of multinational income tax distribution, according to the tax allocation sequence of the multinational enterprise income tax, the E-commerce make the source of tax reduction, tax shift to low-tax countries, VAT is also levied by the destination serious difficulties. The resulting classification becomes blurred, the concept of "permanent establishment" in E-commerce is difficult to apply and implement an independent entity and the principle of fair trading price makes it more difficult to follow the tax jurisdiction of the conflict intensified. E-commerce companies will promote decentralized distribution activities on a global scale as possible, resulting in enough revenue source is difficult indeed, even the management control centers are located and where is difficult to determine the jurisdiction of origin and residents of jurisdiction challenges. The other is loss of decentralized trading session of the international tax revenue sources, it is possible to make tax-related income countries have no taxes. For the use of the existing international tax principles ,the origin without a permanent establishment can't levy taxes, businesses or even through E-commerce, treat "the companies registered choice", "the recognition of revenue nature", "the transfer pricing policy formulation" "the Investing in choice" as the starting point, tax planning strategies to optimize business E-commerce environment, corporate tax savings for reference conducted a global allocation of resources, and do not pay taxes of any country, in order to achieve the possibility of corporate tax avoidance. Country of origin or residence and income tax simply fail, let alone how to distribute it [13].

### **2.4. Electronic Payment Makes the Capital Flow Monitoring Absence**

The traditional cash tax evasion is limited because of the amount of cash transactions is generally small. However, in E-commerce, due to the huge amount of trading and available from the monitoring of electronic money to pay the bank, tax evasion may be greatly increased. And if the information source is a place outside the bank, the tax department is difficult for parties to monitor payment transactions, which also lost to tax evaders an important deterrent.

Unlike the U.S. credit card and mobile payment functionality in Japan, Some of the current payment platforms are caught outside the banking parallel system derived from the trading platform, whose existence is not affected by the Chinese CBRC (China Banking Regulatory Commission) supervision, nor regulatory departments strict. The development speed of those payment platforms to make a timely the policy and implementation brings hitherto unknown challenge. Virtual currency (such as QQ network launched Q coins, Lafont network launched pollen, Douding networks launched beans, etc.) varied with the economic activities occur or not is difficult to define, sales or promotions cannot determine, either. These new tricks accompanied the emergence of electronic payment in enriching people's growing material and cultural needs of the spirit, while the relevant departments of the traditional tax changes and update management capabilities also showed a severe test.

Due to the current tax collection means modernization level is not high, the pace and progress is far unable to meet the demands of taxing E-commerce transaction volume, so the current tax collection and management means or methods are difficult to achieve the taxation of E-commerce transaction volume. Both the hardware configuration or software development, and E-commerce tax collection from all the requirements of a larger gap.

### **2.5. Product Intangibility is Difficult to Determine the Specific Taxes**

Since both buyers and sellers do not meet each other, exchange transaction process generally no written documents or certificates, the two sides only to the Internet as a medium to achieve offer and acceptance in the virtual space. Especially during digital goods transactions, have bigger difference between E-commerce and traditional business, exchange without any visible things, contains all the business activities of commercial use right transfer, completed using the internet. Product intangibility makes it applicable taxes is unknown [14]. However, the digital products should be taxed by sales or taxed by service; is taxed by the high rate of VAT or sales tax by a low tax rate. The current tax law does not clearly defined, which gives a great deal of practical problems.

The current tax system to define the concept of goods, services, franchise, have been not apply to E-commerce. With the exception of part of the deal in E-commerce are still the traditional way of transport logistics, many transactions are converted into digital objects, information and so on to be sent over the Internet. For example, the original purchase of books, audios and videos, images and other customers, now only just to read or download can be. At this time there is no physical goods, the specific number is also difficult to determine. Therefore, according to the current tax system is very difficult to distinguish this kind of transaction, and thus difficult to clear is the sales of goods or the franchise transfer.

### **2.6. Information Technology Makes the Management and Service Levels Improved**

E-commerce challenges to the tax, but from the other perspective it is also conducive to social production and improving the efficiency of tax collection and management. E-commerce can greatly reduce the transmission cost of business information, and the adoption of E-commerce can reduce the cost of investment. Meanwhile, in the age of E-commerce, in order to seize the opportunity, the vast majority of Business Companies would be wise to first consider how to according to their own needs to optimize their work instead of thinking about how to use the Internet to tax evasion. The emergence of E-commerce so that the developing countries and the developed countries are facing the same challenges and opportunities, compared with the production efficiency has the E-commerce bring, the loss of tax revenue is not worth mentioning.

Maintain their own E-commerce platform in the run, while the community to provide a sufficient revenue to offset the externalities, public goods. Previous public goods should have been provided by tax expenditures. Now that provided by the E-commerce, logically it should no longer receive electronic business platform. Then not only can not improve the actual income tax, but the equivalent of reducing the tax, because the state spend more money to do the same thing [15]. How the use of electronic technology, information to improve tax collection efficiency of tax research is of great significance. For example Consumption tax as a mechanism for cross-border tax collection through E-commerce platform, the use of online banking withholding way off transfer intangible goods were tax collection and so on. Operation of E-commerce in the information flow at the core, is highly dependent on E-commerce trading platform and payment platform. If they can reach close cooperation with these trading platforms and payment platforms, tax collection agencies will be able to manage well aware of the transaction data, statistics and sources of tax revenue than the tax levied in the traditional way easier to implement tax collection costs will fall significantly.

### **2.6.1. TRAS by the Threat of Invoice does Not Comply to Some Extent**

The existing network of sales TRAS rely on the "summonsed tax" mechanism in the fight against fake invoices, yin and yang tickets, there are serious deficiencies on not counting operations. Limited capacity of the security paper invoices, false invoices using rampant; from invoice to the tax authorities to grasp the longer the delay between the invoice information, and the tax authorities have only the vendor invoice, the invoice does not grasp the buyer, even if the true cause buyers and sellers invoice, you can also open the way yin and yang ticket tax evasion; even worse, when for personal sales, billing conceal income by not operating the way has become a common phenomenon, causing serious losses to the revenue of the country. Golden Tax Project effectively curb the general taxpayer fails to comply with the VAT invoice, but small-scale taxpayers ordinary invoices using invoice fraud has become a new source.

With the current tax system is difficult to determine the E-commerce transaction status and trade. Under the existing tax system, whether an act should apply to tax and how much the identity of both the tax rate and the transaction, the transaction is domestic or foreign closely related. Although it can help tax authorities to track transactions on both sides of the computer address by using certain technologies, but because of the enterprise computer address is not regulated and the E-commerce anonymity, to confirm the transaction status is still very difficult, and thus will not be able to confirm that a transaction is domestic or international. This may make some had the obligation of tax payment of enterprises to foreign supply of defrauding export tax rebate, or actual consumption by withholding goods, services such as land and escape the import tariff. So, the tax payment place, problems related to tax link, tax methods and terms of tax and other traditional tax collection and administration are facing new challenges.

### **2.7. Network Cross-border Transactions Complicate the Definition of Tax Jurisdiction**

E-commerce is dependent on the platform for the new technology and the communication technology exists, which makes it very different from traditional commerce and trades, can be an easy job to realize transaction activities in the global scope, no matter at what time or what place, tangible market or the market invisible, as long as there is a computer or a intelligent mobile phone, the realization of economic transaction is no longer difficult. However, the E-commerce so simple and convenient economic transaction activities that have a challenge to the traditional international tax revenue jurisdiction. Current taxation attribution principle about national tax jurisdiction is very difficult to let the government distribution of benefits in the Transnational E-commerce transactions quickly reached a consensus. With the development of Internet trade, source tax jurisdiction (territorial principle) and resident tax jurisdiction (active personality principle) began to suffer. And, because of the differences in the position in international trade, to achieve more in the new form of trade interests, adhere to their principles of tax jurisdiction is different.

The emergence of E-commerce has broken the traditional geographical isolation, greatly exacerbated the economic transactions of trans regional, cross-border commercial trade no longer exists geographical boundaries, but the tax must be imposed by a particular state actors, these subjects for many taxes should be paid the difference between the interest naturally exist within their specific fields. For example, through mutual cooperation website to provide repair and maintenance services, through the Internet from thousands of miles away, doctors to provide remote diagnosis of medical services. All of these will accept jurisdiction bring certain difficulty for every country to exercise the sources of tax. In no borders network cyberspace with freedom, the users are very fluidity and occult, in the past must be face to face transactions of economic activities, but now can through the Internet to remain within doors. The tax authorities is

difficult to determine the location tracking service and use of the product, many of them have not signed a contract or no clear economic business transactions occur, only using the traditional concept of the source about an income with a specific geographic location set up organic relationship becomes very difficult, leading to when the country of origin faced their nature income have no way to taxed. So, this is a damage for the interest of the country and the government which use tax territorial jurisdiction.

Comprehensive and said, electronic business affairs to the tax revenue jurisdiction influence displays in: first, the E-commerce has weakened the source tax jurisdiction. The Internet is implemented on the server through the network, when the foreign enterprises using E-commerce trade activities in their country, they often only equipped with prior approval of software intelligent server. The business behavior of the server can be difficult to classify and statistics, provides remote service labor also break geographical boundaries, which makes countries generated controversy for income source judgment. Second, the E-commerce has shaken the definition and standard of residents. The current tax system generally to whether have "home", whether regard "management center" or "control center" as a taxpayer identity criteria. However, E-commerce beyond the limits of time and space, promoting international trade integration, resulting in the diversification, fuzzy and marginalization of taxpayer. Finally, it is difficult to determine the permanent establishment. The traditional tax is fixed place for all or part of business activities in the enterprise to determine the permanent establishment business source of income. But the virtual, invisible E-commerce makes the enterprise business activities without a fixed place of business organizations to complete, resulting in trade destination and consumption cannot be determined, nor determine the concept of permanent establishment in the international tax.

## **2.8. E-commerce Make Use of International Tax Avoidance Internet Easier**

Use the Internet to tax avoidance through three ways: one of them is the use of international organizations and countries have not yet put forward corresponding countermeasures to the E-commerce tax avoidance; another is the taxpayers through the establishment of The Virtual Corporation in the network to achieve he purpose of tax havens; the last one is the Associate Company through the network of high speed advantage, rapidly in all association members to adjust international revenue, to share the costs, easy to complete the transfer pricing, so as to avoid huge tax.

Because taxpayer put the fast and convenient advantages of Internet into traditional forms of tax avoidance, but also use some Internet-specific tax avoidance schemes, which means the traditional anti-avoidance is difficult to deal with. Therefore, not a "rapid reaction force" or a targeted strategy is difficult to successfully complete the E-commerce tax anti avoidance task. Although E-commerce transaction subject to the economic activities and government collection and management work of great opportunities, but we can't deny that some economic entities using a new Internet trading illegal activities to avoid tax, and even can be considered so-called "absolute being lawbreakers smart" is make good use of legal loopholes. But when we face the issue of the E-commerce tax avoidance, the traditional anti-avoidance measures and means are look like more lag. The large gap between the E-commerce and the traditional anti-avoidance is no doubt to those who wish to take advantage of the Internet for E-commerce transactions and international tax organizations and individuals to provide adequate fertile soil.

### 3. Game Analysis on Taxation of E-commerce

#### 3.1. The Basic Assumptions

Hypothesis 1, The tax authority which deals with specialized network marketing tax inspection, when it is facing all marketing men in a certain domain and game with No.  $i$  taxpayer, and the actions among market men exist mutual influence.

Hypothesis 2, Assuming that the tax payer is a rational person, whose aim of production and operation is the maximum of profit, the tax-payer is also risk neutral, who is an honest tax-payer when tax authority check strictly and punished heavily, otherwise, he will choose to conceal revenue.

Hypothesis 3, The actual income of market man  $i$  is  $y_i$ ,  $y_i$  is a random variable; Tax return ratio is  $\theta$ ,  $\theta \in (0, 1)$ , and  $\theta$  is the decision variables for the tax declaration, the actual declared income of tax-payer is the function of tax return ratio  $f(\theta)$ , the probability of honest tax-payer's tax return is  $q$ ; comprehensive tax bearing rate is  $t$ , tax cost is  $F$ , including tax administrative cost and the cost of pursuing tax liability.  $v$ : condemn or spiritual punishment,  $v = v(n)$ ,  $n$  is the quantity of honest taxpayer,  $n \in (0, \infty)$ ;  $\lambda$  is the proportion of concealing revenue, the punishment ratio of dishonest choice is  $f$ , The rate of late payment is  $\gamma$ , assuming that  $F < t y_i + f + \gamma + v - t \lambda y_i$ ; probability of the tax authorities investigate successfully is  $\rho$ ,  $\rho \in [0, 1]$ ; the credit income of honest tax return is  $z$ , it contains higher level of credit, thus reduce the cost of inspection in the future.

Hypothesis 4, Assuming that the tax declaration game repeated  $T$  times,  $T = (1, \dots, n, \dots, \infty)$ , this is a process of dynamic game which is indefinite repeated. Budget factor is  $\delta$ ,  $\delta \in (0, 1)$ . on the  $t \in T$ , step of gaming, the static declared choice game in which tax authority and tax-payer have complete information, which only exist in mixed strategies game equilibrium.

#### 3.2. Model

##### 3.2.1. Complete Information Dynamic Game Model of Repetition

When the game steps on the  $t$  stage,  $t \in T$  the declared choice game between tax authority and tax-payer exist mixed strategies game equilibrium. So, the benefit of tax authority and tax-payer's different behavior, see Table 1:

**Table 1. Benefit Matrix of Declared Tax Game**

		The tax authority	
		Check	Don't check
Tax-payers	Honest declaration	$y_i(1 - t) + z, (y_i t - c)$	$y_i(1 - t) + z, y_i t$
	Hided declaration	$y_i(1 - t) - \rho(f + \gamma)t * y_i - f_i(\theta) - v(n) - Z,$ $y_i t - c + \rho t(f + \gamma)(y_i - f_i(\theta))$	$(y_i - f_i(\theta))t - v(n) - Z,$ $f_i(\theta)t$

Firstly, when we have a certain probability  $P$  of tax authority audit, the expecting benefit when the tax-payer declares honestly ( $q=1$ ) or dishonestly ( $q=0$ ) respectively is:

$$E(p, q = 1) = p[y(1-t) + z] + (1-p)[y(1-t) + z] \quad (1)$$

$$E(p, q = 0) = p[y_i(1-t) - \rho(f+r)t(y_i - f_i(\theta)) - v(n) - z] + (1-p)[(y_i - f_i(\theta))t - v(n) - z] \quad (2)$$

by  $E(p, q = 1) = E(p, q = 0)$ , Solutions to :

$$p^* = (y_i - t(2y - f_i(\theta)) + v(n) + 2z) / [(y_i - t) - t(y_i - f_i(\theta))(\rho(f + \gamma) + 1)] \quad (3)$$

From formula 3, we can see: if the probability of tax authority audit is less than  $P^*$ , the optimal choice for a tax-payer is to conceal declaration; if the probability of tax authority audit is more than  $P^*$ , the optimal selection of the taxpayer is to declare tax honestly, When the probability of tax authority audit is equal to  $P^*$ , the tax-payer choose to be honest or dishonest at random.

Secondly, when we have a certain probability of honest tax-payer's tax declaration, the expecting benefit of tax authority choose to check ( $p = 1$ ) or not ( $p = 0$ ) is respectively:

$$E(p = 1, q) = q(y_i t - c) + (1-q)[y_i - c + \rho t(f+r)(y_i - f(\theta))] \quad (4)$$

$$E(p = 0, q) = q y_i t + (1-q) f_i(\theta) t \quad (5)$$

by  $E(p = 1, q) = E(p = 0, q)$ , Solutions to :

$$q^* = 1 - c / [t(y_i - f_i(\theta))(1 + \rho(f + \gamma))] \quad (6)$$

From formula 6, we can see, when the probability of honest tax-payer's tax declaration is less than  $q^*$ , the optimal choice of tax authority is to check; when the probability of honest tax-payer's tax declaration is more than  $q^*$ , the optimal selection of the taxpayer is not to check; when the probability of honest tax-payer's tax declaration is equal to  $q^*$ , the tax authority choose check or not at random. Therefore, the hybrid strategy Nash equilibrium of staged game is  $(P^*, q^*)$ , its equilibrium result is  $E(P^*, q^*)$ .

### 3.2.2. Unlimited Repeated Game Equilibrium

In the initial stage of the game, the tax authority and tax-payer abide by the actual agreement of tax law: In according to the tax law, the tax authority offers tax declaration service for tax-payer, reducing extra cost of tax declaration, improving declared efficiency, guaranteeing the declaration obligation of tax-payer. The tax-payer abides by tax law, declares honestly and gets taxable income. At the same time, the mutual trust between tax authority and tax-payer can abide by the agreement. At this time, the probability of tax authority audit  $P = 0$ , the probability of honest tax-payer's tax declaration  $q$  will be between  $q^*$  and 1. According to the basic assumptions, taxpayer's honest tax declaration will offer the tax authority the complete information, guarantee the

tax collection and put in storage timely, the tax authority will achieve maximum profit. So we can see, if tax-payer makes action choice according to agreement, the tax authority is willing to cooperate with him or her. Thus, honest declaration gaming equilibrium  $P = 0$  and which locates  $q^* \sim 1$ , the taxpayer's expecting profit is:

$$E(0, q)/(1 - \delta) \quad (7)$$

Assuming that the tax-payer breaks the initial promise on the stage of  $t \in T$ , considering his maximum self-profit, he chooses to declare dishonestly and conceal tax collection, the probability of honest declaration is  $q$  which locates  $0 \sim q^*$ . From Folk Theorem of Repeated Games we can see that the tax-payer breaks the agreement which will spring the "cold policy" of tax authority. The tax authority will strengthen inspection of tax declaration, make the probability of inspection  $P$  locate  $P^* \sim 1$ , and now tax-payer's dishonest will bear a higher cost penalty, the profit of dishonest choice will reduce. On the stage of  $t \in T$ , tax-payer's expecting profit is  $\delta^t E(0, q)$ , after the stage of  $t+1$ , the first phase of the tax-payer's expecting profit will be equal to the one of mixed strategies game equilibrium,

$E^{t+1}(p, q) = E^{t+2}(p, q) = \dots = E(p^*, q^*)$ , from this formula we can conclude that the expecting profit of dishonest tax-payer is:

$$\delta^t E(0, q) + E(p^*, q^*)/(1 - \delta) \quad (8)$$

Therefore, if the tax-payer is willing to abide by the agreement, declare taxable income honestly, the expecting profit of tax-payer should satisfy the following condition:

$$\delta^t E(0, q)/(1 - \delta) > \delta^t E(0, q) + E(p^*, q^*)/(1 - \delta) \quad (9)$$

The solution of formula 9:

$$\delta > \sqrt[t+1]{E(p^*, q^*)/E(0, q)} \quad (10)$$

From formula 10, when discount factors satisfy this condition (10), the benefit of honest tax-payer is superior to the one of dishonest declaration, the tax-payer would like to cooperate with tax authority, keep the initial promise. In the case of tax authority, it exert cold strategy, reduce the profit of tax-payer's dishonest declaration, make tax-payer give up the noncooperation strategy, driven by the profit, fulfill the declaration obligation and declare the taxable income honestly. The trigger strategy of tax authority will make cooperation continue, the equalizing profit will achieve the optimal profit in the cooperated equilibrium.

The analysis above shows, If (10) established, the tax authorities cold strategy is a sub-game perfect Nash equilibrium of unlimited tax return game, cooperation is the result of staged game equilibrium [16].

### 3.2.3. Experimental Validation of Analysis Results

Assuming that electricity suppliers commerce taxpayers comply with the above four points A hypothesis A real income of 1 million, the consolidated tax  $t = 30\%$ , the tax cost  $F = 6\%$ , public condemnation and spiritual punishment  $v = 1$ , the optimal concealment income ratio is, the proportion of dishonest selected punishment  $f = 20\%$ , due to the burden of taxes may be subject to late payment rate  $r = 20\%$ , then the  $F < t \cdot y_i + f \cdot \gamma + v - t \cdot \lambda \cdot y_i$  calculated  $F < 30(1 - \lambda) + 1.4$  investigate the probability of success of

the tax authorities set  $\rho = 70\%$ , honestly declare income tax credit is set  $Z = 1$ . Then  $P^* = (y_i - t(2y - f_i(\theta)) + v(n) + 2z) / [(y_i - t) - t(y_i - f_i(\theta))(\rho(f + \gamma) + 1)]$  put the number into the set of data obtained  $P^* = 71.72\%$ ; and  $q^* = 1 - c / [t(y_i - f_i(\theta))(1 + \rho(f + \gamma))]$  solution obtained  $q^* = 21.88\%$ ; its equilibrium result is  $E(0.72, 0.22)$ . Through about T time plays the game through the final budget factor  $\delta$  obtained which satisfy the equation  $\delta > \sqrt{E(P^*, q^*)} / E(0, q)$  and  $q$  are located among  $q \in (0.22, 1)$ ,  $q \in (0, 0.22)$  the tax authorities  $P$  placed the probability of inspection intervals  $P \in (0.72, 1)$ . The purpose of this example, the data can be obtained by substituting the formula is on the budget factor  $\delta$  and  $\delta > \sqrt{E(0.72, 0.22)} / E(0, q)$ . Through the above analysis, we can know that:

First, it exist the theoretical optimal proportion of concealing revenue. Set the tax-payer's non-declared profit is  $y^i$ , the declared profit of tax-payer is  $y^i(1 - \tau)$ , therefore a fixed proportion of tax-payer's concealing profit must between the revenue which is determined, tax-payer conceal a proportion income in order to get the max efficiency to determine the optimal concealing income ratio  $\lambda$ , maximize the profit when he conceals income successfully. [17]

Second, when tax authority checks at the rate of  $P^*$ , the proportion of tax-payer's concealing income is still  $q^*$ . If tax authority improves inspection efficiency, the proportion of tax-payer's concealing income will reduce naturally, to 0. This conclusion has been proved by foreign tax scholars, like Allingham Sandmo and Srinivsan, their analysis of which they exert the maximum of anticipated utility and the maximum of anticipated income respectively. In the case of tax authority, they should adhere to the optimal principal that demands the marginal benefit is equal to marginal cost, not merely demands the high proportion of tax audit. Because  $\delta F / \delta \theta > 0$ , and that  $\delta F / \delta \theta + \delta T / \delta \theta = 0$ , tax authority should determine the inspection proportion then the inspection cost is least in order to make  $F_{min}$  satisfy  $\delta F / \delta \theta + \delta T / \delta \theta = 0$  [18].

Third, probability of tax inspection  $\in [p^*, 1]$ , if it is below lower limit, more tax-payers tend to tied of risk to risk neutral to challenge, aim for higher proportion choice of concealing income, make social resources benefit to tax evader, cause the supplying unfairness of government system and challenge the administration power of government directly. Thus it exists inspection vacuum when probability of tax inspection  $0 \sim P^*$ , at that time, it depends on the self-awareness of tax-payer. In this instant, the restriction of tax law will lose efficacy, honest taxation demands on morality, the state responsibility, emotion and so on, so it exists self-defects of honest taxation, namely lacking of constitutional constrains.

#### 4. The Basic Conclusions

Through the above analysis of E-commerce tax collection and management of the game, the article in order to meet the four basic assumptions of the premise, to build complete information dynamic repeated game model, through the different values of p and q matrix distribution, the gradual introduction of p and q different values of variables, the game balanced formula in turn. Although in reality the process of economic operation, while meeting the above four hypothetical situation is difficult to achieve, which really is one of the drawbacks of this article, but the essence of economics lies in the phenomenon will not be achieved by optimizing it in a virtual environment to explore the true essence of economic phenomena while avoiding other interfering factors. This assumption is in this particular research carried out under the technical processing, its government and relevant departments to carry out E-commerce tax collection significance.

Thus it can be seen that both sides of taxation should pay more attention to honesty. Tax enforcement agency should perfect current self-reporting system constantly, implement efficient tax administration, optimize tax service. We should establish and improve tax credit system, under the premise of honest taxation, cultivate the awareness of the need to pay taxes and compliance with taxation of tax-payer, make the nationals good understand and coordinate with government, come to pure social taxation environment, reduce tax cost, achieve tax optimization, which is the foundation of state taxation. Meanwhile some necessary tax audits will be supplement in order to strengthen the deterrent force of tax executive agency. Therefore, the establishment of the tax collection and administration law framework of e-commerce is imperative.

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