RESEARCH PAPER

Fly Under the Tax Radar: Informal Sales in the Process Industries[1]

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Abstract
In the countries, where it is not possible to disclose corporate income through the banking system, tax evasion through informal sales with the help of a third party is a common phenomenon. This paper tries to model firms' tax evasion in such a condition. How tax evasion relies on third parties and hiding the share of raw materials purchased in the financial statement depends on the production method. In this paper, the tax evasion will be investigated in the process production method. In addition to the gap between the value added tax rate and corporate income tax rate, the cost structure is an important endogenous factor in tax evasion. The empirical results of the model based on the data from Iran indicate that the tax evasion of process industries is about 18% of tax capacity, which results in a 4% reduction in the government's tax revenue.
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JEL Classification: H26, C15, D22, L25.

Introduction

Tax evasion occurs because of the economic factors, i.e. low level of education, low average income, unbalanced distribution of income, and corruption (Richardson, 2006). Meanwhile, in developing countries, in addition to the above-mentioned causes, the ineffectiveness of the tax system and its non-compliance with the behavior of economic activists exacerbates tax evasion.

Waseem (2018) argues that by increasing the tax rate, the structure of firms in the developed countries changes easily and quickly in a way as to allow for the possibility of informal sales. It is also easier for the developed countries to provide a pseudo financial statement (Carrillo et al., 2017). This action is more normal in small businesses (Stankevicius and Leonas, 2015).

The present paper focuses on the existing interference between the value added tax (VAT) system and the corporate profit tax system. Asatryan and Peichl (2017) proposed that some firms were willing to pay the raw material value added tax, and not to transfer it to the customer, because they could pay less tax on the profit with less formal sales. The purpose of this study is to measure the logic of this type of tax evasion, and provide a tool for its estimation. There are two general cases in this regard. First, tax auditor cannot match the raw materials with the number of products. For instance, in a luminaire factory, more than 12,000 pieces are used to produce about 1,000 products. The complex structure of the Bill of Materials (BOM) and the heterogeneous raw material pathway does not allow the auditor to count the difference between the materials and the products. In this case, it is possible to make unofficial sales simple. The firm can link the value added tax on purchased raw materials to

official sales. While in the second case, the conversion of raw materials is processed (and not discreet). So, it is not possible to reflect the cost of all raw materials in the financial statement, and simultaneously conceal the part of sale. Firms try to fly under the tax radar with the help of third-parties (Gordon, 2009; Slemrod and Yitzhaki, 2002). The tax boom in these cases would be handled in a way that the firm purchases a share of the raw materials through third-party, and pays the relevant VAT, too. Although the formal purchases of raw materials give the advantage of transferring taxes to the customers, it can hide the same share of product sales, and report a smaller amount of profit to the auditor with unofficial purchases. This process would bring a chain of informal sales in the distribution and the sales segment. To meet the purpose of this paper, tax evasion is simulated in the second case.

The remainder of this paper is organized as follows. Section 2 provides an overview of the related works in this area. In Section 3, based on the full cost structure of the product, a model for estimating tax evasion is presented. By the proposed model, it is also possible to calculate the reduction rate of the government's tax revenue. Section 4 describes the Empirical results of the model. Oil sanctions and the Iranian government target of reducing dependence on oil revenue have increased the importance of tax revenue in budget structure. Finally, Section 5 concludes the paper.

Literature Review

The debate over the use of value-added tax and corporate profit tax in the developing countries and their effect on informal sectors were focused in some research, e.g. Davies and Paz (2011). Results indicated that a cut in the tariff reduced the size of the informal sector. Also, imposing VAT does not need to increase the size of the informal sector. As per the simulation results, switching from a tariff to a revenue-neutral VAT leads to increase welfare. Moreover, Paula and Sheinkman (2010) presented an equilibrium model of tax avoidance.

Leal Ordóñez (2014) investigated the effect of informality due to the incomplete tax enforcement at the extensive margin. In the model, formal status implies that full compliance and all formal firms pay statutory tax rate. Lopez (2017) complemented a model, considering the effect of incomplete tax compliance, which was the result of the tax evading efforts undertaken by formal firms. He developed an approach to study the tax evasion in the developing countries. Moreover, He showed that in these countries, firms tried to keep their official size small, and realized their tax evasion by informal sales. In general equilibrium model, in the developing countries, reducing the returns to tax evasion by formal firms increases tax revenues.

Giombini et al. (2018) investigated the relationship between the tax evasion and the legal system inefficiency on the firm financial constraints, theoretically and empirically. Ulyssea (2018) indicated that firms could exploit two margins of informality: first, not to register their business, and, second, to hire workers "off the books", which he called intensive margin.

Samadi and Nasirabadi (2020), analyzing the relationship between tax evasion and expenditure on tax collection in Iran, concluded that instead of increasing monitoring expenses, in line with reducing tax evasion, it was better to reduce taxes rate in a way that in addition not to decrease in motivation of economic agent activity, it decreased motivation for tax evasion.

Model

In the creation of the model, tax evasion rate was considered as a random variable (e.g. in Goumagias et al., 2018), and like Asatryan and Peichl (2017), audit system is inefficient as companies could have informal sales.

The Equation 1 would be formulated for the firm i as follows:
$$p_i = 1 - m_i - w_i \qquad 0 < m_i < 1 \qquad 0 < \omega_i < 1 \tag{1}$$
where m is the share of the raw material cost, w is the share of the wage and overhead, and p is the share of the profit.

It is assumed that due to the social security laws, it is not possible to distort the costs of employees' salaries. Then, it is assumed that w is correctly reported into the financial statement.

The government's tax revenue from products of the firm is equal to RT, which is defined in the Equation 2. In this equation, tax rate on profit is equal to t, and VAT rate is equal to v:
$$RT_i = v + t \cdot p_i \qquad 0 < t < 1 \qquad 0 < v < 1 \tag{2}$$
when the firm does not have tax evasion, the total tax to be paid is equal to RC:
$$RC = t \cdot p_i \tag{3}$$
In this case, the firm does not pay any VAT; because it has just been transferred to the customer by invoicing the product. Otherwise, the firm has decided to sell tax-free by informal sales. Then the formal profit sign by (p_i') would be determined as the Equation 4.
$$p_i' = (1 - \beta_i)(m_i - 1) - w_i \qquad 0 \le \beta_i \le 1 \tag{4}$$
The β coefficient in the Equation 4 represents the firm's income, which is not reflected in the formal statement. Given that the production is processed, the proportion should be reduced from the reported materials to eliminate the problem in tax audit. So, the government's tax revenue would change to PT, and the firm tax would change to PC:
$$PT = tp_i' + v - v\beta_i(1 - m_i) \tag{5}$$
$$PC = tp_i' + v\beta_i m_i \tag{6}$$
The reduction in government revenue would be $Y = RT - PT$, and the companies' tax reduction is also equal to $X = RC - PC$.
$$Y = t[(1 - m_i)(2 - \beta_i) - w_i] - v(1 - m_i)\beta_i \tag{7}$$
$$X = t[(1 - m_i)(2 - \beta_i) - w_i] - v\beta_i m_i \tag{8}$$
There are three types of variables in the model. The first type is exogenous, and is decided by the government. Two rates (t and v) belong to this group. The second type is the variables which depend on the production structure of the firm, and can take different amounts. The share of raw materials (m), wages, and overhead (w) can have a lot of variety in different firms. Statistical simulation can be used to determine the value of these two variables. The last and third type of variables used in the model is β, which is the informal income rate. The Source of this variable is the fear of people to discover a legal offense. In Mc Caleb (1976) and Friedland et al. (1978), a similar variable has been defined. They included a constant number for the variable, while listing several factors' influence on the size of variable with a psychosocial questionnaire. In this paper, Monte Carlo method is used to determine the value of coefficient.

Empirical Results

The model is based on the tax evasion conditions in a developing country. In the country, it is assumed to be two systems of VAT and corporate profit tax. Due to the ease of obtaining information, in this study Iran has just been selected, where the VAT rate is 9% and the corporate tax is 25%. The great difference between these two rates can provide a good incentive for tax evasion. 32 firms have been selected to estimate the statistical distribution of the finished costs variables. Selected firms have the following conditions: they have a processed industry, they are members of Tehran stock market, they give regular financial reports, and the government is one of the stakeholders (the last because of the inability of these firms to evade taxes).

Based on the Anderson-Darling method, the PERT distribution has the best specification for the finished cost variables. In the next step, based on the same distribution 140,000 different situations have been simulated.

Finally, β is randomly selected between 0 and 0.5. The zero coefficients mean that there is no tax evasion. Since the firm reports wages, at least, 50% of the products should be officially invoiced to show a minimum profit.
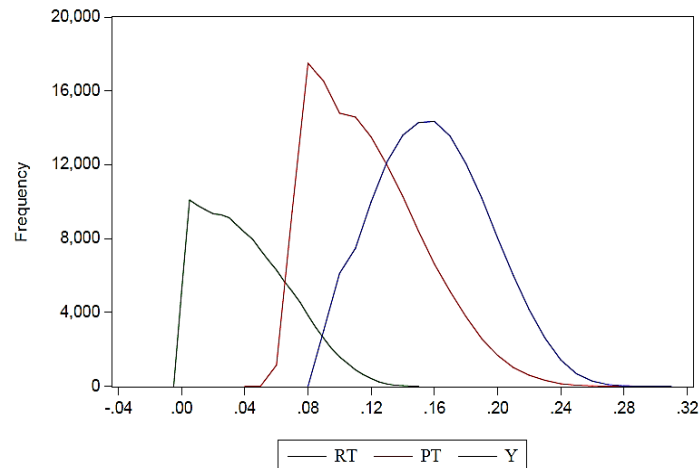
Figure 1. Simulation of Government's Tax Revenue
Source: Research findings.

RT and PT were simulated by using PERT distribution. Subsequently, Y was calculated based on the value of these two variables. All the results are illustrated in the Figure 1. Similarly, the X value was obtained from the difference between the two simulated variables of RC and PC, based on a normal distribution.
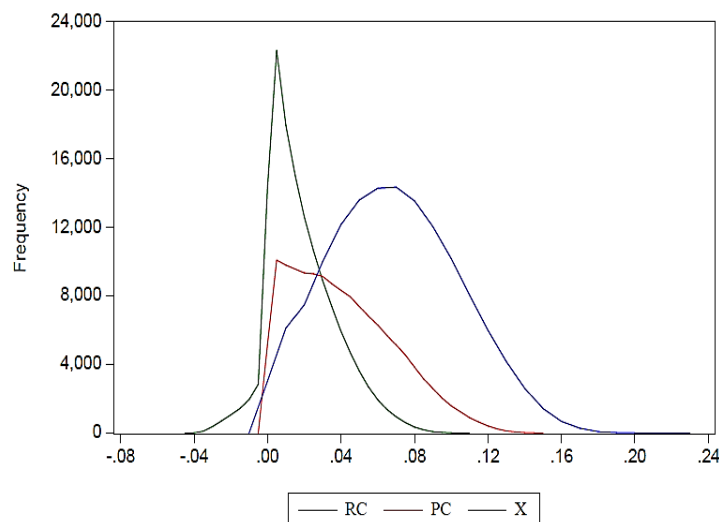
Figure 2. Simulation of Firm's Tax Payment
Source: Research findings.

Statistical description of the simulated variables is provided in Table 1. Result of the Empirical distribution test with Cramer-von Mises statistic (i.e., 223) implies that the assumption that the distribution of Y is not normal is rejected. A similar result was obtained for X, with a value of 374 for Cramer-von Mises statistic.

Table 1. Statistical Description of Simulated Distributions

	X	Y	RC	RT	PC	PT
Mean	0.018	0.041	0.069	0.159	0.041	0.118
Median	0.015	0.037	0.067	0.157	0.037	0.112
Maximum	0.098	0.143	0.207	0.297	0.143	0.276
Minimum	-0.035	0.000	0.000	0.090	0.000	0.059
Std. Dev.	0.019	0.028	0.035	0.035	0.028	0.034
Skewness	0.719	0.591	0.203	0.203	0.591	0.726
Kurtosis	3.600	2.652	2.521	2.521	2.652	2.990

Source: Research findings.

According to the results, X and Y can be estimated. At the confidence level of 99%, the average Y is estimated between 4.07% and 4.11%. At the same level for confidence, the average of X is estimated between 18.36% and 18.62%.

Conclusions

In the less developed countries, inability of the government to control the corporate earnings leads to inefficiencies in the tax system. Several studies have dealt with this issue. The main focus of this paper is that in such countries, the gap between VAT rate and the corporate tax rate provides enough incentive to use third-party for informal sales. In empirical modeling, it is shown that the tax evasion rate in this situation, in addition to the gap between the two rates, depends on the finished cost structure.

The sample for the full cost structure in this paper has been picked up from Iranian processed industries. In Iran, the VAT rate is 0.09, and the corporate tax rate is 0.25. Based on these data, Monte Carlo simulation has been implemented in 140,000 different situations based on PERT distribution. Results indicated that more than 18% of the tax capacity of the firms, whose methods of production was processed, changed to the forms of evasions. This reduces the government's tax revenue by more than 4%.

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