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Survey of the influence of factors affecting the receipt of taxes from the big taxpayers in Sistan and Baluchestan province: Logit and Probit Approach

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Abstract:

In this article, the impact of various factors such as whether the company is public or private, certificate of clearance and the company's income on the paying tax situation by 57 large companies in the Sistan and Baluchistan province, has been investigated. Since the dependent variable of tax collection is a binary variable, probit and logit models have been used to estimate the coefficients. The results of using two models show that all three explanatory variables have a positive and significant effect on tax payment by companies. And the biggest effect is related to the certificate of clearance, state of the company, and company's income, respectively. Examining the final effects also shows that as the company's income increases, the probability of paying its taxes has decreased and this is because the company with a larger income pays taxes on time and better because of the fear of the consequences of not paying taxes and also knowing with the rules of paying taxes. Therefore, with the increase in income, the probability of paying the company tax also increases less. The Hosmer-Lemshow statistic also indicates that the models fit well and the model is consistent with the data. It is suggested that the laws be amended in such a way that it is necessary for the companies to complete the accounts so that the government can collect taxes from more companies through this law and limit the way of tax evasion. On the other hand, considering the positive impact of company revenues on tax collection by the government, facilitating the business environment for large companies can help to increase the tax revenues of the province and the country.

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1- Introduction

In many countries, a major part of the government's income is provided through taxes. Of course, this share is different in different countries. In Iran, in recent years, the share of tax revenues in the government's income portfolio has increased, although it is far from the optimal situation. Despite the efforts made in recent years to develop the country's tax system, the country's tax system is still facing many challenges. Taxes in most countries, especially developed countries, are the main financial source of the government. In developed countries, tax revenues are very important in financing government expenditures; But in developing countries, due to the inflationary structure and the ineffectiveness of the tax system, tax revenues constitute a small percentage of the GDP of these countries (Hass Yaganeh and others, 2018). In the sixth development plan (1396-1400), the goal was to increase the share of taxes from gross production to ten percent; Also, the share of taxes in financing the government's current expenditures should be increased so that at the end of the program, all current expenditures will be financed through taxes (Law of the Sixth Development Plan). Statistics show that the ratio of tax to GDP for the years 2017 to 2021 was 6.4, 4.9, 4.5, 4 and 3.7 respectively (in percentage). Also, the ratio of tax revenue to the total public budget resources (as a percentage) for the years 2017 to 2021 was 2.36, 9.35, 2.39, 8.36, and 32.3, respectively (Program and Budget Organization). It is worth mentioning that the Joint Comprehensive Plan of Action, the implementation of new US sanctions against Iran and the oronaviruses epidemic have been effective in the ups and downs of the tax share in the years of the sixth plan. In total, the statistics show that the goals of the sixth plan in the field of tax revenue collection have not been achieved. The lack of oil revenues (as the most important source of government revenue) due to extensive oil and financial sanctions has made it necessary to pay attention to provincial taxes and prevent tax evasion. Also, the effective presence of the government in the economy and increasing the share of tax revenues in the government's income portfolio is important. Therefore, since one of the important tax sources and capacities are large companies (in terms of income from services and sales), it is of great importance to determine the factors affecting the payment of taxes by these companies. For this reason, the aim of this research is to calculate and estimate the effect of factors effective on tax collection from the tax administration of Sistan and Baluchistan province by using binary probit and logit models.

2. Theoretical framework and research background

Tax is a part of people's income or wealth that is collected by the government according to the law and in order to cover part of the public expenses and maintain the social, economic and political interests of the country. For the sustainability of the society and the provision of social services by the

government, each member of the society, according to his ability to pay, is obliged to pay a part of the price of these services as a tax to the government (Sanjarani, 2021). In fact, taxes can be one of the basic pillars of the country's gross national product. This issue is of great importance for our country, which is a single product and relies on oil revenues, because, considering the financial and oil embargoes and as a result, facing the lack of oil revenues and the devaluation of the national currency against foreign currencies Foreigners, it will be inevitable for the government to adopt correct and effective tax collection mechanisms. In this regard, it will be necessary to know the factors affecting the payment or non-payment of taxes. It is no secret that paying taxes by taxpayers depends on many economic and psychological factors. Fisher and his colleagues (1992) divided the factors affecting tax compliance into four main groups of demographic variables, opportunities for non-compliance (income level, source of income and type of profession), attitudes and perceptions of the fairness of the tax system and the impact of the environment, and finally the structure/system. In fact, the establishment of various taxes in a society causes the transfer of resources from the private sector to the public sector. This shift has effects at the macroeconomic level. The most important of these effects are: determination of the size of the government, allocation effects caused by the change in the balance in the markets and as a result the change in the resources between the markets and different sectors of the economy, the change in the distribution of incomes in the society (GeraeiNejad and Chapardar 2013). Alsheikh et al (2016) mentioned punishments and company size as factors influencing tax evasion. According to Fagariba (2016), tax evasion is the deliberate refusal of tax payers to fulfill legal obligations and is a deliberate and targeted violation of tax laws in order to hide the sources and amount of taxes in order to reduce tax payments, which can have a significant impact on Provide public services and economic growth of the community and it can include declaring low profits, overestimating costs, not recognizing some incomes, etc. In the following, some other domestic and foreign studies on factors affecting tax payment are reviewed.

In a study, Mansouri Mona and others (2019) investigated the factors affecting the components of tax revenue in the context of economic sanctions by using the exploratory factor analysis model and the NARDL nonlinear model during the period of 1979-2017. The results show that the variable of GDP per capita has a negative and significant effect on the tax income of companies in the long run.

Pour Moghim and others (2016) have investigated the factors affecting the level of tax revenue collection in Iran's tax system. They believe that in Iran, after oil revenues, the government's main income in the way of funding the budget is tax revenues, through which the three goals of economic resource allocation, income redistribution and economic stabilization are pursued. Using the co-accumulation approach, the authors have investigated the short-term and long-term

relationships of tax revenues and macroeconomic variables affecting the level of tax revenue collection during the period of 1959-2001.The findings show that macroeconomic variables such as exchange rates, oil revenues and general price levels have a significant effect on the collection of tax revenues in the short and long term.

Khani and others (2013) in an article have discussed the issue of tax avoidance and how to measure it and the factors affecting it. In this study, while stating the theoretical foundations of tax avoidance and mentioning the methods of tax avoidance by companies, they have concluded that companies use loopholes in the laws and seek to avoid paying taxes.

Moradi and others (2013), in an article, have investigated the factors affecting tax evasion, and in their research, they used logistic regression to estimate the relationship between tax evasion and independent variables. Research findings show that lack of legal measures or low legal requirements have a positive effect on tax evasion and reduce trust in the government of tax evasion.

Foya and others (2022) in an article have investigated the factors affecting the compliance of corporate taxpayers with business tax laws in Zimbabwe. They have come to the conclusion that it is very important to punish and encourage taxpayers to increase tax collection. Also, tax rates and tax laws and regulations are also effective on paying taxes by taxpayers.

De Mille (2019) states in her research that non-payment of taxes has a negative effect on the entire economic system of any country, and this causes misallocation of resources. It regulates the distribution of income in an arbitrary and irregular way, and governments will be unable to fulfill their obligations to increase the level of welfare of citizens.

Richardson (2006) investigated the factors affecting tax evasion for 45 countries. He states that the correct understanding of the factors affecting tax evasion allows the enforcers of laws and regulations to reduce the destructive effect of this phenomenon as much as possible by designing correct and appropriate policies. He used the panel data method and among all the factors affecting tax evasion, the complexity of laws and regulations has had the greatest impact on tax evasion. Among the economic factors, the amount of income has had a greater impact than other factors. He concludes that by reducing the complexity of tax laws and regulations and improving revenue sources, the amount of tax evasion will decrease.

3. Research model and estimation method

In this research, we are trying to investigate the effect of the effective factors on tax collection from the big taxpayers of the Tax Administration of Sistan and Baluchistan province. In this regard, a number of large taxpayers (company) have been selected and their tax payment status (TAX) has been considered (as a dependent variable). If the company has paid the tax, we give it the number one

and if the company has not paid the tax, the number zero is assigned to it, so we are facing a binary dependent variable. We want to examine the impact of the state or private nature of the company (GOV), clearing accounts (MFASA) and company income (INCOME) on the state of tax payment by companies. GOV=1 for a public company and GOV=0 otherwise. We get MFASA=1 for a company that has cleared accounts (accounts settlement) in the year and otherwise MFASA=0. We know that utility reflects the preferences of the individual (here the company). For example, how much companies are willing to avoid tax and pay taxes depends to a large extent on their preferences and existing laws. This means that they get more benefits from paying taxes or from not paying taxes and the possibility of facing its consequences such as being fined and reducing credit. Therefore, the random utility inherent in the tax payment problem can be described in a "two-choice" framework.

Therefore, paying the tax can be represented by 1 and not paying it by 0, and accordingly, the utility of option 1 can be represented by $\mathbf{U_{1i}}$ and the utility of option 0 by $\mathbf{U_{0i}}$. If $\mathbf{U_{1i}} \geq \mathbf{U_{0i}}$, then option 1 will be selected and if $\mathbf{U_{1i}} < \mathbf{U_{0i}}$then option 0 will be selected. A logical way to communicate the state of stated random utility, which is a subjective problem, with paying taxes, which is a real problem, is to use the concept of probability. Since tax payment as the dependent variable is a binary variable, probit and logit models are suitable for the relationship between the subjective phenomenon of utility and the objective phenomenon of tax payment. Probit and logit models are binary methods and are based on the maximum likelihood method (MLE). In the following, probit and logit models are briefly discussed. We know that in the probit model $P(Y_i = 1) = \Phi(x_i'\beta)$. Where β represents the final effects of the explanatory variables on the dependent variable and x is the vector of the explanatory variables. Assuming normal distribution of residuals U_i, $\Phi(.)$ is the standard normal cumulative probability function (CDF) or distribution function, which is as follows:

$$P(Z \leq z) = \int_{-\infty}^{Z} \varphi(z)dz = \int_{-\infty}^{z} \frac{1}{\sqrt{2\pi}} e^{-\frac{z^2}{2}} dz = \Phi(z) \quad (1)$$

Where $\varphi(z)$ is the standard normal density function. By estimating β, we can write:

$$p_i = P(Y_i = 1|\mathbf{x}_i) = \Phi(\mathbf{x}_i'\hat{\boldsymbol{\beta}}) = \Phi(\hat{\beta}_1 + \hat{\beta}_2 X_{2i} + \cdots + \hat{\beta}_k X_{ki}) \quad (2)$$

Final effects in the probit model. The effect of change in X_i on Y is called final effect. Now the question is, what is the probability of choosing the option $Y_i = 1$ in response to the change of x_i. This probability, which is the final effect, is obtained as follows:

$$\frac{dP(Y_i=1)}{dx_i} = \varphi(x_i'\hat{\beta})\hat{\beta} \quad (3)$$

So if we want to get the effect of change in X_{ki} on the $P(Y_i = 1)$, we write:

$$\frac{dP(Y_i = 1)}{dX_{ki}} = \varphi(\hat{\beta}_1 + \hat{\beta}_2 X_{2i} + \cdots + \hat{\beta}_k X_{ki})\hat{\beta}_k \quad , k = 1,2, \dots, K \quad (4)$$

The above formula shows that the final effect of X on Y changes for different values of X. What is the solution?

In order to have a number for the final effect of X on Y, it is common to put their average value instead of X_{ki} in the above relation (Souri, 2012). Therefore:

Logit model. For the random variable Z, the logistic function is:

$$L(Z) = \frac{1}{1 + e^{-Z}} = \frac{e^Z}{1 + e^Z} \quad (5)$$

And its density function is

$$l(Z) = L'(Z) = \frac{e^Z}{(1+e^Z)^2} = L(Z)(1 - L(Z))$$

The probability that $Y_i = 1$ is obtained as follows:

$$P(Y_i = 1|x_i) = L(x_i'\beta) = \frac{1}{1 + e^{-x_i'\beta}} = \frac{e^{x_i'\beta}}{1 + e^{x_i'\beta}} \quad (6)$$

And the probability that $Y_i = 0$ is equal to:

$$P(Y_i = 0|x_i) = 1 - P(Y_i = 1|x_i) = \frac{1}{1 + e^{x_i'\beta}} \quad (7)$$

To interpret the logit model, the probability that $Y_i = 1$ depends on the estimated coefficients and the value of the explanatory variables.

Examining the final effects in the logit model. Now the question is, what is the probability of choosing option $Y_i = 1$ in response to the change of x_i. In fact, the effect of change in X_i on Y is called the final effect, which is calculated as follows:

$$\frac{dP(Y_i=1)}{dx_i} = l(x_i'\hat{\beta})\hat{\beta} = L(x_i'\hat{\beta})(1 - L(x_i'\hat{\beta}))\hat{\beta} = P(Y_i = 1|x_i)P(Y_i = 0|x_i)\hat{\beta} \quad (8)$$

Like the probit model, it is also common for the logit model that for the average values of the explanatory variables, the final effect of X on Y is calculated as follows (souri, 2012):

$$\frac{dP(Y_i = 1)}{dX_i} = l(\hat{\beta}_1 + \hat{\beta}_2 \bar{X}_2 + \cdots + \hat{\beta}_k \bar{X}_k)\hat{\beta}_i \quad (9)$$

Therefore, in the next section, using probit and logit models, the impact of GOV, MFASA and INCOME variables on TAX of selected companies will be investigated. Therefore, the general format of the current research model can be expressed as follows:

$$TAX = F(INCOME, MFASA, GOV) \downarrow TAX = \beta_0 + \beta_1 GOV + \beta_2 MFASA + \beta_3 INCOME \quad (10)$$

In which:

Dependent variable is:

Tax collection (TAX): For this variable, a value of 1 has been set for companies that have been taxed and 0 for companies that have not been taxed.

Explanatory variables are:

- INCOME: indicates the sum of income from services and income from sales, the logarithm of which is used in the research. It is expected that with the increase in income, the act of tax collection and collection by the tax administration will be done more and at a more appropriate speed, so theoretically it is expected that this variable will have a positive effect on the dependent variable.
- Party to the contract with the government (GOV): Any company that is a party to the contract with that government, it is easier to collect taxes from it, because this company needs to renew the contract with the government to continue its activities, and the government will pay its taxes as long as the said company pays its taxes. has not paid, does not renew his contract. This variable is used in the form of zero and one in this study, that is, the value of 1 is considered for companies whose contract party is the government, and the value of 0 is considered for those whose contract party is not the government. It is also expected that this variable has a direct relationship with the dependent variable.
- Tax settlement or settlement of accounts (MFASA): If a company needs to settle its tax account (mufasa) to continue its work, it is easier to collect taxes from that company. In fact, in order to assign projects to some companies, it is necessary that these companies have accounts in this case, the said company will go to the tax affairs department to continue its activities and pay its taxes and receive a tax clearance or proof of tax settlement from there. Therefore, it is more difficult to collect taxes from such companies. In this research, the companies that needed amortization were marked with the number 1 and the companies that did not need the amortization were marked with the number 0, so it is expected that this variable will have a positive effect on the dependent variable.

4- Experimental investigation and research findings

As stated in this article, we aim to examine the impact of factors affecting tax collection from large taxpayers of the Tax Affairs Department of Sistan and Baluchistan province. Therefore, the number of 57 companies, which are considered to be large taxpayers according to the tax affairs department of Sistan

and Baluchistan province, and the data related to the variables of the model were available for them, have been selected. Considering that the dependent variable is the tax payment or non-payment model (binary variable), probit and logit models have been used to determine the extent and manner of explanatory variables' effects on the dependent variable. Therefore, based on the discussions in the previous section, the estimation results for the probit model are presented in Table (1):

Table 1. Estimation results of the research model using the nonlinear probit method

prob	Z statistic	Std.error	coefficient	variable
0.0011	-3.27	2.86	-9.36	C
0.0009	3.33	0.44	1.48	GOV
0.0102	2.56	0.82	2.09	MFASA
0.0011	3.27	0.03	0.089	INCOME

source: research findings

As the results show, all variables are significant at the 95% confidence level, and according to theoretical expectations, the variables of being a company (GOV), MFASA and income (INCOME) have a positive effect on tax payment. Goodness of fit tests of the estimated probit model are performed using the Hosmer-Lemshow statistic[1]. This test is based on comparing the predicted and actual value of the dependent variable in different groups. If the difference between the actual and predicted values of the dependent variable is large, it indicates a poor fit of the model. In the hypothesis test with the help of the Hosmer-Lemshow test statistic, the hypothesis H, indicates the goodness of the model fit or the matching of the data with the model. The non-significance of this test (statistical probability greater than 10%) indicates the appropriate adaptation of the model (predicted values of the dependent variable) with real observations. The results of this test showed that the probability of H-L Statistic was equal to 0.9879, which means not rejecting the hypothesis $\boldsymbol{H_0}$ that the model fit is good. Therefore, the model has been fitted well and the model is compatible with the data.

Now, according to the estimated coefficients for the probit model of large taxpayers of the Tax Affairs Department of Sistan and Baluchistan Province, we can write:

$$p_{20} = P(Y_{20} = 1 | income_{20}, gov_{20} = 1, mfasa_{20} = 1) = \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * income_{20}) \quad (11)$$

Note: The number 20 is because, for example, we have chosen the 20th company from the table, which was a government company ($\mathbf{gov_{20} = 1}$) and made the

[1] Hosmer – Lemeshow Statistic

settlement ($\mathbf{mfasa_{20} = 1}$). This issue can be considered for any company from the list of 57 mentioned companies.

$$
\begin{aligned}
p_{20} &= P(Y_{20} = 1 | income_{20} = 50, gov_{20} = 1, mfasa_{20} = 1) \\
&= \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * 50) \\
&= 0{,}092 \\
p_{20} &= P(Y_{20} = 1 | income_{20} = 60, gov_{20} = 1, mfasa_{20} = 1) \\
&= \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * 60) \\
&= 0{,}331 \\
p_{20} &= P(Y_{20} = 1 | income_{20} = 65, gov_{20} = 1, mfasa_{20} = 1) \\
&= \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * 65) \\
&= 0{,}504 \\
p_{20} &= P(Y_{20} = 1 | income_{20} = 75, gov_{20} = 1, mfasa_{20} = 1) \\
&= \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * 75) \\
&= 0{,}82 \\
p_{20} &= P(Y_{20} = 1 | income_{20} = 85, gov_{20} = 1, mfasa_{20} = 1) \\
&= \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * 85) \\
&= 0{,}96 \\
p_{20} &= P(Y_{20} = 1 | income_{20} = 95, gov_{20} = 1, mfasa_{20} = 1) \\
&= \Phi(-9.361300 + 1{,}482087 * 1 + 2{,}092485 * 1 + 0{,}089171 * 95) \\
&= 0{,}99
\end{aligned}
\tag{12}
$$

The results show that with increasing income, the probability of paying taxes by the company increases. A company with an income of 50 units has only a 0.092 probability of paying taxes. While the company with an income of 75 units, the probability of paying taxes is equal to 0.82, and the company with an income of 95 units, the probability of paying taxes is equal to 0.99.

Examining the final effects in the probit model:

In the previous part, we saw that a company whose income is 65 units, the probability of paying taxes is about 0.50. The effect of the change in the company's income for paying taxes is obtained from the following relationship:

$$
\frac{dP(TAX = 1)}{\text{dINCOME}} = \varphi(-9.361300 + 1{,}482087 \times 0.67 + 2{,}092485 \times 0.56 + 0{,}089171 \times 65) \times 0{,}089171 = 0.0133 \tag{13}
$$

Which is 0.67 average of GOV and 0.56 average of MFASA, and 0.089171 is the variable coefficient of INCOME in the probit model.

Also, a company whose income is 85 units, the probability of paying taxes is about 0.96. The effect of the change in the company's income for paying taxes is obtained from the following relationship:

$$
\frac{dP(TAX = 1)}{\text{dINCOME}} = \varphi(-9.361300 + 1{,}482087 \times 0.67 + 2{,}092485 \times 0.56 + 0{,}089171 \times 85) \times 0{,}089171 = 0.033 \tag{14}
$$

We saw that a company whose income is 95 units has a probability of paying taxes of about 0.99. The effect of the change in the company's income for paying taxes is obtained from the following relationship:

$$\frac{dP(TAX=1)}{\text{dINCOME}} = \varphi(-9.361300 + 1{,}482087 \times 0.67 + 2{,}092485 \times 0.56 + 0{,}089171 \times 95) \times 0{,}089171 = 0.016 \quad (15)$$

As you can see, with the company's income increasing from 85 units to 95 units, the probability of paying taxes has decreased from 0.033 to 0.016, and this is because the history of paying taxes shows that the company with a larger income is afraid of the consequences of not paying. Taxes, as well as familiarity with the rules of tax payment, pays taxes on time and better, so as his income increases, the probability of paying taxes also increases less.

What about binary or virtual explanatory variables GOV and MFASA?

Because the change in these variables means that, for example, the variable increases from 0 to 1. In general, if $\mathbf{X_i}$ is a binary variable, the effect of change in $\mathbf{X_i}$ on Y will be as follows:

$$\frac{\Delta Y}{\Delta X_i} = \mathrm{P}(\mathrm{Y}=1|\mathrm{X_i}=1,\bar{\mathrm{X}}_{\mathrm{other}}) - \mathrm{P}(\mathrm{Y}=1|\mathrm{X_i}=0,\bar{\mathrm{X}}_{\mathrm{other}}) \quad (16)$$

The above expression means how much the probability of paying taxes by the company increases due to the change in the state of the company (or, for example, its liquidation). Note that $\bar{\mathbf{X}}_{\mathbf{other}}$ other means that for other variables, we put their average value in the regression equation.

$$\frac{dP(TAX=1)}{\text{dGOV}} = [\Phi(-9.361300 + 1{,}482087 \times 1 + 2{,}092485 \times 0.56 + 0{,}089171 \times 101.43)] - [\Phi(-9.361300 + 1{,}482087 \times 0 + 2{,}092485 \times 0.56 + 0{,}089171 \times 101.43)] = 0.186 \quad (17)$$

Which is 101.43 average INCOME and 0.56 average MFASA.

The above expression means that the probability of paying taxes by the company increases by 0.186 or 18.6% due to the change in the state of the company's statehood (i.e. the company turns from private to public).

$$\frac{dP(TAX=1)}{\text{dMFASA}} = [\Phi(-9.361300 + 1{,}482087 \times 0.67 + 2{,}092485 \times 1 + 0{,}089171 \times 101.43)] - [\Phi(-9.361300 + 1{,}482087 \times 0.67 + 2{,}092485 \times 0 + 0{,}089171 \times 101.43)] = 0.248 \quad (18)$$

The interpretation of the above statement is that the probability of paying taxes by the company, due to the change in the company's account balance (that is, the company did not account balance before, but from now on, it will do account balance) is 0.248 or 24.8 percent increases..
Now we go to the logit model and estimate the research model using it and using the maximum likelihood method. The estimation results for the logit model are shown in Table (2):

Table 2. Model estimation results using the non-linear binomial logit method and based on the maximum likelihood method

prob	Z statistic	Std.error	coefficient	variable
0.03	-2.12	7.64	-16.19	C
0.04	2.02	1.30	2.63	GOV
0.09	1.68	2.18	2.66	MFASA
0.03	2.12	0.07	0.15	INCOME

Source: research findings

As the results show, all variables are significant at the 90% confidence level, and according to theoretical expectations, all three variables have had a positive impact on corporate tax payments.
As the logit model estimation output shows, the probability of paying TAX depends on the level of explanatory variables, namely GOV, MFASA and INCOME. For example, the probability of paying TAX for different incomes is obtained as follows:

$$p_{20} = P(Y_{20} = 1 | income_{20}, gov_{20} = 1, mfasa_{20} = 1) = \mathrm{L}(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + 1.543501 * income_{20}) \quad (19)$$

Note: The number 20 is because, for example, we have chosen the 20th company from the list of companies, which was government ($\mathbf{gov_{20} = 1}$) and has done the clearing of the account ($\mathbf{mfasa_{20} = 1}$(). This issue can be considered for any company from the list of 57 mentioned companies.

$$\begin{aligned} p_{20} &= P(Y_{20} = 1 | income_{20} = 50, gov_{20} = 1, mfasa_{20} = 1) \\ &= \mathrm{L}(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + ,1543501 * 50) \\ &= \mathrm{L}(-2.193127) = \frac{1}{1 + e^{2.193127}} = 0.100369 \\ p_{20} &= P(Y_{20} = 1 | income_{20} = 60, gov_{20} = 1, mfasa_{20} = 1) \\ &= L(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + 1.543501 * 60) \\ &= 0{,}343 \\ p_{20} &= P(Y_{20} = 1 | income_{20} = 65, gov_{20} = 1, mfasa_{20} = 1) \\ &= L(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + 1.543501 * 65) \\ &= 0{,}531 \end{aligned} \quad (20)$$

$$p_{20} = P(Y_{20} = 1 | income_{20} = 75, gov_{20} = 1, mfasa_{20} = 1) = L(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + 1.543501 * 75) = 0{,}84$$

$$p_{20} = P(Y_{20} = 1 | income_{20} = 85, gov_{20} = 1, mfasa_{20} = 1) = L(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + 1.543501 * 85) = 0{,}96$$

$$p_{20} = P(Y_{20} = 1 | income_{20} = 95, gov_{20} = 1, mfasa_{20} = 1) = L(-16.19395 + 2.62567 * 1 + 3.657648 * 1 + 1.543501 * 95) = 0{,}99$$

The results show that with increasing income, the probability of paying taxes by the company increases. A company with an income of 50 units has only 0, 10 or 10% probability of paying taxes. While the company with an income of 75 units, the probability of paying taxes is equal to 0.81 (81 percent) and the company with an income of 95 units, the probability of paying taxes is equal to 0.99.

Investigating the final effects in the logit model:

In the previous part, we saw that a company whose income is 65 units, the probability of paying taxes is about 0.53. The effect of the change in the company's income for paying taxes is obtained from the following relationship:

$$\frac{dP(TAX = 1)}{\text{dINCOME}} = l(-16.19395 + 2.62567 * 0.67 + 3.657648 * 0.56 + 0.1543501 * 65) \times 0{,}15435 = 0.012 \quad (21)$$

We saw that a company whose income is 95 units has a probability of paying taxes of about 0.99. The effect of the change in the company's income for paying taxes is obtained from the following relationship:

$$\frac{dP(TAX = 1)}{\text{dINCOME}} = l(-16.19395 + 2.62567 * 0.67 + 3.657648 * 0.56 + 0.1543501 * 95) \times 0{,}15435 = 0.013 \quad (22)$$

As you can see, with the company's income increasing from 85 units to 95 units, the probability of paying taxes has decreased from 0.034 to 0.013, and this is because the history of paying taxes shows that the company with a larger income is afraid of the consequences of not paying. Taxes, as well as familiarity with tax payment rules, pays taxes on time. Therefore, as her income increases, the probability of paying taxes also increases less.

In the case of binary or virtual explanatory variables GOV and MFASA, it works exactly like the probit model. So we have:

$$\frac{dP(TAX = 1)}{\text{dGOV}} = [L(-16.19395 + 2.62567 * 1 + 3.657648 * 0.56 + 0.1543501 * 101.433)] - [L(-16.19395 + 2.62567 * 0 + 3.657648 * 0.56 + 0.1543501 * 101.433)] = 0.165 \quad (23)$$

The above expression means that the probability of paying taxes by the company increases by 0.165 or 5.16 percent due to the change in the status of the company's statehood (i.e., the company changes from private to public).

$$\frac{dP(TAX=1)}{\text{dMFASA}} = [\text{L}(-16.19395 + 2.62567 * 0.67 + 3.657648 * 1 + 0.1543501 * 101.433)] - [\text{L}(-16.19395 + 2.62567 * 0.67 + 3.657648 * 0 + 0.1543501 * 101.433)] = 0.22 \quad (24)$$

The interpretation of the above statement is that the probability of paying taxes by the company increases by 0.22 or 22% due to the change in the company's settlement status (that is, the company did not settle accounts before, but from now on it will settle accounts).

5. Conclusions and suggestions

In this article, the factors affecting the payment or non-payment of taxes by large companies in Sistan and Baluchistan province were investigated. There is no doubt that tax is one of the important components of the income of each province and, accordingly, the national income. Especially since in recent years, due to cruel oil and financial sanctions, the government has faced a serious decrease in revenues and taxes can fill this gap to some extent. Therefore, it is necessary to know the factors affecting the payment of taxes by different companies and to calculate and estimate the effectiveness of each of these factors. For this purpose, in this article, the impact of factors such as whether the company is government or private, the status of the company's accounts and income, on tax collection by the tax department in Sistan and Baluchistan province has been examined. In this regard, the number of 57 large companies (in terms of size) income from services and sales) was considered and the data related to the dependent variable and explanatory variables were obtained from the General Administration of Tax Affairs of Sistan and Baluchistan province. Since the dependent variable is binary or binomial (tax collection or non-collection), the models used to estimate the amount and how the explanatory variables affect the dependent variable in this research are probit and logit models. The estimation results of the mentioned models indicate that all three explanatory variables of the state of the company, the need to settle the accounts and the company's income have a positive and significant effect on the collection or non-collection of taxes by the provincial tax administration in such a way that the need to settle The account (clearance) has the most impact and the state of the company is the second most important in influencing tax collection, and the impact of the company's income on tax payment is less than the other two variables. The influence coefficients of the variables of settlement of accounts, statehood and company's income in the estimated probit model are 2.09, 1.48 and 0.089, respectively. Also, the results show that with increasing income, the probability of paying taxes by the

company increases. A company with an income of 50 units has a probability of paying taxes only 0.092, while a company with an income of 75 units has a probability of paying taxes equal to 0.82 and a company with an income of 95 units has a probability of paying taxes equal to 0.99. Examining the final effects in the probit model shows that as the company's income increases from 85 units to 95 units, the probability of paying taxes decreases from 0.033 to 0.016, and this is because the history of paying taxes shows that the company with a larger income Due to the fear of the consequences of not paying taxes, as well as being familiar with the rules of paying taxes, he pays taxes on time and better; Therefore, as his income increases, the probability of paying taxes also increases less. Also, the probability of paying taxes by the company increases by 0.186 or 18.6% due to the change in the status of the company's statehood (i.e. the company changes from private to public) and the probability of paying taxes by the company due to The change in the company's settlement status (that is, the company did not settle accounts before, but from now on it will settle accounts) increases by 0.248 or 24.8 percent. On the other hand, the influence coefficients of the accounting variables, state ownership and company revenues in the estimated logit model are 2.66, 2.63 and 0.15, respectively.

The results of this model also show that with increasing income, the probability of paying taxes by the company increases. A company with an income of 50 units has a probability of paying taxes only 0.10, while a company with an income of 75 units has a probability of paying taxes of 0.81 and a company with an income of 95 units has a probability of paying taxes of 0.99. Examining the final effects in the logit model also shows that as the company's income increases from 85 units to 95 units, the probability of paying taxes has decreased from 0.033 to 0.016. The probability of paying taxes by the company increases by 0.165 or 16.5 percent due to the change in the status of the company's statehood (i.e., the company changes from private to public) and the possibility of paying taxes by the company, due to the change in the company's settlement status (that is, the company did not settle accounts before, but from now on it will settle accounts) It increases by 0.22 or 22%. Considering that the estimated coefficients are positive and significant in both models, it is suggested that the laws be amended in such a way that it is necessary for the companies to settle their accounts so that the government can collect taxes from more companies through the passage of this law. and limit tax evasion. On the other hand, considering the positive impact of company revenues on tax collection by the government, facilitating the business environment for large companies can help to increase the tax revenues of the province and the country.

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Appendix

Table 3. Characteristics of the dependent and explanatory variables of the 57 companies examined in the present study

Company number	TAX	GOV	MFASA	INCOME	Company number	TAX	GOV	MFASA	INCOME	Company number	TAX	GOV	MFASA	INCOME
1	1	1	0	12/8164	20	1	1	1	10/37891	39	1	1	1	9/946939
2	1	1	0	11/65222	21	1	1	1	10/33878	40	1	1	1	7/006466
3	1	0	0	11/39151	22	1	1	1	10/33555	41	1	1	1	9/940842
4	0	0	0	11/12953	23	1	0	0	10/3278	22	1	1	1	9/926415
5	1	1	0	10/93314	44	1	1	1	10/31719	43	1	1	0	9/918776
6	1	0	0	10/82646	25	1	0	0	10/26622	44	0	0	1	7/948406
7	0	0	0	10/78517	26	1	1	1	10/24505	45	1	1	1	9/906528
8	0	0	0	10/7814	27	1	0	1	10/20443	46	1	1	1	9/905907
9	1	1	1	10/75961	28	1	0	0	10/17829	47	1	1	1	9/896675
10	1	0	0	10/71498	29	1	1	1	10/1604	48	1	1	1	9/893595
11	1	1	0	10/68843	30	1	1	1	10/02003	49	1	1	0	9/887746
12	1	0	0	10/60253	31	1	1	1	10/0145	50	1	1	1	9/88674
13	0	0	0	10/58437	32	0	1	0	10/01445	51	1	1	1	9/873992
14	1	1	1	10/56012	33	0	0	0	7/955736	52	1	1	1	9/857867
15	1	1	0	10/4722	34	1	1	1	10	53	0	0	0	9/132194
16	1	0	0	10/4591	35	1	1	1	9/985674	54	0	0	0	9/070671
17	1	1	1	10/45715	36	1	1	1	9/976148	55	1	1	1	9/849655
18	1	1	1	10/45098	37	1	1	1	9/971218	56	1	1	1	9/845098
19	0	0	0	10/4161	38	1	1	1	9/95619	57	0	0	0	9/345697

Source: Sistan and Baluchistan Province Tax Administration Organization

بررسی تاثیر عوامل موثر بر وصول مالیات ازمؤدیان بزرگِ اداره امور مالیاتی استان سیستان و بلوچستان: رهیافت مدل های دودویی لاجیت و پرابیت

چکیده

در این مقاله تأثیر عوامل مختلفی چون دولتی یا خصوصی بودن شرکت، انجام مفاصا حساب و درآمدهای شرکت بر وضعیت وصول مالیات توسط اداره امور مالیاتی استان سیستان و بلوچستان برای 57 شرکت بزرگ مورد بررسی قرار گرفته است. از آنجایی که متغیر وابسته‌ی وصول مالیات، یک متغییر دو دویی می باشد از مدل های پروبیت و لاجیت برای برآورد ضرایب استفاده شده است. نتایج بکارگیری دو مدل نشان می‌دهد که هر سه متغیر توضیحی تاثیر مثبت و معناداری بر پرداخت مالیات توسط شرکت‌ها داشته‌اند و بیشترین اثر به ترتیب مربوط به انجام مفاصا حساب، دولتی بودن شرکت و درآمدهای شرکت می باشد. بررسی اثرات نهایی نیز نشان می دهد که با افزایش درآمد شرکت، اندازه‌ی احتمال بدست آمده برای پرداخت مالیات شرکت کاهش یافته است و این بدان دلیل است که شرکت با درآمد بزرگتر به خاطر ترس از عواقب نپرداختن مالیات و همچنین آشنایی با قواعد پرداخت مالیات، مالیات ها را به موقع و بهتر می پردازد؛ بنابراین با افزایش درآمدش، احتمال پرداخت مالیاتش نیز کمتر افزایش می‌یابد. آماره هاسمر– لمشو نیز حاکی از آن است که برازش الگوها به نیکویی صورت گرفته و مدل با داده‌ها انطباق دارد. پیشنهاد می‌شود که قوانین به گونه‌ای تعدیل و اصلاح گردد که انجام مفاصا حساب توسط شرکت ها ضروری گردد تا دولت بتواند از ممر این قانون، از شرکت‌های بیشتری مالیات دریافت کرده و راه فرار مالیاتی را محدودتر نماید.

کلمات کلیدی: وصول مالیات، مؤدیان بزرگِ مالیاتی، مدل‌های پروبیت و لاجیت، استان سیستان و بلوچستان