MINIMIZING TAX GAP BY IMPROVING MECHANISM OF TAX INCENTIVES

Azizjon Rakhmonov
Independent researcher at Fiscal Institute under Tax committee of Uzbekistan
Department of Finance, KIMYO International University in Tashkent, Uzbekistan

Abstract. The article sheds light on the theoretical basis of tax incentives to stimulate research and development (R&D) investment. Furthermore, the study also provides aspects of international practice in comparison with Uzbekistan`s practice of incentivizing private sector to invest in technological modernization.

According to econometric analyzes of 554 firms over 2015-2018 in Uzbekistan, we found that investment tax credits with target, limited period, and redeemably conditions can successfully boost technological innovation and performance of firms in the short-run.
Key words: R&D, investment activity, tax incentives, tax gap**,** tax evasion, investment tax credit, technological modernization

Introduction

Investment, particularly in research and development (R&D), is one of the key drivers of long-term economic growth of a nation (Nair et. al 2020). Governments, therefore, use a variety of fiscal and monetary instruments to encourage businesses to invest in modernizing their production processes and sophisticating their products. Tax incentives and concessions are among the most often used indirect fiscal mechanisms to promote investment. In fact, in most of the technologically advanced nations, tax holidays, tax deductions, tax credits, research tax credits, accelerated depreciation, and investment tax credits are among the most popular types of tax incentives for actively recruiting investment and expanding innovative activities.

Uzbekistan has also implemented various economic instruments, including tax mechanisms, in recent years to increase investment and innovation activity. However, incentivizing tax instruments in Uzbekistan take the form of a general tax exemption, such as deferring tax payment or paying tax debt in installments, which differs from the main characteristics of tax credits in international practice.

This leaves room for further research into the feasibility of introducing investment tax credits in Uzbekistan based on theoretical aspects and international practices of investment incentives, specifically investment tax credits. Thus, this article provides a broad theoretical study of the characteristics of investment tax credits, as well as an analysis of the effects of existing tax incentives for technological modernization in Uzbekistan, in order to draw conclusions about the viability of introducing investment tax credits. It is critical to conduct research on the theoretical aspects of investment tax credits as well as an analysis of international practice for this purpose.

Literature review

Extensive studies have been done on the beneficial benefits of investments in the development of creative activities on production efficiency and business sales. In fact, a study of 168 of the largest industrial enterprises in the United States and China discovered that firms that invest in R&D generate 4-11 percent more sales and 4-13 percent more profit than firms that do not (Shuddhasattwa Rafiq 2016). Chen and Yang (Chen 2012) by examining the activities of Indonesian enterprises from 1998 to 2000 discovered a positive relationship between the volume of investment in innovation and level of production efficiency of the firm. Trajtenberg (Trajtenberg 1990) took a macro approach in his research, and found that R&D is a critical factor in ensuring country`s innovative competitiveness and long-term economic growth.

However, several authors argue that in most of developing countries private investment in R&D are far lower than what is required (Ioannis Bournakis 2018). According to the studies the following factors are the main two factors of such low level of investments.

First, the investment in the R&D limits the investor`s ability to fully absorb the private benefits associated with a new product or development process. This is explained by the imperfect intellectual property rights in developing countries, which results in the rapid spread of innovations and technology (positive externalities). This, in turn, leads to public benefits being more than private interests. As a result, firms and investors typically do not consider it profitable to invest in this area (Arrow 1962).

Second, when it comes to external financing, attracting investment to the R&D poses even greater risks (Hall 2002). Due to long-term nature of such investments, they require long-term financing. This increases the risk of failure of investment projects, as well as opportunity cost of other short-term counterproductive investments.

As an alternative, government grants may be awarded through public competitions, which are judged based on project quality, location, employment contribution, and other criteria. This type of direct government support will limit R&D to a few business entities and reduce investment efficiency. Investment tax credits, on the other hand, enable the development of R&D in all sectors of the economy by providing equal opportunities for all. Tax credits also reduce the opportunity costs of investing for businesses and investors by reducing the tax burden. This, in turn, leads to increase in return on investment (Inmaculada C.Alvarez-Ayuso 2018).

Theoretically, investment tax credit is essentially distinguished in two ways in modern practice: (1) as the amount of tax to be taken into account in covering the taxpayer`s tax liability, or (2) as a reduction in the tax debt payable.

In international practice, a tax credit involves reducing the amount of a taxpayer`s tax liability to the amount of expenses incurred. Most countries offer full or redeemable tax credit (Canada, France, Italy, Norway) based on the total cost of research and innovation. In some countries, tax credits are provided on an incremental or non-repayable basis (USA, Japan, Mexico, South Korea) due to an increase (increase) in R&D expenditures over a period of time. In international practice, there is also a mixed tax credit. In this case, the full amount of tax credit is added to the accumulated tax credit (Spain, Portugal) (др. 2015).

In general, the rate investment tax credit varies from country to country depending on the type of enterprise, form of investment, and value. For example, in Japan for electronics and equipment - 5.3%, in the UK for the first year of operation of new machinery, technology and materials - 50%, in Canada, regardless of the area and location of the enterprise - 10-15%, and in Ireland and Luxembourg – 100% (В.И. 2016). As can be seen from the preceding, R&D tax credits are widely used in international practice to encourage innovative production. This provides evidence that the investment tax credit is the more effective than other tax breaks, which is provided in the form of full exemption for an indefinite period of time.

Methodology and Data

In order to determine to what extent R&D stimulating tax incentives in Uzbekistan are effective we conduct econometric analyzes. The study includes observations from 554 firms over 2015-2018.

As a dependent variable, we use capital investment and gross profit of enterprises to examine how tax incentives for technological modernization are effective in increasing non-current assets in the short-run, and efficient in improving performance of the companies.

For the period covered in the study, there were two major incentives for technological modernization under the existing tax law: 1) 25% maximum reduction of the tax base of purchased

new technological equipment; 2) reduction of taxable profit of enterprises for costs allocated to the modernization of production process, technical and technological re-equipment.

These incentives include certain aspects of the investment tax credit, specifically the targeted to a particular direction, terms of eligibility, and partiality of incentives. Analysis of these incentives is critical to determine the effectiveness of investment tax credits over full tax exemptions.

To perform regression analysis, we use a panel data set. The panel data set enables to increase the number of observations, by allowing cross section of years and different entities. It also enables for the control for non-observable, firm specific, and time factor affects (Hsiao 2003).

In analyzing the impact of incentives for technological modernization on the capital investment or gross profit of enterprises, the following baseline equation (1) is formed:

$$Y_{it} = \alpha + \beta X_{it} + \delta \acute{Z}_{it} + \varepsilon_{it} \quad (1)$$

$$i = 1, 2, 3, \ldots, N$$

$$t = 2015, 2016, \ldots, T$$

where, Y_{it} – is the amount of net capital investment (or gross profit) of the t enterprise in year i; α – denotes intercept; β and δ coefficients; X – is the amount of tax incentives; $\acute{Z}$ – stands for a set of controlling variables; ε_{it} – is the composite error term.

Data on selected indicators as dependent, independent and controlling variables are obtained from the State Tax Committee and the World Bank. Tables 1 and 2 provide us with a brief overview of the selected variables.

Table 1. Brief description and expected correlation sign of variables

Variables	Definition (source)	Expected correlation sign
Dependent variable, (Y_{it})		
Capital formation	Non-current assets in financial statements. (State Tax Committee)	
Gross profit	Gross profit in financial statements (State tax Committee)	
Concerned Independent variable, (X_{it})		
Incentive for innovation	Tax incentives provided for technological modernization in tax reports. (State Tax Committee)	+
Controlling variables, ($\acute{Z}_{it}$)		
Net profit and loss	Profit/loss after tax in financial statements. (State Tax Committee)	±
Tax burden	The burden of all taxes and mandatory payments paid by businesses. (World Bank)	-
Interest rate	Bank interest rates on medium- and long-term financing needs of the private sector. (World Bank)	-
Tax on goods and services	Sales/consumption taxes on goods and services (VAT, excise tax). (World Bank)	-
Long-term investment	Investment in other companies in financial statements. (State Tax Committee)	+
Doing Business index	"Ease of doing Business". (World Bank)	+

The regression analyses include firms that benefited from incentives over two, three and four years` period. According to the descriptive statistics in Table 2, in 2015-2016, a total of 263 firms had an extra 178.3 mln. UZS fund due to incentive, and capital investments and gross profit averaged 17056.3 and 26225.6 mln. UZS, respectively.

Similarly, over 2015-2017 period, a total of 279 business entities received an average of 40.1 mln. UZS of additional funds due to tax breaks targeted to innovative development. Their capital investments and gross profit averaged UZS 1327.1 mln. and 20487.5 mln. UZS, respectively. During the four years, 2015-2018, the average amount of tax incentives received by 12 enterprises amounted to 26.0 mln. UZS, and the average capital investment and gross profit amounted to 23.0 mln. and 2225.3 mln. UZS, respectively.

Table 2. Descriptive statistics

Variables	Number of Entities	Mean	Std. Dev	Min	Max
Two year (2015-2016)					
Capital formation	263	17056.26	183278.4	0	3013144
Gross profit	263	26225.58	164494.3	0	2911346
Incentive for innovation	263	178.28	1083.902	0.004	14383.64
Net profit and loss	263	3087	28709.12	-15689.82	479276
Tax burden	263	39.6	1.501	38.1	41.1
Interest rate	263	13.64	0.125	13.523	13.773
Tax on goods and services	263	28.11	1.119	26.994	29.231
Long-term investment	263	2751.18	16699.42	0	246200.2
Doing Business index	263	61.884	0.209	61.675	62.093
Three year (2015-2017)					
Capital formation	279	1327.112	25503.07	0	736140.1
Gross profit	279	20487.5	253780.5	0	6475586
Incentive for innovation	279	40.105	71.91876	0.009	808.814
Net profit and loss	279	2050.51	31506.91	-25822.36	891274.2
Tax burden	279	39.166	1.370	38.1	41.1
Interest rate	279	14.224	0.821	13.524	15.376
Tax on goods and services	279	30.361	3.310	26.994	34.858
Long-term investment	279	380.973	2083.508	0	25676.22
Doing Business index	279	63.461	2.237	61.675	66.613
Four year (2015-2018)					
Capital formation	12	23.016	106.911	0	718.468
Gross profit	12	2225.294	3365.444	0	19204.11
Incentive for innovation	12	26.031	23.239	0.361	102.413
Net profit and loss	12	145.388	422.024	-895.552	2127.388
Tax burden	12	37.4	3.316	32.1	41.1
Interest rate	12	15.660	2.613	13.524	19.965
Tax on goods and services	12	29.442	3.312	26.684	34.858
Long-term investment	12	11.027	37.066	0	151.038
Doing Business index	12	64.534	2.712	61.675	67.752

Results and Discussion

In regression analyses three models are used, namely, Ordinary Least Squares (*OLS*), Fixed Effects (*FE*) and Random Effects (*RE*) models. Hausman and Breusch & Pagan Lagrangian multiplier tests showed that the *RE* is most appropriate model for the first two cases (in two- and three-year analysis). The OLS model appeared to be suitable for the third case (in the four-year analysis), due to certain the features of our dataset.

In addition to above tests, before running regression, several diagnostic tests were performed. In fact, the Variance Inflation Factor (VIF) test (Gujarati 2009) is performed to check the level of multicollinearity between the selected independent variables. Test results showed that the degree of overlap between regressors is less than 5 (see Table 3), which implies that, the degree of bias that could arise as a result of multicollinearity is statistically insignificant. In addition, to control for "heteroskedasticity" issues the *"robust"* specification was also selected.

In the first step of our analysis, we determine the effect of provided incentive amount on the capital investments. The results of the regression in Table 3 reveals that the impact of the incentives for innovative equipment is statistically significant at 0.01 level in the 1st case. This indicates that a 1% increase in the amount of incentive benefits leads to a 1.08% increase in the volume of capital investments of the firms who took advantage of the incentive for two years (2015-2016).

Similarly, the enterprises that used incentive for technological modernization during 2015-2017 (the 2nd case) were statistically significant at 0.01 level. As for the degree of the effect, a 1% increase in such incentives show a possibility of increasing the volume of capital investments of firms` by about 0.47%.

However, the level of technological modernization of enterprises that benefited from the incentives over four years (2015-2018) turned out to be statistically insignificant, although it showed a positive correlation. It can be explained by the small number of enterprises that have invested in the modernization of fixed assets (12 entities) and their very small investment (average 26.0 mln. UZS) (see Table 2).

Based on the aforementioned findings it can be concluded that the incentives that is provided under certain conditions (if they are used effectively) enable to modernize the technological state of business entities in a short-time (two to three years).

Table 3. Regression results on the impact of tax incentives for technological modernization on capital investments of enterprises.

Dep. Var: Capital formation	**1th case (Two-year)**			**2nd case (Three-year)**			**3rd case (Four-year)**	
	[1]Coeff.	[2]Std. Err.	[3]VIF	[1]Coeff.	[2]Std. Err.	[3]VIF	[1] Coeff.	[2]Std. Err.
Incentive for innovation, *(log)*	1.080***	0.197	1.04	0.469***	0.159	1.04	0.257	0.276
Net profit and loss, *(log)*	0.099**	0.046	2.14	0.101**	0.040	2.45	-0.064	0.160
Tax burden, *(%)*	-0.465***	0.179	2.08	-0.296**	0.140	1.99	0.245	0.739
Interest rate, *(%)*	-5.585***	2.145	2.08	-0.400*	0.238	2.15	-0.068	0.937
Constant, *(α)*	11.767	7.261	-	15.680*	8.055	-	-8.728	40.837
Number of observations	479			731			44	
Number of entities	258			278			12	
R^2	0.282			0.104			0.104	
F-statistics	39.88***			19.20***			4.63***	
[4]Breusch & Pagan LM test	5.27***			210.52***			0.01	
[5]Hausman test	32.80			16.76			2.44	
[6]Cook-Weisberg test *(Heteroskedasticity)*	2.80*			23.53***			13.30***	

Significance levels: *** - p<0.01 (99%), ** - p<0.05 (95%), * - p<0.1 (90%).
[1] Coefficients, β and δ *is* from $Y_{it} = \alpha + \beta X_{it} + \delta \acute{Z}_{it} + \varepsilon_{it.}$
[2] *Robust* standart errors in parenthesis.
[3] VIF test: If VIF < 5, there is *"multicollinearity"*.
[4] Breusch & Pagan LM test: H_0 – *OLS model is appropriate.*
[5] Hausman test: H_0 – appropriate model is *RE* .
[6] Cook-Weisberg test: H_0 – There is no heteroskedasticity.

The results of the regression analysis presented in Table 4 provides the extent to which incentives contribute to the gross profit of firms. In this analysis, also, the Random Effects (*RE*) model was found to be the most appropriate model for the nature of our panel dataset. The results of the empirical analysis provide information on enterprises that have been benefiting from incentives in the form of a reduction in taxable profit in the cost of investment aimed at modernizing production for two, three, and four years, respectively.

The firms that took advantage of the such incentives for two years (2015-2016), appeared to have positive and statistically significant (at 0.05 level) correlation of this incentive with their gross profit. This evidences the possibility of 0.32% increase in gross profit of firms due to 1% increase of the incentive amount. Such a low growth rate can be explained by the fact that investments in fixed assets will pay off in the next two to three years.

Likewise, during 2015-2017 (the 3rd case), received incentive amounts show significant (at 0.01 level) impact of incentives on their gross profit. According to the results, a 1% increase in incentives contributed on average 0.5% increase in gross profit of firms.

The findings also show that incentives used during 2015-2018 (four years case) is positively related to the gross profit of the firms as well. However, in this case, the significance of correlation is lower (at 0.1 level), and a 1% increase in incentive amount are likely to increase firm`s gross profit by about 0.92%. The low level of significance in this case can be explained by the volume of investments made by enterprises during this period.

Based on empirical test results, we can conclude that the impact of tax breaks given under specific conditions has a significant impact on enterprise investment activity. Setting the purpose, amount, and duration of such incentives, which are the main conditions for the provision of investment tax credits, increases the level of effective use in this case. It is precisely the inclusion of such conditions and an investment-oriented investment tax credit that allows for positive outcomes, such as effective incentives for innovation and investment activities and a reduction in the tax burden on investors.

Table 4. Regression results on the impact of tax incentives for technological modernization on gross profit of enterprises.

Dep. Ver. Gross profit	**1th case (Two-year)**			**2nd case (Three-year)**			**3rd case (Four-year)**	
	[1]Coeff.	[2]Std. Err.	[3]VIF	[1]Coeff.	[2]Std. Err.	[3]VIF	[1] Coeff.	[2]Std. Err.
Incentive for innovation, *(log)*	0.320**	0.143	1.240	0.479***	0.074	1.030	0.922*	0.579
Tax on goods and services, *(%)*	-4.840***	0.204	1.000	-7.161***	0.255	4.600	-0.203	0.191
Long-term investment, *(log)*	0.015	0.040	1.230	0.001	0.020	1.03	-0.040	0.064
Doing Business, *(index)*	25.893***	1.091	1.160	11.521***	0.396	24.59	0.691***	0.247
Constant, *(α)*	141.911***	5.876	-	507.829***	17.460	-	-36.124**	17.003
Number of observations	526			837			48	
Number of entities	263			279			12	
R^2	0.529			0.637			0.359	
F-statistics	585.23***			1115.70***			39.79***	
Breusch & Pagan LM test	3.38			5.63			1.88	
Hausman test	0.00			0.00			0.00	
Cook-Weisberg test *(Heteroskedasticity)*	78.82***			219.80***			4.13**	

Significance levels: *** - p<0.01 (99%), ** - p<0.05 (95%), * - p<0.1 (90%).

Conclusion

The study shows that there is a positive correlation between the amount of investment in innovation and the level of production efficiency of firms. Businesses that invest in the R&D will have the potential to generate high returns in the medium- to long-term period. However, the long-term nature of the return on investment in the R&D increases the risk of failure of projects, as well as the opportunity cost of other short-term investment projects. It has been found that the effective use of a variety of fiscal instruments, especially investment tax credits, has potential to reduce the impact of such risks.

According to the empirical analysis, the tax incentives provided under certain terms are of great importance in terms of technological modernization and profitability of firms in the short- and medium-term. But incentives appeared to become less efficient by extension of time limit more than 3 years.

For this reason, the investment tax credit is considered as an effective tool to stimulate investment activity of enterprises in the short-, medium-, and long-term. Because clearly established purpose and amount and time limit of incentive, which is included as a condition for granting concessions, increases the degree of certainty of firms about redeemability of the tax credit, which encourages firms to use them more efficiently.

In order to achieve effective incentives for investment and innovation activities in Uzbekistan through tax incentives, it is necessary to introduce an investment tax credit, which has been tested in international practice. The use of investment tax credit instead of tax benefits for an indefinite period of time and without any pre- and post-conditions encourages firms to invest more in the innovative activity, which in turn reduces loss of the budget revenue.

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