Research on the Incentive Effect of Tax Preference and Financial Subsidy on the Development of Integ rated Circuit Industry

Yuntong Hu[1,a], Fengwei Zhao[2,b*]

[1]Business School,Southwest University of Political Science and Law,Chongqing,China
[2]Business School,Southwest University of Political Science and Law,Chongqing,China
[a]52391002@qq.com
[b*]1120013712@qq.com

Abstract

tax preference and financial subsidy, as the main policy tools for government departments to stimulate indust rial development, play an important role in the definition of government and market under market economy. Compared with other industries, the high-end manufacturing industry represented by the integrated circuit ind ustry has the characteristics of high investment, high risk and positive externality of scientific research result s, which makes the fiscal and tax policies inevitably have different incentive effects on its industrial develop ment. Based on the micro data of IC listed companies from 2011 to 2020, this paper analyzes the impact a nd differences of tax preferential policies and financial subsidies on the IC industry. The empirical study fou nd that tax preference and financial subsidy have promoted the development of IC industry, and the incentiv e effect of tax preference is more significant. At the same time, by studying the incentive effect of the two policy tools on the important activities of integrated circuit enterprises, it is found that the two policy tools have a positive incentive on the R & D investment of integrated circuit enterprises, and the incentive effect of financial subsidies on Enterprise R & D is more obvious; There is no significant inhibitory effect on the investment of integrated circuit enterprises; Tax preference for enterprise financing shows positive incentive, while financial subsidies show inhibitory effect.

Key words:tax preference; Financial subsidies; Integrated circuit industry; Incentive effect; Empiric al analysis

1.Introduction

IC is a strategic and key industry in national ec onomy, which is involved in the fields of electric, military, aerospace, computer and so on.In 2014, the State Council issued the national development of i ntegrated circuit industry, which pointed out that Ch ina should upgrade the development of IC industry to a national strategy.In the government work report in 2018, integrated circuits are listed as the top pr iority in real economy development.Previously, the State Council, in its report made in China 2025, re quested that China's chip self-sufficiency rate will r each 50% by 2025.With a series of fiscal and tax r eform policies in recent years, the integrated circuit industry has been reduced to some extent in financi al pressure.The comprehensive tax reduction and cos

t reduction promoted by the state have made the en terprise reduce the burden unprecedented.At the sam e time, as a means of economic regulation arising f rom the transition from the planned economic syste m to the market economic system, tax incentives, fi nancial subsidies and other policy tools mainly act on the enterprise level to induce enterprises to mak e strategic choices in the main activities of enterpri ses such as R&D investment, enterprise investment and enterprise financing,Finally achieve the win-win situation of maximizing the interests of enterprises a nd realizing the national industrial goal.However, in view of the special industry of IC, which requires huge capital investment, long time cycle and rapid renewal and iteration of industrial technology and p roducts, the objectives of the government and enter prises will not be completely consistent due to the

asymmetry of information and the lack of restraint and supervision system,This will greatly reduce the effectiveness of the two policy tools. Events such as "Hanxin" embezzling funds and defrauding financial subsidies at home and abroad and the uncompleted completion of Wuhan Hongxin's 10 billion level project have aroused public doubts about whether the two fiscal and tax policies can really stimulate the development of enterprises.

In fact, many scholars have conducted in-depth research on fiscal and tax subsidy policies in different industries and regions using different measurement models, but the results are different Foreign scholars represented by Wren (2005) and Harris & Trainor (2005) Ozcelik & Taymaz (2008) Alessandro & Francesco (2018) and domestic scholars represented by Yun Wu (2013), Yunhuan Zhu (2010) and Deyin Chu (2019) believe that economic regulation measures taken by the government such as tax preference can positively stimulate the development of enterprises,To a certain extent, it can positively stimulate enterprise policies such as enterprise science and technology R&D and investment and financing vitality.Liu et al. (2011) started by questioning economists' doubts about the economic policies that promote economic growth and industrialization in developing countries. They summarized economists' literature and found that these positive policies often do not seem to be so effective in developing countries. They took China's fiscal and tax policies as an example,It is believed that financial subsidies and tax incentives are two important economic regulation policy tools in China. They not only affirm China's fiscal and tax policies, but also worry about China's fiscal and tax development, efficiency and fairness[1-7]. Pingfu Li and Yonghui Li(2015) studied 2315 strategic emerging enterprises and showed that tax preference and financial subsidy policies showed a significant inverted "U" effect on innovation investment such as enterprise science and technology R&D and enterprise survival time[8].

This paper holds that the reasons for the above different research results are as follows: firstly, some literatures ignore the influence of industrial characteristics, especially the effect of fiscal and tax policies of high-tech manufacturing industry represented by integrated circuit industry, which is characterized by high investment, high risk, fast renewal and high elimination rate, must be different from that of other industries. Secondly,Tax incentives and financial subsidies, as tools of ex ante and ex post incentive policies, have their own distinctive characteristics. The two policies have certain differences in stimulating the development of enterprises. If the two are confused, the research results will also be different. Third, although some documents point out that the

incentive effect of fiscal and tax policies on enterprise activities is not obvious,However, it is rarely pointed out that the fiscal and tax policies are caused by the dislocation of incentive objects or the lack of incentive measures.In view of this, based on the existing research literature, this paper systematically investigates the incentive effect of tax incentives and financial subsidies on the IC industry by using the empirical data of listed IC companies from 2011 to 2020 and empirical research.The research shows that: first, preferential tax policies have a significant positive incentive effect on the development of integrated circuit industry. Although financial subsidies have a certain positive incentive on the development of integrated circuit industry, they are not significant.Second, in terms of scientific research investment of integrated circuit enterprises, tax incentives and financial subsidies show positive incentive effects, but the incentive effect of financial subsidies is more obvious.In investment activities, tax incentives and financial subsidies show negative incentive effects, which inhibit enterprise investment activities to a certain extent.In financing activities, tax incentives show no obvious positive incentive effect, and financial subsidies show inhibitory effect.

2. Literature review

Tax preference and financial subsidy, as two market economy adjustment tools at the same time, lead to the adjustment of relevant strategic decisions of enterprises to a certain extent. However, due to information asymmetry, monopoly, externality, government supervision and other reasons, the policy cannot accurately play its due role.Marshall's consumer surplus theory points out that if the government levies on goods with decreasing returns, the tax will be greater than the lost consumer surplus. If some of the tax is used to subsidize goods with increasing returns, the consumer surplus will be greater than the subsidies paid, so as to improve social welfare. This laid the theoretical foundation for the government to implement tax preference and financial subsidy policies.Since then, many scholars have devoted themselves to the research of government fiscal and tax policies.

2.1.Incentive effect of tax preference on enterprise development

Bloom and Griffit (2008) investigated the impact of preferential tax policies on the level of enterprise R & D investment.Tax changes and research and development expenditures in nine OECD countries were estimated over a 19-year period.It is found that considering the national characteristics, the world

macro impact and other policies, tax incentives are significantly effective in improving the intensity of R&D[9].Hall and van Reenen (1999) believe that tax preference has a certain "crowding in effect" on enterprises, and tax preference promotes the R & D level of enterprises to a certain extent[10].Zhang Li and Wei Sun (2018) proposed that it is important to use preferential tax policies to attract highly skilled talents, for example, to reduce the burden of personal income tax by exempting highly skilled talents from personal income tax and deducting personal income tax[11].Guangqiang Liu (2014) empirically tested the incentive effects of tax preference and financial subsidy policies on different industries in different countries by establishing multiple linear regression equations with listed companies as samples, and conducted a comparative study. His research shows that the effects of tax preference and financial subsidy policies on different countries and industries are significantly different[12].

2.2.Incentive effect of financial subsidies on enterprise development

Tzelepis & Skuras (2006) conducted an empirical analysis on the sample of Greek enterprises. The research results found that financial subsidies have a positive impact on the long-term strategic direction of enterprises, such as the net market growth and the optimal business scale of enterprises.Providing capital subsidies can help enterprises overcome the cost disadvantage caused by suboptimal output scale and fixed capital operation, and help enterprises increase their net market share. Financial subsidies should be one of the strategic tools for the future development of enterprises[13].Feldman & Kelly (2006) found through research that financial subsidies can have a "recognition effect" on enterprises. Financial subsidies send a positive signal that enterprises have good development prospects to the outside world, which helps enterprises better obtain external financing and reduce the financing threshold of enterprises [14].Zhang and Du Dan (2014) found through empirical research that financial subsidies may lead to over investment in China's strategic emerging enterprises[15]. Jinhong Yu (2019) research found that government financial subsidies can not promote the performance of enterprises measured by profitability. Every 1% increase in financial subsidy intensity will lead to a decrease of 0.79% of the total asset return and 1.33% reduction in the return on net assets[16].

2.3.A comparative study on the incentive effect of tax preferential and financial subsidy policies on Enterprises

Yongcui Peng (2021) and other scholars analyzed the reasons for the difference between the two incentive tools: first, financial subsidy is a kind of pre incentive directly providing financial support for enterprise activities, and the financial subsidies provide the determination of income, while the tax preferential is mainly the post incentive by adopting measures such as tax exemption, pre levy and retreat, namely, levy or retreat,Tax saving income is a kind of expected income, and compared with financial subsidies, tax preferences have stronger autonomy in the use of income, and will not make specific requirements for the purpose of tax refund.Secondly, the incentive object of financial subsidy is often designated by the government, which has certain limitations. Compared with tax preference, the limitation is less, and the government will not require specific use of tax saving.Third, although the financial subsidies have more limitations, compared with tax preference, it has the advantages of fast response and low operating cost[17].Guangqiang Liu (2016) thinks that the role of financial subsidies is more direct and rapid than tax preference. Tax preferential policies need a long time to show policy effects, but at the same time, financial subsidies will also have the disadvantages of efficiency loss and distortion effect, which will directly increase the financial and political burden of the government[18].Yanning Chen (2020) research found that both financial subsidies and tax preferences will have significant incentive effects on enterprises, but the incentive effect of financial subsidies on enterprises is better than tax preferential policies.With the exception of state-owned enterprises, tax incentives have more advantages over financial subsidies[19].

As mentioned above, most of the existing literature focuses on whether tax preference and financial subsidy policy have incentive effect on the development of enterprises. There are few comparative studies on tax preference and financial subsidy policies for a specific industry.The difference of incentive effect of IC industry often comes from the difference of two policy tools.This paper will combine the characteristics of IC industry, through empirical research, analyze the incentive effect of two policy tools on the integrated circuit industry, provide decision-making for the implementation of corresponding fiscal and tax policies, clarify fiscal and tax policies, and provide theoretical support for the precise incentive of financial and tax policies to the development of enterprises.

3. theoretical analysis and research hypothesis

IC industry is a basic, key and strategic industry in national economy. However, due to the characteristics of high investment, high risk and positive externality of research results, the profit margin of IC industry is not high and the enthusiasm for R & D of enterprises is not high.In the absence of external stimulation, enterprises tend to adopt more conservative competition strategies.The support of IC industry through tax preferential and financial subsidy policies will help it break through the bottleneck of development, improve its profitability, promote social resources flowing into IC industry and provide resource guarantee for it.The preferential tax and financial subsidy policies reduce the financial burden of IC industry, further reduce the production and operation costs of IC enterprises, thus encouraging the healthy development of IC enterprises and improving the market competitiveness of the enterprises.Based on this, this paper proposes hypothesis 1 and hypothesis 2

H1: preferential tax policies have positive incentive effect on the development of integrated circuit enterprises.

H2: the financial subsidy policy has positive incentive effect on the development of integrated circuit enterprises.

Because of the difference of tax preference and financial subsidy in incentive mode and incentive object, the two policy tools will have different effects in the major decision-making activities of enterprises.According to the literature of Minggui Yu et al. (2010), Guangqiang Liu (2016), combined with the main incentive objects of current tax preferences and financial subsidies, this paper selects enterprise R & D, enterprise investment and enterprise financing as explanatory variables[16].Haihong Feng(2015) through panel analysis of 28 large and medium-sized industries in China found that the government tax incentives have significant incentive effect on Enterprise R&D, which is more obvious in the technology intensive enterprises[20].Tongying Liang et al. (2012) proved that financial subsidies have positive incentive effect on R&D investment of advanced manufacturing industry in China through GMM[21]. this paper proposes hypothesis 3

H3: tax preferential policies have positive incentive effect on R&D investment of integrated circuit enterprises.The financial subsidy policy has positive incentive effect on the R&D of IC enterprises and the incentive effect is more significant.

However, there are few researches on the relationship between tax preference and financial subsidy on the investment behavior of enterprises. Many mathematicians believe that tax preference has no incentive effect on enterprise investment behavior, even suppresses the investment behavior of enterprises.Zhengping Gao and Xingwei Zhang(2014) found that local fiscal and tax policies have no incentive effect on the investment behavior of enterprises[22].Guigen Shao et al. (2016) through analyzing the current tax preferential policies in China, it is pointed out that the reason why tax preferential policies have no incentive effect or even inhibition effect on enterprise investment is that most enterprises' investment behaviors can not enjoy tax preferential, the discount threshold is too high and narrow tax reduction objects[23].Haishang Yu (2016) thinks that the current fiscal and tax policies have "accumulation effect" on the investment behavior of enterprises, and shows invalid or even negative effects on some enterprises with low investment level[24]. Based on this, this paper proposes Hypothesis 4

H4: tax preference and financial subsidy policy have no significant incentive effect or even inhibition effect on investment of integrated circuit enterprises.

For the enterprise financing behavior of IC enterprises, Guangqiang Liu (2016) finds that financial subsidies have a certain inhibition on enterprise financing due to asymmetric information of enterprises, while tax incentives will positively stimulate corporate financing behavior[18].The research of Yuan Gao (2018) and Haoyan Li (2021) shows that tax preference has not only positive incentive effect on enterprise financing but also corporate performance.As financial subsidy is a kind of recognition income in advance, enterprises may reduce their own financing demand.The expected income after the preferential tax policy is also a positive signal to the capital market, which will reduce the financing threshold to a certain extent[25].Based on this, this paper proposes Hypothesis 5:

H5: tax preferential policies have positive incentive effect on the financing of IC enterprises.The financial subsidy policy has a restraining effect on the financing of IC enterprises.

4. research design and result analysis

4.1.Data source and sample selection

This paper selects the listed companies of Shanghai Shenzhen A-share IC industry from 2011 to 2020 as samples, excluding the st, st* and data missing enterprises, and a total of 385 samples of 45 enterprises.The main financial data of this paper is fro

m the national Tai'an database, some of the indicators are calculated and sorted out, and some enterprise information is from the website of China Semiconductor Industry Association.

4.2. Variable design and model construction

4.2.1. The variable being interpreted.

This paper uses Pro to measure the business ability of enterprises by referring to relevant literature. The total profit reflects the development level and speed of the enterprise to a large extent, and is an important index to evaluate the development ability of the enterprise. Therefore, this paper selects the natural logarithm of total profit as the indicator of the operating income of integrated circuit enterprises. Referring to the research of Minggui Yu et al. (2010) and Guangqiang Liu (2015), the research and development investment index of the enterprise adopts the natural logarithm of "technology R&D investment fund", the enterprise investment capacity is measured by the natural logarithm of "(net fixed assets Con

struction in progress)", and the enterprise financing capacity is measured by "(short-term loan+long-term loan)/total assets".

4.2.2. Explain the variables.

This paper describes the general practice of enterprise tax preference index by using Liansheng Wu (2009) actual tax rate, and uses "total profit * (nominal income tax rate-actual income tax rate)" as the tax preference index. The natural logarithm of "government subsidy" is adopted in the financial subsidies.

4.2.3. Control variables.

In addition, according to the relevant literature, the paper also selects the scale of the enterprise, the ratio of assets and liabilities, the age of the enterprise, the asset turnover rate, the total operating cost, the non operating income, the sales expenses and so on as the control variables. The specific variable definitions are shown in Table 1.

Table 1 main definition variables

variable		Symbol	Variable definition and value method
Explained variable	Operating income	Pro	Natural logarithm of total profit
	R & D investment	RD	Natural logarithm of technology R & D investment
	Enterprise investment	Qytz	Natural logarithm of (net fixed assets + Construction in progress)
	Enterprise financing	Qyrz	(short term loan + long term loan) / total assets
Explanatory variable	Tax preference	Taxi	Total profit * (nominal income tax rate - effective income tax rate)
	Financial subsidy	Czbt	Natural logarithm of government subsidies
control variable	Enterprise scale	Size	Logarithm of enterprise market value
	Asset liability ratio	Lev	Total liabilities / total assets
	Enterprise age	Age	Years of establishment of the enterprise
	Asset turnover	Incm	Total operating income / total assets
	Total operating cost	Yyzcb	Natural logarithm of total operating cost
	Non operating income	Yywsr	Non logarithmic natural income
	selling expenses	Xsfy	Natural logarithm of selling expenses

According to the research hypothesis and the definition of each variable, the research models (1) - (5) are established

$$Pro_t=\alpha_0+\alpha_1 Taxi_t+\alpha_2 Size_t+\alpha_3 Lev_t+\alpha_4 Age_t+\alpha_5 Incm+\alpha_6 Yyzcb+\alpha_7 Yywsr+\alpha_8 Xsfy+\alpha_t \varepsilon_t \quad \text{model (1)}$$

$$Pro_t=\beta_0+\beta_1 Czbt_t+\beta_2 Size_t+\beta_3 Lev_t+\beta_4 Age_t+\beta_5 Incm_t+\beta_6$$

$$Yyzcb_t+\beta_7 Yywsr_t+\beta_8 Xsfy_t+\beta_t \varepsilon_t \quad \text{model (2)}$$

$$RD_t=\gamma_0+\gamma_1 Taxi_t+\gamma_2 Czbt_t+\gamma_3 Size_t+\gamma_4 Lev_t+\gamma_5 Age_t+\gamma_6 Incm_t+\gamma_7 Yyzcb_t+\gamma_8 Yywsr_t+\gamma_9 Xsfy_t+\gamma_t \varepsilon_t \quad \text{model (3)}$$

$$Qytz_t=\delta_0+\delta_1 Taxi_t+\delta_2 Czbt_t+\delta_3 Size_t+\delta_4 Lev_t+\delta_5 Age_t+\delta_6 Incm_t+\delta_7 Yyzcb_t+\delta_8 Yywsr_t+\delta_9 Xsfy_t+\delta_t \varepsilon_t \quad \text{model (4)}$$

$Qyrz_t=\zeta_0+\zeta_1Taxi_t+\zeta_2Czbt_t+\zeta_3Size_t+\zeta_4Lev_t+\zeta_5Age_t+\zeta_6Incm_t+\zeta_7Yyzcb_t+\zeta_8Yywsr_t+\zeta_9Xsfy_t+\zeta_t\varepsilon_t$ model (5)

Where T represents the year, α_0、β_0、γ_0、δ_0、ζ_0 represents the constant term coefficient, α_i、β_i、γ_i、δ_i、$\zeta_i$represents partial regression coefficient, ε_t is the residual.

4.3.Empirical analysis

After constructing the corresponding model and simply processing the data, this paper will use stata 160 software.

4.3.1.Descriptive statistics

Table 2 shows the descriptive statistical results of various variables. The minimum operating income of integrated circuit enterprises is 14.824, the maximum value is 22.999, the mean value is 18.853 and the standard deviation is 1.16, which shows that there is a large operating income gap and different profit levels among listed integrated circuit enterprises in China.The standard deviations of R & D investment, enterprise investment and enterprise financing are 1.136, 1.598 and 1.913 respectively, indicating that there is a large gap between IC enterprises in R & D, investment and financing and other main business activities.The minimum value of tax preference enjoyed is 10.212, the maximum value is 22.944, the average value is 16.811, the standard deviation is 1.678, the minimum value of financial subsidy enjoyed is 9.752, the maximum value is 21.372, the average value is 16.925, and the standard deviation is 1.356, which indicates that there is a large gap between tax preference and financial subsidy among listed IC enterprises in China, and the range of fiscal and tax revenue enjoyed is large.

Table 2 Descriptive statistics of each variable

variable		Symbol	minimum value	Maximum	mean value	standard deviation
Explained variable	Profitability	Pro	14.824	22.999	22.999	1.16
	R & D investment	RD	15.429	22.665	18.484	1.136
	Enterprise investment	Qytz	14.667	25.66	20.367	1.598
	Enterprise financing	Qyrz	8.897	24.726	19.429	1.913
Explanatory variable	Tax preference	Taxi	10.365	20.347	16.649	1.369
	Financial subsidy	Czbt	9.752	21.372	16.925	1.356
control variable	Enterprise scale	Size	19.813	26.268	22.045	1.009
	Asset liability ratio	Lev	0.025	0.721	0.336	0.188
	Enterprise age	Age	3	39	17.273	6.125
	Asset turnover	Incm	0.009	14.258	1.043	1.884
	Total operating cost	Yyzcb	18.179	25.166	21.153	1.202
	Non operating income	Yywsr	0.802	21.458	15.941	2.195
	selling expenses	Xsfy	14.37	21.675	17.8	1.051

4.3.2.Regression results and analysis

(1) Incentive effect of tax preference and financial subsidy on integrated circuit industry

According to the estimation theory of relevant panel data, with the help of Hausman test, the test results of model (1) and model (2) reject the original assumption that there is no significant difference between the coefficients of random effect and fixed effect at the significance level of 0.05, and meet the fixed effect model. At the same time, in order to reduce the impact of unobservable factors on empirical research,The stepwise regression method is adopted in this paper. The specific regression analysis results are shown in Table 3 and table 4:

Table 3 regression results of model (1)

Explained variable: profitability			
Variable name	（1）	（2）	（3）
Taxi	0.538***	0.537***	0.539***
	（20.01）	（19.91）	（20.21）
Size	0.305***	0.189**	0.262***
	（5.24）	（2.07）	（2.78）
Lev	-0.267	-0.37	-0.368
	（-0.73）	（-0.99）	（-0.99）
Age		0.0256	0.0543***
		（1.61）	（2.79）
Incm		-0.0282	0.0103
		（-0.95）	（0.31）
Yyzcb			-0.2925***
			（-2.68）
Yywsr			0.0197
			（1.36）
Xsfy			0.094
			（1.28）
Constant	3.176	5.368***	7.391***
	（2.99）	（3.13）	（3.68）
time effect	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Hausman Test	Fixed effect	Fixed effect	Fixed effect
Number of samples	385	385	385

Table 4 regression results of model (2)

Explanatory variable: profitability			
Variable name	（1）	（2）	（3）
Czbt	0.0602*	0.0631*	0.0632*
	（1.41）	（1.48）	（1.47）
Size	0.869***	0.686***	0.749***
	（10.29）	（5.03）	（5.27）
Lev	-0.559	-0.656	-0.65
	（-1.04）	（-1.20）	（-1.17）
Age		0.0421*	0.0654**
		（1.79）	（2.26）
Incm		-0.00528	0.0268
		（-0.12）	（0.54）
Yyzcb			-0.245
			（-1.50）
Yywsr			0.0158
			（0.73）
Xsfy			0.0837
			（0.76）
Constant	-1.232	2.074	3.693
	（-0.80）	（0.82）	（1.24）
time effect	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Hausman Test	Fixed effect	Fixed effect	Fixed effect
Number of samples	385	385	385

From the regression results of model (1) and model (2), the p value of the significance statistic is close to 0, which shows that the whole model is highly significant, and the model has statistical significance. The results in table (3) and table (4) show that the tax preference shows positive at the level of 1% of the impact, and the influence coefficient is 0.539.This shows that the tax preferential policies effectively increase the operating income of IC enterprises, which has a significant positive incentive effect on the profits of the enterprises, while the financial subsidies are positive at the level of 10%, and the influence coefficient on the profitability of the enterprises is 0.0632, which shows that the tax preference is more significant than the financial subsidy on the integrated circuit enterprises, It can also be concluded that the incentive effect of the two policy tools, tax preference and financial subsidy, is different for IC enterprises, which is basically in line with the theoretical expectation. From the control variables, the size of the enterprise and the age of the enterprise have positive incentive effect on the business income of the enterprise, which indicates that the longer the scale of the IC enterprise is, the longer the business income will be. However, the asset liability ratio of an enterprise has a negative effect on the operating income of integrated circuit enterprises, which indicates that the higher the assets and liabilities of the enterprise, the higher the risk of operation, which is not conducive to the increase of the enterprise's asset income. Hypothesis (1) and hypothesis (2) are established.

(2) Incentive effect of tax preference and financial subsidy on different decision-making activities of integrated circuit enterprises

According to the previous analysis, due to the inherent characteristics of tax preference, financial subsidy policy and information asymmetry and regulatory differences, the two policy tools will inevitably cause certain differences in different decision-making activities of integrated circuit enterprises. In order to verify the difference, this paper makes research and development investment, enterprise investment, and so on The important decision-making activities of enterprises such as enterprise financing are tested by empirical analysis.The regression results are shown in table (5) and table (6):

Table 5 regression results of model (3), (4) and (5)

	R & D investment	Enterprise investment	Corporate financing
Variable name	（1）	（2）	（3）
Taxi	0.0492*	-0.0148	0.0393
	（1.85）	（-0.46）	（0.58）
Size	0.729***	-0.0336	-0.0429
	（10.00）	（-0.29）	（-0.23）
Lev	-0.112	-0.878*	0.816
	（-0.37）	（-1.94）	（1.05）
Age	-0.00581	0.107***	0.0152
	（-0.52）	（4.54）	（0.54）
Incm	-0.0677**	0.0095	0.0348
	（-2.25）	（0.24）	（0.45）
Yyzcb	0.131	0.469***	0.83***
	（1.74）	（3.54）	（4.27）
Yywsr	-0.033**	0.00464	-0.0149
	（-2.38）	（0.26）	（-0.39）
Xsfy	0.0721	-0.0405	-0.0421
	（1.20）	（-0.45）	（-0.27）
Constant	-1.7	10.503***	2.228
	（-1.28）	（4.32）	（0.62）
time effect	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Hausman Test	Random effect	Fixed effect	Random effect
Number of samples	385	385	385

Table 6 regression results of model (3), (4) and 5

	R & D investment	Enterprise investment	Corporate financing
Variable name	（1）	（2）	（3）
Czbt	0.13***	-0.00234	-0.00914
	（4.70）	（-0.07）	（-0.13）
Size	0.648***	0.129*	0.00857
	（9.09）	（1.30）	（0.04）
Lev	-0.0882	-0.557	0.812
	（-0.30）	（-1.36）	（1.05）
Age	-0.00463	0.0293*	0.0151
	（-0.44）	（1.79）	（0.55）
Incm	-0.0677**	0.0265	0.0333
	（-2.32）	（0.68）	（0.44）
Yyzcb	0.124	0.762***	0.843***
	（1.73）	（7.17）	（4.39）
Yywsr	-0.0329**	0.00355	-0.0132
	（-2.43）	（0.20）	（-0.34）
Xsfy	0.0845	-0.101	-0.045
	（1.46）	（-1.26）	（-0.29）
Constant	-1.416	2.828	1.652
	（-1.12）	（1.52）	（0.47）
time effect	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Hausman Test	Random effect	Fixed effect	Random effect
Number of samples	385	385	385

From the regression results in table (5) (6): ① tax preference and financial subsidy policy have positive incentive effect on R & D investment of IC industry, which is the same as those of fenghaihong and other scholars mentioned above, and the incentive effect of financial subsidy on R & D investment of IC industry is more obvious,This also confirms the above-mentioned view that the incentive objects of financial subsidies are often designated by the government and earmarked for scientific research projects, while the tax preference incentive objects obtained by enterprises are not fixed, and the preferential income obtained is used for non scientific research and innovation projects. Hypothesis (3) is true;② Tax preference and financial subsidy policies have no significant negative incentive effect on the investment of enterprises in the integrated circuit industry,

which inhibits the investment enthusiasm of integrated circuit enterprises to a certain extent. To a certain extent, it also means that the more tax preference and financial subsidy policies enjoyed by integrated circuit enterprises, the less their demand for foreign investment to obtain investment income,Hypothesis (4) holds;③There is a positive correlation between tax preference and IC enterprise financing, which indicates that tax preference promotes IC enterprise financing to a certain extent. On the other hand, financial subsidy is negatively correlated with IC financing, which proves that financial subsidy policy inhibits IC financing to a certain extent. Hypothesis (5) is true,This phenomenon may be that the preferential tax policy represents the strategic decision-making and direction of national industrial development. To a certain extent, it acts on the capital market, reduces the financing difficulty of enterprises and improves the financing income of enterprises. As a kind of income determined in advance, the financial situation of enterprises has eased with the increase of the intensity of financial subsidy policy,Caused by the reduction of financing demand.

4.3.3.robustness check

Based on previous experience, this paper uses the model replacement method to test the robustness of the model. This paper uses the maximum likelihood estimation (MLE) model to test the empirical results.According to the test results, the significance of the core explanatory variables compared with the regression results of the original model is basically the same, and the regression results are basically consistent with the test results of the original model, which proves that the model in this paper is robust. The specific results are shown in table (7), table (8), table (9) and table (10):

Table 7 robustness test results of model (1)

Explained variable: profitability			
Variable name	(1)	(2)	(3)
Taxi	0.559***	0.566***	0.567***
	(22.03)	(21.79)	(21.80)
Size	0.378***	0.381***	0.403***
	(9.68)	(9.47)	(8.09)
Lev	-0.185	-0.147	-0.125
	(-1.06)	(-0.84)	(-0.71)
Age		-0.00685	-0.00708
		(-1.38)	(-1.39)
Incm		-0.00195	0.00475

		(-0.12)	(0.21)
Yyzcb			0.0124
			(0.32)
Yywsr			0.00409
			(0.31)
Xsfy			-0.0477
			(-1.19)
Constant	1.175*	1.108	1.106
	(1.71)	(1.50)	(1.41)
time effect	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Number of samples	385	385	385

Table 8 robustness test results of model (2)

Explained variable: profitability			
Variable name	(1)	(2)	(3)
Czbt	0.0405	0.0424	0.0413
	(1.06)	(1.12)	(1.08)
Size	0.827***	0.775***	0.768***
	(14.11)	(12.55)	(10.11)
Lev	-0.511**	-0.57**	-0.562**
	(-1.95)	(-2.17)	(-2.12)
Age		0.0156*	0.0148**
		(2.16)	(1.98)
Incm		-0.039*	-0.0451
		(-1.65)	(-1.33)
Yyzcb			0.0159
			(0.27)
Yywsr			-0.0039
			(-0.20)
Xsfy			-0.00791
			(-0.13)
Constant	0.00493	0.921	0.965
	(0.00)	(0.83)	(0.82)
time effect	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Number of samples	385	385	385

Table 9 robustness test results of models (3), (4) and (5)

	R&D invest ment	Enterprise i nvestment	Enterprise financing
Variable n ame	（1）	（2）	（3）
Taxi	0.105***	-0.0784*	0.0669
	（3.43）	（-1.63）	（0.88）
Size	0.662***	0.218**	-0.128
	（11.23）	（2.36）	（-0.84）
Lev	0.0685	0.312	1.581***
	（0.33）	（0.95）	（2.79）
Age	-0.0275***	-0.0213**	-0.0167
	（-4.57）	（-2.26）	（-1.05）
Incm	-0.122**	0.0579	-0.0489
	（-4.55）	（1.37）	（-0.67）
Yyzcb	0.221***	0.999***	1.025***
	（4.78）	（13.75）	（8.12）
Yywsr	-0.0263*	0.0813***	0.0503
	（-1.66）	（3.28）	（1.19）
Xsfy	0.0255	-0.225***	-0.00203
	（0.54）	（-3.03）	（-0.02）
Constant	-2.02**	-3.987***	-1.757
	（-2.18）	（-2.74）	（-0.70）
time effec t	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Number o f samples	385	385	385

Table 10 robustness test results of models (3), (4) and (5)

	R&D invest ment	Enterprise i nvestment	Enterprise financing
Variable n ame	（1）	（2）	（3）
Czbt	0.195***	-0.0985**	-0.211***
	（6.76）	（-2.09）	（-2.89）
Size	0.575***	0.354***	0.108
	（9.97）	（3.76）	（0.70）
Lev	0.135	0.169	1.318**
	（0.67）	（0.52）	（2.35）
Age	-0.0209***	-0.0197**	-0.0163
	（-3.68）	（-2.13）	（-1.06）

Incm	-0.121***	0.0454	-0.0609
	（-4.73）	（1.08）	（-0.84）
Yyzcb	0.191***	1.017***	1.0636**
	（4.27）	（13.94）	（8.49）
Yywsr	-0.0228	0.0775**	0.0453
	（-1.51）	（3.13）	（1.09）
Xsfy	0.0537	-0.231**	-0.0253
	（1.18）	（-3.12）	（-0.21）
Constant	-1.72*	-4.187**	-2.514
	（-1.93）	（-2.88）	（-1.01）
time effec t	Yes	Yes	Yes
Prob > F	0.0000	0.0000	0.0000
Number of sample s	385	385	385

5. Conclusions

This paper uses the statistical data from 2011 to 2020 to screen the financial data of integrated circ uit enterprises, and uses panel empirical analysis to verify the incentive effect and difference of tax pref erence and financial subsidy policies on China's inte grated circuit enterprises. Based on the previous ana lysis, it is found that tax incentives and financial s ubsidies have positive incentive effects on the IC in dustry, and the incentive effect of tax incentives on the development of IC enterprises is more significan t. For the decision-making activities of different ent erprises, fiscal and tax policies also have the follow ing differences: first, tax preference and financial su bsidy policies have a positive correlation with the R&D investment of integrated circuit enterprises, an d the incentive effect of financial subsidy on the R &D investment of enterprises is more significant; S econd, tax preference and financial subsidy policies have no significant inhibitory effect on the investme nt of integrated circuit enterprises; Third, preferentia l tax policies have a positive incentive effect on th e financing of IC enterprises. The financial subsidy policy has a restraining effect on the financing of i ntegrated circuit enterprises.

6. policy implications

According to the conclusions of the above resear ch, this paper puts forward the following three poli cy suggestions:

Firstly, continue to establish and improve the tax preference and financial subsidy policy system for

the IC industry. According to the research, the tax preference and financial subsidy policies have a positive incentive effect on the IC enterprises. An imperfect fiscal and taxation system will limit the healthy development of the integrated circuit industry. China should continue to deepen reform, constantly improve the fiscal and taxation policy system, and speed up the legal process of Taxation and the comprehensive performance evaluation system of financial subsidies. We will continue to increase fiscal and tax incentives.

Secondly, clarify the incentive objectives of fiscal and tax policies and adhere to the incentive principle of industrial differentiation. Combined with the content of this paper, the tax preference and financial subsidy policies have a significant incentive effect on the incentive effect of integrated circuits. However, for a long time, in order to ensure the stability of fiscal and tax policies, government departments often implement "one size fits all" policies. Although this will stimulate the development of enterprises to a certain extent, it may virtually cause the fiscal and tax policies to have no significant effect on some industries, It even has an inhibitory effect on some enterprise policies in different industries. We should formulate different policies for the corresponding industries, one industry and one decision. For example, China's tax preferential policies often focus on the back-end links of the production and operation stage of integrated circuit enterprises. Only when integrated circuit enterprises reach a certain preferential "threshold" can they enjoy a certain tax preference. However, the IC industry is a typical industry with huge initial investment funds. Reaching this "threshold" requires a large amount of capital investment. According to the tax preferential policies mentioned above, there is also a significant positive incentive effect on the front-end links of production and operation such as scientific research investment of IC enterprises. If integrated enterprises enjoy preferential fiscal and tax policies in the early stage of business activities and directly attack the "focus" of enterprise production, it may further stimulate the enterprise's R&D enthusiasm and accurately stimulate the creative vitality of integrated circuit enterprises.

Third, make comprehensive and rational use of tax incentives and financial subsidies. We will rationally allocate tax incentives and financial subsidies under the existing financial resources. As mentioned above, tax preference and financial subsidy have different incentive effects on the IC industry. At present, the incentive effect of tax preference on IC enterprises is more significant than that of financial subsidy policy. We should adjust the industrial policy, increase the preferential intensity of IC tax preference, form the optimal proportion of fiscal and tax policy, and maximize the income of IC enterprises, Make government investment more effective; At the same time, we should also clarify the current fiscal and tax policies, establish a dynamic performance evaluation system of fiscal and tax policies, clean up the outdated policies with poor incentive effect, and study and establish the exit mechanism of tax preference and financial subsidy policies.

Fourth, actively introduce social capital. As two policy tools for the government to encourage the development of enterprises, fiscal and tax policies have alleviated the financial situation of enterprises to a certain extent, but also caused many enterprises to rely heavily on fiscal and tax policies, and even cheat and compensate in a large area, which not only violates the normal development law of market economy, but also causes the loss of national finance. On the premise of adhering to the supervision of fiscal and tax policies, We should encourage the flow of capital into the integrated circuit industry. Encouraging IC to introduce social capital can be considered from the following two aspects: on the one hand, from the perspective of financial institutions, it should be suggested to strengthen the pre Tax Deduction Policy for IC loan losses and reduce the risk consideration of financial institutions for IC enterprise financing. For the income obtained from the investment of financial institutions, a certain degree of fiscal and tax relief policy can also be considered to reduce the investment risk of financial institutions as much as possible, improve the investment income and stimulate the investment enthusiasm of financial institutions. On the other hand, from the perspective of integrated circuit enterprises, it is suggested that the financial and tax incentives for integrated circuit enterprises to borrow from financial institutions should be strengthened to reduce the financing cost of enterprises.

In short, although tax preference and financial subsidy policies can play a positive role in promoting IC enterprises, if we really want the two policy tools to give full play to the incentive effect, we still need to continue to establish and improve the fiscal and tax system, deepen the reform of the fiscal and tax system, clarify the incentive objectives, and actively introduce social forces to take appropriate policies and strategies

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