Will a Refund of an Advance Tax Payment Promote Tax Compliance?

Fan yong, Li haonan and Xi xiaoyu

(Central University of Finance and Economics)

Abstract

The expected utility theory and the prospect theory are the two basic theories used to analyze tax compliance decisions, indicating that the taxpayers are more concerned about the expected value, or more concerned with the change value relative to the reference point, respectively. However, these two basic theories have different views on the advance tax payment which is widely applied in the design of tax system. The prospect theory proposes that the prepaid tax refund promotes tax compliance. This conclusion has been supported by a large number of studies based on experimental data, but a few questions are not taken seriously. Recent studies of expected utility theory have, however, found that the direction of this effect is uncertain. This paper uses real evidence to reexamine the effect of prepaid tax refund on tax compliance. Compared with previous indirect and experimental studies, this paper uses a more convincing 2013 data set from China's *National Tax Survey*, which includes key direct data such as enterprise audit tax and preliminary tax, and uses instrumental variables to eliminate endogeneity. This research shows that: (1) The tax refund will reduce the tax compliance, which is different from the earlier conclusion: The advance tax payment will promote tax compliance under the prospect theory, and only under the expected utility theory this result may appear, so the taxpayer pays more attention to the expected value under this evidence; (2) When extending the tax refund range of the sample, the effect of reduction on tax compliance was reduced. This evidence indirectly indicates that the size of the tax refund may affect the taxpayers' attention pertaining to the expected value or the change value relative to the reference point; (3) A preliminary tax system should be as accurate as possible in estimating the income, reducing the

deviation between prepaid and actual tax, which can improve the enterprise tax compliance. This paper provides important counterexamples and opportunities to reflect on the theory of tax compliance.

Keywords: Advance tax payment, expected utility theory, prospect theory, tax compliance

JEL: H26

1. Preface

A prepaid tax system is designed to even out the tax revenues throughout the fiscal year. It is widely used in national taxation systems, such as personal income tax, enterprise income tax and VAT. However, the two basic theories on tax compliance, expected utility theory and prospect theory, show different effects of the prepayment system. In the expected utility theory, the prepayment system has no effect on taxpayers' tax compliance (Allingham and Sandmo, 1972). However, when the prospect theory is applied to the analysis of tax compliance, the prepayment system leads to the important "double dividend", which not only can even out the tax revenue, but also promote tax compliance (Yaniv, 1999; Elffers and Hessing, 1997). In particular, the prospect theory theorizes that people's decisions are more dependent on the gains or losses relative to a reference point. People tend to prefer risk aversion when experiencing gains and tend to prefer risk preference when experiencing losses. Therefore, when the pre-paid income is the reference point, the tax refund (or preliminary deficit) generated by the prepayment system will be regarded as the benefit (or loss).[1] When receiving a tax refund, people are more likely to choose the "relatively stable" method because of their risk aversion. When receiving tax compensation, people are more likely to choose the "relatively risky" method because of the risk peference. Therefore, when there are more people in the refund interval, there is better tax compliance. This conclusion is supported by a lot of experimental evidence and some empirical evidence with only a small amount of questioning voice. In conclusion, it seems that the prepayment system

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[1] Other reference points are used in other bodies of literature, but the conclusion is similar. For example, Dhami and Nowaihi (2007) use after-tax income as a reference point.

provides a simple and convenient option for tax authorities to raise the tax compliance rate by adding more taxpayers (include individual taxpayer and enterprise taxpayer) to the tax refund interval.

However, "When the expected utility theory is criticized for its effectiveness, other alternative theories, such as prospect theory, do not perform better, but even worse in some cases. No theory seems to be robust" (King and Sheffrin,2002). The prepaid tax system and prospect theory that seemingly have been supported by numerous studies are not perfect, and the lack of clear evidence is a key aspect, which may even lead to a different conclusion. The key questions include two aspects. For example, Webley (1991) indicates that the prospect theory will only come to play when the amount of the payment or tax refund is large. The experimental study evidence focuses on a large number of tax refunds or deficits and has not attracted enough attention after Webley. Morita (2014), on the other hand, found that the prepaid system does not affect the tax compliance under expected utility theory, hypothesizing that the prepaid system does not affect the disposable income, but this hypothesis has not been confirmed. The prepaid system may affect the tax compliance by affecting the daily available liquidity. Under such circumstances, the effect of the prepayment system on tax compliance depends on whether the taxpayer is inclined to focus on the implications of the expected utility theory or the prospect theory. The reason why these queries have not aroused concern is that there is no significant empirical evidence to provide theoretical opportunities for reflection.

However, the reality in China during the implementation of this policy indicates that Morita's doubts regarding the hypothesis of the expected utility theory may be correct.[2] If the prepayment system does not affect the daily expenses, the taxpayer will not try to do anything illegal like too low or no prepayment of taxes. In order to curb such behavior, the State Administration of Taxation issued *The Announcement on the Strengthening of Corporate Income Tax Prepayment* in 2009, which stipulates that if the annual payable proportion of prepayment corporate income tax is obviously low, the corporation must in a timely manner identify the cause or adjust their prepayment

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[2] The prepaid tax is clearly stipulated in *The Corporate Income Tax Law* and *The Tax Collection and Administration Law*, and the subsequent documents also specify the penalties for too low or no prepayment of taxes.

amount. The annual prepayment tax of corporate income tax shall be no less than 70% of the corporate income tax (including the prepayment and final settlement). It is therefore necessary to rethink these issues.

If these aspects are taken into consideration, the existing studies have not fully answered the following two questions:

(1) What kind of impact will the prepayment system have on tax compliance? Is this effect consistent with the prediction of the expected utility theory or the prediction of the prospect theory?

(2) What are the conditions of tax compliance behavior tending to expected utility theory or prospect theory? Under what conditions are taxpayers paying more attention to expectations, and under what conditions are they more concerned about the value of change relative to the reference point?

Question (1) is static. Although the existing evidence supports the promotion of the prepaid system to increase tax compliance, it does not indicate that this conclusion is inevitable. These doubt deserve more accurate and convincing realistic evidence in order to test the problem. Question (2) is dynamic. If the doubt surrounding this question is reasonable, then there may be different conditions that make the taxpayer's behavior more likely to fulfill the prediction of either the utility theory or the prospect theory. Different conditions make the taxpayer pay different attention to the expected value or the change value relative to the reference point. These conditions may be in line with Webley (1991), who focuses on the size of the tax refunds (or deficits). This aspect needs to be further explored.

The data used for this study take these two aspects into account. The data for *The National Tax Survey* is obtained by the Ministry of Finance and the State Administration of Taxation by way of stratified sampling. The questionnaire is filled out by the enterprises with sufficient authority and data accuracy and is more reliable than previous experimental research. *The National Tax Survey* also has very specific details pertaining to corporate tax payments, including tax refunds and corporate tax compliance data, which provide sufficient details for the discussion of Question (1) and (2) to facilitate the identification of the applicable effects. If the doubts expressed in Morita (2014) are reasonable, the prepaid system will affect tax compliance by

restricting the daily cash flow. Based on this, it is obvious that smaller enterprises, especially small and micro enterprises, are more affected by this effect. Therefore, this study focuses on the smaller enterprises, especially the samples of small and micro enterprises which is one group can enjoy tax preference, so that the validity of this question can be more easily identified.

This paper builds on Question (1) and Question (2), analyzes the effect of the prepaid system on tax compliance under the expected utility theory and the prospect theory, and tests the conclusions of (1) and (2) using actual data. This leads to the following conclusions: First, with the increase of the tax refund of the corporate income tax, the tax compliance of enterprises will decrease. Second, for tax refund ranges from 200,000 CNY to 500,000 CNY, when enterprises receiving larger tax refunds join the sample, the coefficient is obviously reduced. That is, the larger tax refund the corporation receives, the lower the effect of the tax refund reducing their tax compliance.

These conclusions give possible answers to Question (1) and Question (2). Based on actual evidence, the answer to Question (1) is that the taxpayers' behavior tends to follow the expected utility theory and that they pay more attention to the expected value. The reason is that the tax refund will only promote tax payments when the taxpayers' compliance behavior is in accordance with the prospect theory. Only with the expected utility theory is it possible for a prepaid tax refund to reduce tax compliance by affecting the available income in the prepaid period and the final settlement period. The answer to Question (2) is less certain. The expansion of this study can only indirectly support the conjecture of Webley (1991). The taxpayers will gradually behave more in accordance with the prospect theory with the increase of the tax refund. That is, taxpayers will gradually shift their concerns to the change values relative to the reference point. However, further research on this conclusion is still needed.

The sample used in this paper consists of the enterprises in *The National Tax Survey* in 2013 and the main focus is on smaller enterprises with taxable income less than 2,000,000 CNY. The method used is the instrumental variable method. Because the favored policy for small and micro enterprises is in place when the enterprise income tax is paid in advance, and the preferential (or not preferential) state of the previous year should be used temporarily for the next year in prepayment period. Then the

preliminary deficits or tax refund is made when the preferential state is changed. The instrumental variables in this paper are the exogenous tax rebates produced by the time difference between the prepayment period and the qualification period. The instrumental variables include two sub-values. One is the descended value of the applicable actual tax rate produced by the change of preferential policy state, and the other is the amount of tax refund generated by the change of state. The second part is equal to the first part multiplied by the taxable income.

This study makes two main contributions to the literature. First, this paper starts with two limited, but critical questions. It then answers the basic questions of the prepaid system and tax compliance using actual data, and supports the validity of the doubts, suggesting conclusions that are different from previous research. This study provides an opportunity to rethink the related research on tax compliance. Second, it provides a theoretical basis for the improvement of China's prepaid tax system. It is not a good approach to force more taxpayers stay in their current tax refund interval. The design of the prepaid system should still be based on the principle of accurate assessment of taxable income; that is, to reduce the difference between the prepaid tax and the actual tax as much as possible, which can promote tax compliance.

The rest of the paper is structured as follows: The second part is the related literature review. The third part presents the background information and the research hypothesis. The fourth part introduces the research design. The fifth part puts forward a reasonable instrumental variable for the existence and rationality of the instrumental variables. The sixth part consists of the empirical results and the stability test of the conclusion. The seventh part is the actual conclusion.

2.Literature Review

Prospect Theory was first proposed by Kahneman and Tversky (1979), and then applied to tax compliance studies. One of the important following studies is Yaniv (1999), who used a simplified prospect theory model to study the issue of tax compliance. He proved that the more taxes paid in advance, the higher the taxpayer's declared income.

Bernasconi and Zanardi (2004) conducted similar studies based on the theoretical model of cumulative prospect and reached the same conclusion. Prior to this, tax compliance studies based on the expected utility theory indicated that the prepayment system had no effect on tax compliance (Allingham and Sandmo, 1972).

With subsequent theoretical developments, many experimental studies have tested the phenomenon of prepayment. For example, Robben (1990) carried out experiments on corporate tax compliance in 10 cities in the United States and Europe. The participants in the experiment were divided into two groups. One was told that they would receive a higher tax refund. The other group was told that they would incur higher tax deficits. The conclusions showed that less tax evasion occurred in the group that could receive tax refunds. Kirchler and Maciejovsky (2001) found that entrepreneurs tend to be risk adverse and more inclined to be high tax honesty when there are unanticipated tax refunds. Copeland and Cuccia (2002) further studied changes in the reference point, and proposed that taxpayers will make adaptive adjustments over time. Experienced taxpayers may expect refunds or make up payments, and use the expected status as a reference point to divide benefit or loss.

Although there is less actual evidence related to this conclusion, this conclusion is also supported indirectly. Engström (2015) studied the impact of prepayment systems on tax compliance based on data on individual income tax in Sweden. They used a special reported deduction item as a measure of tax compliance. There was no penalty for over-declaring or under-reporting deduction items. Therefore, the study is on the effect of the prepayment system on tax compliance under risk-free conditions. The results corroborated the conclusion discussed in the previous section; the taxpayers in the tax refund zone preferred to declare a lower deduction, and the taxpayers in the deficit zone were incline to declare a higher deduction. Schmidt (2001) also came to the same conclusion in an indirect manner. The study focused on whether taxpayers accept different taxation schemes suggested by tax advisors under different prepayment conditions. The conclusion is that taxpayers who get tax refunds are more likely to reject tax consultants' aggressive taxation plans. Taxpayers who are faced tax deficits are more likely to accept aggressive taxation plans. In contrast, the evidence in this

paper is more direct, and the variables we use are the amount of tax audit which companies need to make up.

The prospect theory does not only shed new light on the prepayment system, but also explains many tax compliance puzzles under expected utility theories. Dhami and Nowaihi (2007) criticized the validity of the expected utility theory, focusing on three aspects. The first is what is discussed in this paper, namely that the prepayment system has no effect on tax compliance under the expected utility theory, but that there is evidence confirming the impact of the prepayment system on tax compliance. The second aspect is that under the theory of expected utility, the probability of tax evasion should be as high as 91% to 98.5%, but Slemrod and Yitzhaki (2002) indicated that even considering the unintentional misreporting of income, only 30% of taxpayers choose to evade taxation. The third aspect is the "Yitzhaki puzzle", which assumes that when absolute risk aversion is decreasing, the theoretical model shows that the increase in tax rate will lead to an increase in tax evasion. Many experimental and practical studies have, however, reached the opposite conclusion (Andreoni et al. 1998; Alm et al. 1992), but all three aspects of this challenge can be well explained under the prospect theory.

Prospect theory has a good momentum of development in tax compliance. It explains many unresolvable tax compliance phenomena under the theory of expected utility, and seems to be more applicable to the description of tax compliance behaviors. One cannot, however, ignore possible shortcomings. For example, Webley (1991) believed that prospect theory will only come into effect when the amount of repayment or refund is large.

Elffers and Hessing (1997) believe that tax refunds and deficits may make taxpayers feel "wrongly treated", especially when the amount is large. King and Sheffrin (2002), by designing experimental problems, found that when facing some of the problems, the subjects' answers are more in line with the expected utility theory, while when facing another part of the problems, their responses are more in line with the prospect theory. No theory alone can show very robust results under all circumstances. Morita (2014) also expressed similar doubts. He constructed a two-period model of the expected utility function, in which the prepayment system

influences the tax compliance by affecting the available income in two phases. The author believed that the prepayment system is responsible for tax compliance. The impact depends on whether the taxpayer's belief is in line with expected utility theory or prospect theory. Obviously, prospect theory is not as successful as it was first thought to be in describing tax compliance behavior.

There are also some studies that aim to explain a company's tax compliance behavior. Pin and Chu (2005) used an extended principal-agent model to study the impact of corporate tax evasion on taxpayers. They found that tax evasion not only caused taxpayers to bear the risk of audits from tax authorities, but also made them take on the risk of efficiency loss of internal management. Bayer and Kupzowa (2006) added a "bad government" to the model. They believed that tax enforcement may give the government an opportunity of "extortion", exaggerating tax obligations or increasing penalties. The possibility of the existence of a "bad government" may greatly increase the cost of managing tax compliance. The state can obtain double returns by curbing this kind of behavior; that is, it can reduce the tax management cost and supply a better business environment for the company. Although these studies focused on tax compliance from another perspective, they also drew some conclusions that are worth considering. They are, however, not very helpful in solving the fundamental problem of tax compliance, namely how to describe tax compliance behavior through a sound and reasonable theory. This paper uses reliable data and aims to shed light on how to accurately describe the long-lasting and important issue of tax compliance behaviors.

3. Background and Research Hypotheses

3.1 Introduction to the Prepayment System

The tax prepayment system of China mainly involves land increment tax, enterprise income tax, value added tax and so on. The various prepayment systems are different and the prepayment system discussed in this paper refers to the prepayment system of

enterprise income tax[3].The prepayment system of enterprise income tax means that the enterprise shall calculate yearly taxes, prepay by instalments and submit a year-end final settlement. The enterprise shall prepay the income tax monthly (or quarterly) according to the fifty-fourth provision of the *Enterprise Income Tax Law*. There are two main types of prepayment method. One is to prepay the tax in accordance with the actual monthly (or quarterly) profit, and the other is to prepay the income tax in accordance with the monthly (or quarterly) average taxable income in the last tax year[4].

The difference between the prepayment tax and the actual tax mainly comes from four aspects:

First, there will be a difference between actual profit and taxable income when the enterprise prepays its tax in accordance with the current actual profit. According to the formula of prepaid tax return: actual profit = income before tax + taxable income for particular business calculation - tax-exempt income - non-taxable income - prior year deficiency, while the taxable income should lead to more tax adjustments on this basis, so there are differences.

Second, the difference caused by operational conditions will exist when the enterprise prepays its tax in accordance with the average taxable income in the last tax year. An enterprise may not have exactly the same operational conditions in two adjacent years; there will always be a difference. Therefore, tax refunds will be generated when the operational conditions were relatively good in the previous year, and if not, the tax deficits will be generated.

Third, the difference caused by the preferential policy of income tax can be enjoyed in the prepaid period. Some preferential policies of income tax can be enjoyed during the prepaid period, whose preferential qualification temporarily follows the last year, but since the qualification period is after the prepaid period, the difference between actual tax and prepaid tax will be generated when the preferential qualification changes. For example, if the eligible small and micro businesses met the preferential

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[3] Compared to the prepayment of enterprise income tax, the prepayment system of other taxes only involves some special aspects.
[4] In addition, a few companies are likely to prepay tax in accordance with other methods approved by the tax authorities. For example, the tax authorities can levy taxes in accordance with the actual operating conditions when there are large fluctuations in the cost and income of the enterprises in recent years, the situation of the current year is quite different from that of the last tax year.

conditions last year but do not meet the requirements in the current year, they may face the situation that the prepaid tax is less than the actual tax, and additional taxes should be paid. However, if last year does not meet the preferential conditions and they are satisfied in the current year, they may face the situation that the prepaid tax is greater than the actual tax, and a tax refund will be issues. Similar situations may occur when the preferential status of the key state-supported high and new technology enterprises changes.

Fourth, a difference will exist between prepaid tax and actual tax when the enterprise enjoys the income tax preferential policy during the settlement period which can't enjoy during the prepayment period. These policies include additional deductions of RandD expenditures incurred for the purpose of developing new technologies, new products and new crafts and so on.

In addition, it also includes factors pertaining to the actual operation of enterprises and the realistic factors in the process of tax administration[5]. The payments and tax refunds are mainly derived from these differences.

3.2 Prepayment System and Tax Compliance

Since the study of prospect theory was applied to the tax prepayment system, it has been supported by a large number of theories and empirical studies. It is regarded as an efficient and low-cost strategy to improve tax compliance. Only a few studies have raised some concerns; the most important of which are Morita (2014), King and Sheffrin (2002) and Webley (1991)[6]. The views of Morita (2014) and King and Sheffrin (2002) are somewhat similar but differ on some points. What they have in common is that they all agree that the behavior of the taxpayer may in some cases adhere to expected utility theory rather than prospect theory. Based on these questions, this study analyzes the influence of the prepayment system on tax compliance under these two theories, presenting research hypotheses. Tax compliance discussed below is a narrow version of tax compliance, which corresponds to tax evasion.

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[5] Since the prepayment method cannot be changed arbitrarily, the difference caused by changing prepayment method is generally lower.
[6] There are also some doubts, such as Cullis and Jones (2006), which involve gender differences and reference points changes in long-term.

3.2.1 The Effect of Expected Utility Theory on Tax Compliance

It was earlier considered that the prepayment system under expected utility theory had no effect on tax compliance. This changed with the expected utility analysis by Morita (2014). Morita (2014) questions the hypothesis of the previous literature that disposable revenue for the whole fiscal year is not affected by the prepayment system. Morita (2014) proposes that the daily consumption and savings decisions of taxpayers will be affected by the prepayment system. This is the key point on which the conclusion is established, and this part will analyze whether this hypothesis is true through the phenomenon of tax administration.

Both China and other countries experience the same phenomenon related to prepayment of taxes, with a considerable part of taxpayers being reluctant to prepay tax and engaging in all kinds of behaviors to reduce or not prepay their tax[7]. This phenomenon is very common. From *The Notice on Strengthening the Prepayment of Enterprise Income Tax*, which was issued by the State Administration of Taxation in 2009, one can see that this phenomenon is very pervasive. The notice stipulates that, if the proportion of enterprise income tax prepaid to the enterprise income tax payable is obviously on the low side throughout the year, the reasons must be identified, and the prepayment method or the amount of tax paid in advance shall be adjusted. In principle, the amount of enterprise income tax paid in advance shall be no less than 70% of actual taxes. These regulations reflect that there are a number of taxpayers who are trying to reduce or not prepay the tax. If this pertains to a minority, it can be managed directly by the local tax authorities, and they are not required to make provisions in the form of documents.

One possible reason for this phenomenon is that the prepayment system will affect the daily disposable income of enterprises[8], especially for small enterprises with less daily turnover in capital. In addition, the prepayment tax in China does not calculate interest after prepayment, which is equivalent to "compulsory saving behavior" without any interest to the enterprise. Therefore, challenges related to capital and loss of interest

[7] Detailed descriptions of this phenomenon outside of China can be obtained from King and Sheffrin (2002).
[8] There are other reasons for this phenomenon, such as the enterprise's resistance to tax payment, and that companies think prepay tax is troublesome.

are the likely causes of this phenomenon.

The existence of this phenomenon confirms that the hypothesis that the prepayment system has no influence besides the tax refund in the previous literature is invalid. Many instances of this phenomenon also show that these effects cannot and should not be ignored. Therefore Morita (2014) has a realistic basis for questioning the hypothesis.

Since the expected utility analysis included in this paper is different from classical analysis, it focuses on these differences, and other hypotheses follow the hypothesis of classical analysis. Referring to the discussion in Morita (2014), a financial year is divided into a prepayment period and a settlement period. During the prepayment period, the taxpayer pays the enterprise income tax to the tax authorities in accordance with a certain basis, while in the settlement period, the tax authorities adjust the taxes according to the settlement, refunding to (or requiring more tax of) the taxpayer the portion of the prepaid tax that is greater than (or less than) the actual amount of the tax payable. The income of the two periods in the model are exogenous; y_1 and y_2, respectively. In the prepayment period, the taxpayers' income y_1 is used for prepaid taxes D, consumption C_1, and investment and savings I. The part used for investment and savings I can obtain earnings at the rate of return of r in the second period[9]. Tax returns shall be declared in the settlement period and the real income that the taxpayer should declare is $w = y_{1+}y_2$[10], but taxpayers can choose to hide part of their income. Assuming that the declared income of the taxpayer is x, the tax refund of $D - \theta x$ will be received after the settlement. At the same time, the taxpayer will spend the total surplus income in the second period, including the income of the second period and investment and savings of the first period[11]. If tax evasion is not found, then the consumption in the second period is:

$$C_{2,1} = y_2 + (1 + r)I + (D - \theta x), \tag{1}$$

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[9] This study assumes the rate of return is equal to the interest rate in order to simplify the calculation, but it does not affect the conclusion even if it is not equal.

[10] Morita (2014) is used here, the income includes calculating the interest; that is, $w = (1 + r)y_{1+}y_2$, but in China, the declared income of the year does not incur interest.

[11] Morita (2014) discussion of whether the change of this hypothesis that spending the total surplus income in the second period will affect the conclusion is not studied in this paper. However, the existence of this hypothesis does not affect the most important part of the model; ,that is, the prepayment system will affect the taxpayer's tax compliance by affecting the cash flow and daily expenses.

where θ indicates the tax rate, and if tax evasion is found, and tax payments and fines are required. Assuming the amount of tax and fine is f times as much as the amount of tax evasion[12], then the consumption in the second period is:

$$C_{2,2} = y_2 + (1+r)I + (D - \theta x) - f\theta(w - x). \tag{2}$$

Assuming the probability of tax evasion is found to be p, then the expected utility function is:

$$EU = U(C_1) + \delta[(1-p)U(C_{2,1}) + pU(C_{2,2})], \tag{3}$$

where δ indicates the discount factor of utility. Assuming that the prepaid tax is divided into two parts, one is the fixed value K and the other is the value that varies with the estimated income H. β is the prepayment rate.

$$D = K + \beta H \tag{4}$$

On the condition that both x and I are interior solutions[13], the first order condition of declared income can be obtained by the two sides of the equation's (3) derivation of x:

$$-\delta\theta(1-p)U'(C_{2,1}) + (f-1)\delta\theta pU'(C_{2,2}) = 0. \tag{5}$$

The first order condition of I can be obtained by the two sides of the equation (3) derivation of I.

$$-U'(C_1) + \delta(1+r)[(1-p)U'(C_{2,1}) + pU'(C_{2,2})] = 0 \tag{6}$$

According to (4), (5) and (6), the relationship between declared income and tax refund can be obtained:

$$\frac{\partial x}{\partial K} = \frac{r(1-p)U'(C_{2,1})[R(C_{2,2})-R(C_{2,1})]}{Z}\{-U''(C_1) + \xi\} \tag{7}$$

$$\frac{\partial x}{\partial H} = \beta\frac{\partial x}{\partial K} \tag{8}$$

(8): $Z = U''(C_1)[(1-p)U''(C_{2,1}) + (f-1)pU''(C_{2,2})] + \delta(1+r)^2\{(1-\theta)[(1-p)U''(C_{2,1}) - (f-1)pU''(C_{2,2})] + f^2(1-p)U''(C_{2,1})pU''(C_{2,2})\} > 0$, indicates the second order condition, while $\xi = \delta(1+r)[(1-p)U''(C_{2,1}) + pU''(C_{2,2})] < 0$.

$\frac{\partial x}{\partial K}$ and $\frac{\partial x}{\partial H}$ could be greater than 0 or less than 0. Since the direction of influence is uncertain, two opposite hypotheses are given for testing:

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[12] Assuming $1 \le f \le 1/p$, one can guarantee that X is the interior solution.
[13] When I is a corner solution, a similar conclusion can be obtained. But at this time, the declared income is affected by the prepaid tax, which is caused by the prepaid tax increasing the available income of the second period and the change in the marginal utility of the income. See specifically Morita (2014).

Hypothesis 1: When the behavior related to the taxpayer's tax compliance tends to the expected utility theory, the tax compliance will decrease as the prepaid tax (therefore tax refund) is increased.

Hypothesis 2: When the behavior related to the taxpayer's tax compliance tends to the expected utility theory, the tax compliance will go up as the prepaid tax (therefore tax refund) is increased.

This paper focuses on smaller enterprises whose decisions are more inclined to short-term goals (δ is smaller) (Tang, 2014), and the daily available liquidity is lower compared to large and medium-sized enterprises. Therefore, this paper is more inclined to satisfy Hypothesis 1.

3.2.2 The Effect of Prospect Theory on Tax Compliance

This section uses the symbols discussed above and refers to the classical assumption of prospect theory from Yaniv (1999). The income available after prepayment $w - D$ is treated as the reference point:

$$V = v(D - \theta x) + \phi(p)v[-f\theta(w - x)]^{14}, \tag{9}$$

where $v(\cdot)$ indicates the value function and $\phi(p)$ indicates the probability weight function. According to Formula (9), the first order condition of declared income can be obtained as follows:

$$-\theta v'(D - \theta x) + \phi(p)f\theta v'[-f\theta(w - x)] = 0 \tag{10}$$

The relationship between declared income and prepaid tax can be obtained from Formula (10):

$$\frac{\partial X}{\partial K} = \frac{\theta v''(D - \theta x)}{F} > 0, \tag{11}$$

where $F = \theta^2 v''(D - \theta x) + \phi(p)f^2 v''[-f\theta(w - x)] < 0$ [15] indicates the second order condition. $\frac{\partial X}{\partial H} = \beta \frac{\partial x}{\partial K} > 0$. Therefore, under the prospect theory, as the amount of prepaid tax refund increases, the declared income will go up, and tax compliance behavior will be promoted.

Hypothesis 3: When the behavior of taxpayer's tax compliance tends to the

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[14] In fact, this formula is $V = v(D - \theta x) + \phi(1 - p)v(0) + \phi(p)v[-f\theta(w - x)]$, where $v(0) = 0$, so the second part of the right side of the equation is omitted.
[15] Only when it is in the tax refund interval, that is $D - \theta x > 0$, the second order condition is less than 0. See specifically Yaniv (1999).

prospect theory, the tax compliance will go up as the prepaid tax (therefore tax refund) is increased.

4. Study Design

4.1 Data Source and Processing

The data used in this paper is the cross-sectional data from the 2013 National Tax Survey, produced by the Ministry of Finance and the State Administration of Taxation. Some variables refer to the data in 2014 and 2015. This data is filled by random sampling's enterprises, and these enterprises must fill the form provided by the Ministry of Finance and the State Administration of Taxation. Therefore, it has enough authority and accuracy. The National Tax Survey data includes detailed information from the tax return forms, such as the amount of tax audit, as well as tax refund of enterprise income tax. This has advantages when studying the tax behavior of enterprises, and greatly improves the precision of the research and reduces research errors caused by the underlying data.

The full sample used in this paper consists of the 8,747 enterprises that generate tax refund in the survey data[16], and the focus is on small and micro enterprises[17]. There are two reasons for focusing on small and micro enterprises: First, their daily available liquidity is less than that of large and medium-sized enterprises; therefore, the prepayment system has a more significant impact. Second, because the model analyzed in chapter 3 also can describe enterprises tax evasion behavior if we exclude principal-agent problem, small and micro enterprise samples can better avoid other influences such as principal-agent problem found in large and medium-size enterprises. The small

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[16] Only choose refund sample and ignore deficit sample is reasonable. According to the loss aversion aspects, tax refund and deficits have different effects on tax compliance. Engström (2015) also confirmed that there are kink points and discontinuity points in the zero point between tax refund and repayments arising from prepayments. Therefore, the impact of deficits and tax refund should be studied separately. Because there may be more enterprises with tax refunds under poor operating conditions. It will also be verified later that there is no significant correlation between operating status and tax compliance. Therefore, the enterprises that only choose the tax refund do not have the choice deviation caused by the difference of operating conditions.

[17] Since small and micro businesses are not fixed, they will change over time, so they may also include smaller enterprises that may become small and micro enterprises.

and micro enterprises' taxes mentioned in this paper is the concept stipulated in the tax law. The measurements pertaining to the small micro enterprises are based on three indices, namely total assets, the number of employees and taxable income. When these three indices are satisfied, the enterprise is considered a small or micro enterprise. The enterprise may, however, change over time. The small and micro enterprises that met the standards last year may fail to satisfy the requirements this year due to their development, while earlier non-small and micro enterprises may also meet the standards of small and micro enterprises in the subsequent year. Therefore, given the development status of the enterprise, the focus will be extended to smaller enterprises near the small and micro enterprise standard. According to the development situation in 2013 of small and micro enterprise samples from 2012 shown in Figure 1, most have income of less than 2,000,000 CNY. Therefore, this study focuses on the sample of 4107 enterprises whose taxable income is less than 2,000,000 CNY in 2013.

The processing of data in this paper is as follows: First, some outliers are excluded, including if the value of taxable income and amount of tax audit are negative, and the sample of enterprise opening (establishment) date is later than 2013. Second, some samples including content errors in the tax survey data were excluded, for example adding words that have no relationship to the content of that variable, etc. Variables related to this error include VAT payment method, income tax payment method and "the reform to replace the business tax with value-added tax"
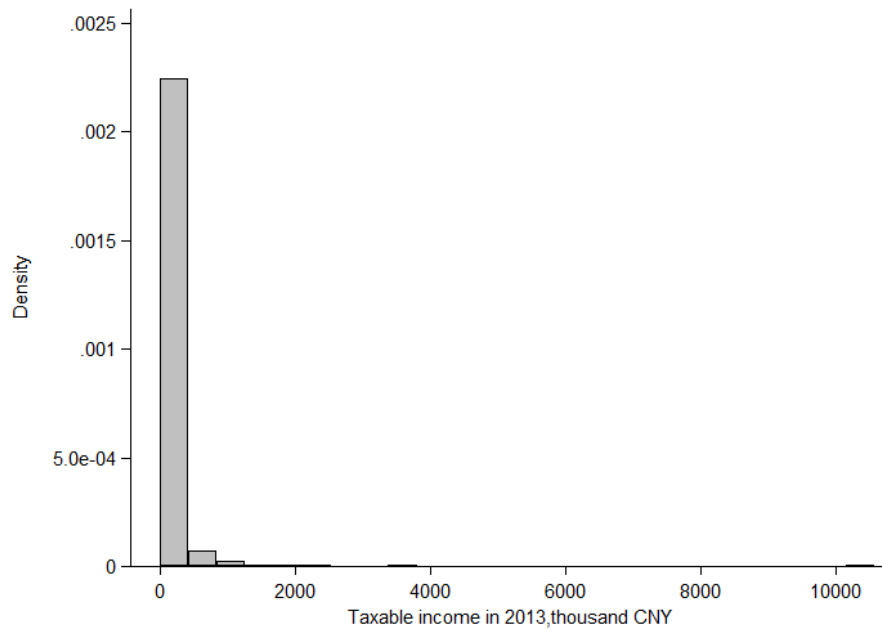
Fig.1 The taxable income distribution in 2013 for small and micro enterprise samples from 2012

4.2 Empirical strategy

Similar to Alm et al. (2016), the explained variable selected in this paper is the amount of tax audit (tax_audit), which is used to indicate the tax compliance level of the enterprise. This method has a great advantage over the methods used to describe the level of tax compliance in the previous literature, and the variables used in previous studies are generally indirect. For example, the effective tax rate of enterprises (Fan and Tian, 2016), may be influenced by many factors; the meaning of the coefficient includes a number of impacts and the estimated deviation is larger. Other variables such as the tax declaration of special deduction items (Engström et al. 2015) and the extent to which taxpayers accept aggressive tax advice (Schmidt, 2001) are very one-sided in measuring tax compliance, and it is difficult to reflect the overall level of tax compliance. The amount of tax audit is the lower limit of tax evasion, which can accurately estimate the tax compliance of enterprises.

However, a question may arise when use tax audit as a variable to measure tax compliance, namely whether the amount of tax audit equals the tax evasion. There are

two main possible deviations. One is whether or not the amount found in the tax audit this year equals to the tax evasion of this year. Tax inspection of the year is usually focused on the tax filing of last year, rather than that of the current year. One of the reasons is that many cases are not clear-cut when the tax year has not yet ended and the tax inspection is therefore less effective. Therefore, the most suitable tax compliance index for enterprises is the amount of tax audit in the next year (i.e., the second year). It is often, however, the case that tax evasion is detected after more than a year. In order to prevent the omission of these cases, this paper also includes a regression analysis of 2013 (the current year) and 2015 (the second year).

The other issue is whether or not tax inspection can detect all tax evasion. It is in reality impossible to detect all tax evasion, but with the improvements in the tax administration's ability, tax loss is decreasing year by year, so this deviation is gradually diminishing. In addition, compared with the indirect methods used in other studies related to the tax compliance mentioned above, the deviation will be smaller if one uses the amount of the tax audit directly. Finally, the deviation from underestimating the amount of tax evasion will only apply to the lower limit in this study; that is, the effect of tax refund that promotes tax evasion will only be underestimated instead of being overestimated or miscalculated, which will therefore not affect the conclusion.

The key explanatory variable is the enterprise's tax refund ($refund$).The data used is the amount of refundable enterprise income tax for the current year. In the actual regression, this paper takes the inverse hyperbolic sine transformation of the explaining variable ($refund$) and the explained variable (tax_audit). There is a large amount of zero data in the amount of tax audit, which indicates that the enterprise fully conforms to the tax compliance[18]. It is not reasonable to abandon this part of the data when calculating the logarithm. Therefore, this paper use inverse hyperbolic sine transformation to replace logarithm.

Considering that the enterprise tax compliance may be affected by other factors, this paper adds six control variables, include enterprise age (age), enterprise size ($size$), VAT payment method (vat_type), income tax payment method (eit_type), "the reform

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[18] Full tax compliance is based on the assumption that the amount of tax audit is equal to the tax evasion that mentioned above, even without this assumption, the amount of tax audit is 0 also means higher tax compliance.

to replace the business tax with value-added tax" ($reform$) and actual tax rates ($rate$).

Among these, 2013 minus enterprise opening (establishment) time is the age of the enterprise (age). With increased enterprise age, it is indicated that the enterprise will be more adaptable to the tax system, adjust the expected value, treat the income and tax separately, and reduce the resistance to tax (Adams and Webley, 2001). On the other hand, the increased enterprise age also means that the enterprise has more knowledge about possible ways to evade taxes, and the tax evasion opportunities are therefore increasing while the risks are decreasing. Therefore, the enterprise age will have an impact on tax compliance. At the same time, Engström (2015) believes that the quadratic term of the enterprise age also affects tax compliance, so the age of the company and its quadratic term are added to the control variables.

Enterprise size ($size$) used in this paper is the inverse hyperbolic sine transformation value of taxable income. The reason is same as tax audit，the taxable income also exists as part of the zero value. The identification of small and micro enterprises in income tax involves three aspects: total assets, number of employees and taxable income, all of which are variables describing the size of enterprises. Different from logarithmic values of total assets used in the literature on other issues as variables to describe the size of the enterprise, in the study of tax compliance, the taxable income is a more significant enterprise size variable. This is therefore more applicable as the enterprise size variable in this paper[19].

The value added tax payment method (vat_type) and income tax payment method (eit_type) include two aspects that may affect tax compliance. One is the integrity of the enterprise's financial and accounting system, and the other is the tax evasion opportunities under different payment types. There are two kinds of VAT payment methods, i.e., as a general VAT taxpayer or a small-scale VAT taxpayer, which can be represented by vat_type1, and vat_type2, respectively. The income tax payment method includes two types, namely levy upon tax rate and levy upon deemed income. The method of levy upon deemed income is subdivided into two categories: income and cost. These can be represented by eit_type1, eit_type2 or eit_type3,

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[19] When the total assets and the number of employees were used as enterprise size variables, the results did not change significantly.

respectively.

"The reform to replace the business tax with value-added tax" ($reform$) shows that when the enterprise is a pilot enterprise of the reform, it may face stricter tax inspection and audit, and also may have more levy vulnerabilities in the reform period, so this study needs to add the virtual variable of "$reform$". This variable uses the data "whether it is a VAT transformation pilot taxpayer" in the tax survey data directly, which is more accurate than the method of distinguishing the reform pilot area.

Finally, the tax rate ($rate$) is a common variable in the tax compliance model, but the influence direction of the tax rate on tax compliance is uncertain. The tax rate used in this paper is the actual tax rate obtained by screening and matching the total assets, the number of employees and the taxable income in accordance with the standard of the preferential policy of small and micro enterprises. Since the actual tax rate relates to the exogeneity of instrumental variables, it is specifically introduced in Section V. The regression model used in this paper therefore is:

$$tax\_audit_i = \alpha_1 + \alpha_2 refund_i + \alpha_3 X_i + \varepsilon \tag{12}$$

where i represents the enterprise, X is the control variable mentioned above, and ε is the residual term.

There are two instrumental variables, which are defined as "changes in actual tax rate of tax refund resulting from changes in the status of preferential policies for small and micro enterprises" (Δt) and "the refund amount generated by changes in the status of preferential policies for small and micro enterprises" (ΔT). The specific situation is also introduced in Section V. The full sample summary statistics of explained variables, explanatory variables, control variables and instrumental variables are shown in Table 1.

Table 1: Summary Statistics

variable	mean	standard error	minimum	maximum
tax_audit	1.365	3.977	0	20.974
refund	12.888	2.309	7.701	21.880
age	11.448	5.798	0	67
size	12.151	7.425	0	24.639

vat_type1	0.9975	0.0501	0	1
vat_type2	0.0025	0.0501	0	1
eit_type1	0.9888	0.1053	0	1
eit_type2	0.0065	0.0805	0	1
eit_type3	0.0047	0.0683	0	1
reform	0.0880	0.2834	0	1
rate	0.2416	0.0324	0.1	0.25
Δt	0.0035	0.0199	0	0.15
ΔT	129.930	1106.481	0	14850

Note: The observation is 8747. tax_audit, $refund$ and $size$ in the table are the number after inverse hyperbolic sine transformation.

5. Instrumental variables: Exogenous Tax Refunds Generated By Changes in the Status of Preferential Policies for Small and Micro Enterprises

Tax refund and tax compliance may have an endogenous relationship due to reciprocal causation. In other words, as the same time as tax refunds affect tax evasion, tax evasion will also affect accounting records, invoices and so on. This may affect the difference between prepayments and actual taxes, which in turn affects tax refunds and produce an endogenous problem[20]. This part aims to solve the possible endogenous problem by using the instrumental variable method.

As a suitable instrumental variable, it must have sufficient relationship with the tax refund and satisfy the exogenous hypothesis of regression. Since this article focuses on the tax evasion of small-scale business owners, the selected instrumental variables are also relevant to small-scale enterprises. According to the requirements of the above-mentioned selection of instrumental variables, exogenous tax refunds were selected as an instrumental variable which was produced in the state change of preferential policies

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[20] Another situation that may lead to an endogenous problem is that firms who more likely try to prepay less or not may have the same qualities as those that tend to evade taxation, resulting in endogenous problems caused by missing variables.

for small and micro enterprises. The instrumental variable can be divided into two parts; one is the decreased value of actual application tax rate resulting from the change of state, and the other is the tax refund generated by the change of state. The second part is equal to the first part multiplied by the taxable income. The following section first introduces the instrumental variables, and then demonstrates the rationality of the selected instrumental variables.

In the part 3, which introduces the prepayment system in china, the differences between the prepayments and the actual taxes mainly come from four aspects. The instrumental variables chosen in this paper belong to the third aspect. Specifically, since the data used in this paper is produced in 2013, the preferential income tax policy chosen is the preferential policy for small and micro enterprises in 2013[21]. The preferential income tax policy for small and micro enterprises in 2013 pertains to small and micro enterprises with an annual taxable income 60,000 CNY or less. Their taxable income is reduced by 50% compared to their income, and the enterprise income tax is paid at the 20% tax rate, so the actual tax rate is 10% (20%*50%). Other small and micro enterprises[22] pay the corporate income tax rate of 20%. Non-small and micro enterprises pay the corporate income tax rate of 25%. This preferential policy can be used during the prepayment period, but the preferential qualification is determined after the prepayment period. Therefore the prepayment is temporarily followed by the qualification status of the previous year, it will produce a tax refund or payment because of the changes in the company's qualifications during the final settlement. Table 2 shows the changes in the actual tax rate as an example of the change in the status of preferential policies which caused by the change of taxable income when the total assets and the number of employees meet the conditions for small and micro enterprises[23].

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[21] There have been eight changes in preferential policies for small and micro enterprises in the past ten years, covering the scope of preferential taxable income, etc. The policies mentioned in this article only apply to 2012-2013, and new changes have taken place since 2014.

[22] Other small and micro enterprises refer to enterprises that meet the following requirements: (1) engaging in non-restricted and prohibited industries in the country; (2) non-resident enterprises that do not enjoy the preferential income tax policy for small and micro enterprises; (3) the annual taxable income does not exceed 300,000 CNY; (4) a company that has the necessary conditions to calculate its own taxable income amount (this article was revised in 2014); (5) industrial enterprises: the number of employees does not exceed 100, and the total assets do not exceed 30 million CNY; and (6) other companies: the number of employees does not exceed 80, and total assets do not exceed 10 million CNY.

[23] The standards for the identification of small and micro enterprises include the total assets, the

The taxable income of the enterprise in the previous year and the current year is divided into less than 60,000 CNY, more than 60,000 CNY but less than 300,000 CNY, and 300,000 CNY or more. The corresponding effective tax rates are 10%, 20% and 25%, respectively. When the position of taxable income changes in the current year, the actual tax rate will also change. For example, in the previous year, the taxable income was more than 60,000 CNY but less than 300,000 CNY, which was reduced to 60,000 CNY or less due to poor business conditions in the current year. Therefore, the 20% tax rate is applied during the prepayment period. However, the deduction is calculated as 50% of taxable income and it is applicable when the settlement is finalized. 20% tax is paid, and a 10% tax refunded[24] is generated. The situation in the other lines in the table is similar. There are three situations where tax refunds will be generated. The three situations will not change, and there are three cases that will generate tax deficits.

Table 2: Changes in Actual Tax Rates Resulting from Changes in the Status of Preferential Policies for Small and Micro Enterprises - Changes in Taxable Income

	Taxable income I (10000 CNY)		Actual tax rates and its change (%)		
	Previous year	Current year	Previous year	Current year	Tax refund (or deficit)
	$30 \geq I \geq 6$	$I \leq 6$	20	10	10
refund	$I \geq 30$	$I \leq 6$	25	10	15
	$I \geq 30$	$30 \geq I \geq 6$	25	20	5

number of employees, and the amount of taxable income. Except for the taxable income shown in Table 2, the total amount of assets and the number of employees exceeding the standard or decreasing compared to the standard will also result in qualifying. And it will also result in changes in the actual tax rate, Just to illustrate with a specific example, suppose that the company did not meet the standards for the number of employees in small and micro enterprises in the previous year, but met the standards of total assets and taxable income, and then the number of employees in the following year was met because of reducing the number of employees. Corporate standards, assuming that the taxable income for the year is less than 300,000 CNY but greater than 60,000 CNY, the actual tax rate for the previous year was 25% and the actual tax rate for the year was 20%, resulting in a 5% rebate and taxable income for that year. If the amount is = 60,000 CNY or les, a 15% tax refund will be generated. Other situations are similar.

[24] The percentages of 5%, 10% and 15% of the tax refunds or surcharges generated at this time refer to the percentages of the prepayment methods adopted at that time. For example, the prepayments made with actual profits are 5%, 10% and 15% of the actual profits. %, and using the average amount of taxable income in the previous tax year for prepayment, it is 5%, 10% and 15% of the taxable income in the previous year. However, since there are other reasons for the difference between the amount of prepayments and actual taxable payments, the actual amount of tax refund (or repayment) may be less than this value.

	$I \leq 6$	$30 \geq I \geq 6$	10	20	-10
deficit	$I \leq 6$	$I \geq 30$	10	25	-15
	$30 \geq I \geq 6$	$I \geq 30$	20	25	-5
	$I \leq 6$	$I \leq 6$	10	10	0
constant	$30 \geq I \geq 6$	$30 \geq I \geq 6$	20	20	0
	$I \geq 30$	$I \geq 30$	25	25	0

Note: In the last column in the table, a negative value indicates that the deficit.

Suppose that the conditions for the preferential policies of small and micro enterprises are not met for State 1, that the conditions for preferential policies for small and micro enterprises are met, but that the taxable income is greater than 60,000 CNY for State 2, the conditions are met, and the taxable income is less than 60,000 CNY for State 3. Overall, the tax refund is shown in Figure 2. The lower part of the status in Figure 2 shows the actual tax rate, and the top of the arrow shows the actual tax rate change value resulting from the status change. This is one of the instrumental variables used in this paper, referred to as Δt. These situations include tax refunds arising from changes in the taxable income, including the first three lines in Table 2 and the few mentioned in the footnotes, and that the tax refunds which were caused by the changes of the number of employees and total assets. ΔT is based on Δt multiplied by taxable income.

Therefore, the precise definitions of the two instrumental variables are: 1. The change in the actual tax rate caused by this type of situation, Δt, will be assigned to the value of tax refund due to such circumstances, based on the change in the actual tax rate. The assigned value is 0 for other circumstances[25]. 2. The amount of tax refund for such cases is ΔT, which is the product of the first instrumental variable and the taxable income of the enterprise, $\Delta T = \Delta t * I$. The two instrumental variables represent the relative amount and absolute amount of tax refund, respectively.

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[25] This article deals with the tax refund zone for prepaid taxes, and therefore ignores the deficits, but it also aims to use the instrumental variables that take into account the deficits in the robustness test. The results did not change significantly.
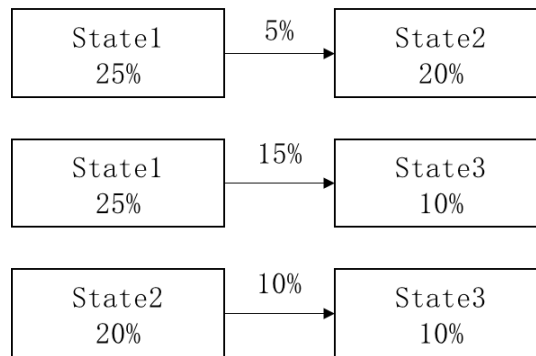
Fig.2 The state changes involved in the selected instrumental variables

Successful instrumental variables in the existing literature all use the rationality of large-scale arguments for instrumental variables (Miguel et al. 2004; Daron et al. 2003; Luo, 2016). Reasonable and appropriate instrumental variables not only need to pass various tests, but also require a rigorous logic derivation process to confirm its rationality. Therefore, on the basis that the instrumental variables used in this paper have passed the correlation tests[26] (under identification test, weak identification test and over identification test), the rationality of instrumental variables is still demonstrated from the perspective of logic and statistical indicators.

First, it is important to demonstrate whether the correlation between instrumental variables and endogenous variables is sufficient. From a logical view, the amount of tax refund generated by changes in the status of preferential policies for small and micro enterprises is one of the important sources of the difference between prepayments and actual tax payables, and it has a good correlation with the actual tax refunds of enterprises.

Statistical indicators can also show that the correlation between the two is strong enough. Table 3 shows the results of first-stage regression. (1) and (2) indicate the result when the control variables are added or not. Regardless of whether or not the control variables were added, it was significant at the 1% level, confirming that there was no problem with weak instrumental variables, which is in line with the logic.

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[26] Instrumental variables test results are placed in the results of the empirical analysis.

Table 3: First-stage regression results for instrumental variables

	(1)	(2)
Δt	0.0702***	0.0993***
	(0.0136)	(0.0136)
ΔT	12.271***	11.676***
	(0.991)	(1.043)
Cons	7.848***	11.945***
	(0.165)	(0.0371)
Control variables	Yes	No
Sample size	4107	4107

Note: *, **, and *** are significant at the significance levels of 10%, 5%, and 1%, respectively, and standard deviations are shown in parentheses. The following results are the same as those in the table unless otherwise specified.

Second, it's necessary to proof these instrumental variables are exogenous to tax compliance, and only through the prepayment tax refund to affects the tax compliance of the enterprise. This article demonstrates the exogenous problem in two parts. First, referring to the practices of Daron et al. (2003) and Luo (2016), and regressing the tax compliance and instrumental variables directly, if there is no other way to affect tax compliance, then regression results should not be significant. Second, referring to the approach in Miguel et al. (2004), the possibility of an endogenous problem of instrumental variables is ruled out as much as possible by excluding some potential influencing pathways.

In the first part, regress directly uses the tax compliance and instrumental variables. Table 4 shows the regression results.

Table 4: Regression of Tax Compliance and Instrumental Variables

	(1)	(2)	(3)	(4)
Δt	4.599**	3.320	4.438*	3.520
	(2.268)	(2.285)	(2.284)	(2.311)
ΔT	0.0292	0.0183	0.0285	0.0233

	(1)	(2)	(3)	(4)
	(0.0404)	(0.0404)	(0.0412)	(0.0412)
refund		0.109***		0.0748**
		(0.0269)		(0.0305)
Cons	1.378***	0.146	-0.386	-0.974**
	(0.0629)	(0.310)	(0.371)	(0.439)
Control variables	No	No	Yes	Yes
Sample size	4107	4107	4107	4107

The first two columns and the last two columns in Table 4 indicate the situation where control variables are not added, and the control variables are added, respectively. The results in columns (1) and (3) indicate that ΔT has no significant effect on tax compliance, and only Δt has a positive effect on the amount of tax audit. The significance levels are 5% and 10%, respectively. However, after the tax refund is added, the effect of the actual tax rate change value Δt on the tax compliance is significantly lower, indicating that the impact is covered by the newly added variables (Daron et al. 2003), and the explanatory variables are still influenced by endogenous variables. Therefore, it can be illustrated that instrumental variables affect the explanatory variables only through endogenous variables and the selected instrumental variables meet exogenous requirements.

The second part excludes the possible ways that some instrumental variables may influence explained variable. Further confirming that instrumental variables are exogenous, these possible ways include operating conditions, tax evasion motives, and effective tax rates.

The first is the operating status. Enterprises that enjoy changes in the status of preferential policies for small and micro enterprises which result in tax refunds show that compared with the operating conditions of the previous year, these companies were in worse operating conditions this year. One question worth considering is whether the instrumental variables may affect the tax compliance of companies by affecting operating conditions. This study examines this possibility by adding operating conditions. In order to ensure robustness, there are two types of indicators for measuring operating conditions. One is whether the company is a profitable dummy (*produm*).

When the business operating profit is greater than 0, the assigned value is 1, and when it is less than or equal to 0, the assigned value is 0. The second is the operating profit rate (pro) of a company, which is the ratio of operating profit to operating income. Table 5 shows the regression result between tax compliance and operating status. Among them, (1) and (2) indicate the impact of profitable dummy on tax compliance, (3) and (4) indicate the impact of the company's profitability (operating profit rate) on tax compliance, and if two indicators that reflect the company's operating conditions both are not significant. It indicates that the business status of the company does not have a significant impact on tax compliance, and instrumental variables do not affect the tax compliance of the business through the operating conditions[27].

Table 5: Tax Compliance and Operating Conditions

	(1)	(2)	(3)	(4)
produm	0.0554	0.215		
	(0.122)	(0.150)		
pro			-0.0127	-0.0120
			(0.0366)	(0.0360)
Cons	1.306***	-0.528**	1.335***	-0.441*
	(0.0899)	(0.274)	(0.0607)	(0.268)
Control variables	No	Yes	No	Yes
Sample size	4107	4107	4106	4106

Another possible way of influencing is whether the motives for changing the state of the business are related to tax compliance (or based on tax evasion motives). In other words, enterprises near the preferential standards may artificially control the taxable income to meet the requirements of preferential policies. Also, enterprises that tend to artificially control taxable income may be more inclined to engage in tax evasion or have stronger incentives for tax evasion. If there is such a phenomenon, as indicated by Saez (2010), the taxable income of enterprises should generate a bunching near the

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[27] Similar conclusions can also be reached using indicators such as ROE and other operating conditions.

preferential node. However, due to the existence of some uncertain gains, companies cannot absolutely control the amount of taxable income, so this may lead to a mountainous cluster near the node.
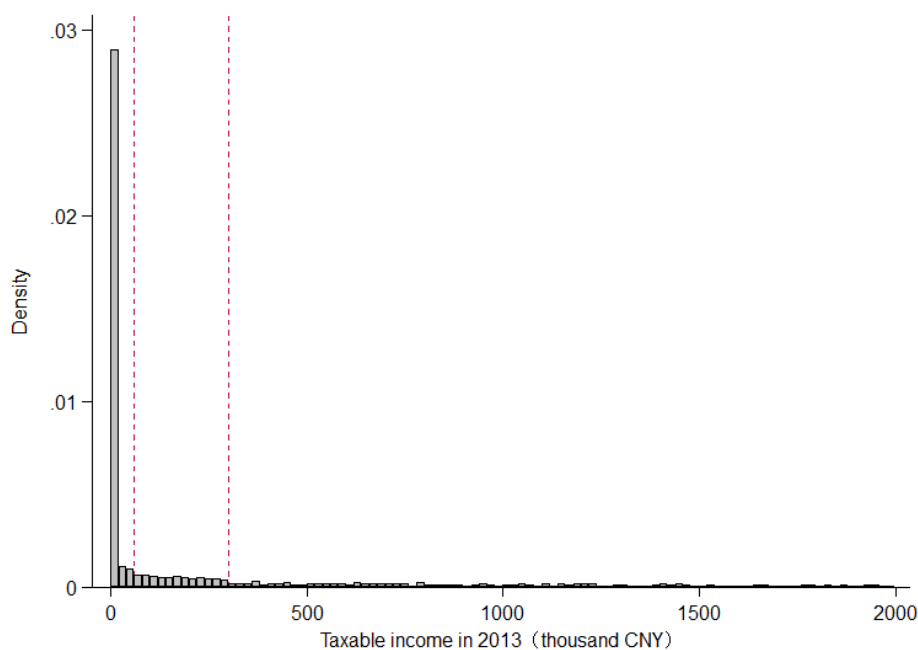

Fig.3 Distribution of Taxable Income of Enterprises in 2013

Figure 3 shows the distribution of the taxable income of the enterprises in 2013. Two of the dotted lines represent two nodes, 60,000 CNY and 300,000 CNY. No obvious distributed peaks are found near the two nodes. In order to prevent such an artificial trend from being smoothed by an excessively large interval, this paper selects a smaller interval (0 to 1 million CNY) to test whether this trend exists. Figure 4 shows the distribution of taxable income from 0 to 1 million CNY in 2013, and no significant mountain-like clustering has yet been found near the nodes. It can be explained by there not being any obvious evidence near the node of a large number of companies to manipulate the taxable income to meet the preferential policies for small and micro enterprises.
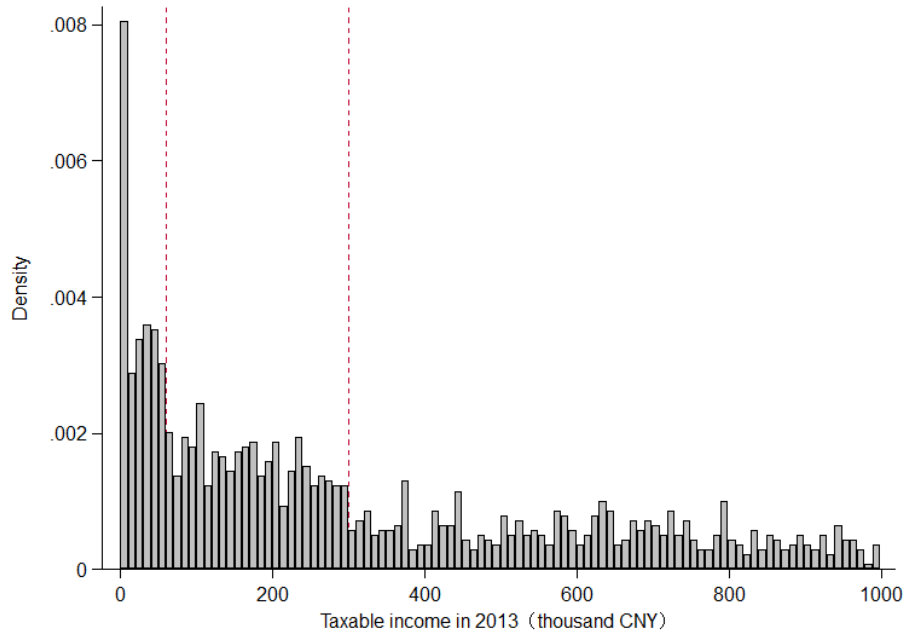
Fig.4 Distribution of taxable income between 0 and 1 million CNY in 2013 in enterprises

However, the interpretation of of Figure 3 and Figure 4 still has a certain degree of subjectivity. Therefore, this study uses another alternative statistical test, namely Benford's Law (Benford, 1938), to test whether there is a "artificial operation" to reduce the enterprise to the preferential node to enjoy the tax preference. Benford's Law indicates that in data existing in real life, it is not what people expect that the probability for any of 1 through 9 as the first digit is equal. In fact, it is different. For example, the probability of the first number is about 30% of the digit 1. The formulas for the expected digital frequencies are:

$$p(a) = log(1 + \frac{1}{a}).$$ (13)

If there is no "artificial operation" of the tax return data, the probability of the first number appears in accordance with Ben Ford's Law (Christian and Gupta, 1993). This study also tests the sample data in this way, and Table 6 indicates that the occurrence probability of the first number is not significantly different from the expected value, and the Z-test is not significant. Similarly, there is almost no such "artificial trend" in

enterprises[28].

Table 6: "Benford" test of "Artificial Trend" in Enterprises[29]

First Digit	Actual	Benford Value	Z-stat
1	0.30005	0.30103	0.189
2	0.17920	0.17609	0.750
3	0.12563	0.12494	0.180
4	0.09858	0.09691	0.510
5	0.07882	0.07918	0.105
6	0.06646	0.06695	0.162
7	0.05659	0.05799	0.538
8	0.04979	0.05115	0.556
9	0.04489	0.04576	0.365

The last aspect is the actual tax rate. In the tax compliance model and experiments, the tax rate is one of the important factors affecting tax compliance. The effective tax rate changes when the state of enjoying preferential policies for small and micro enterprises changes, so the instrumental variables may also affect the tax compliance degree of the enterprise by affecting the actual tax rate that the company faces. It needs to pass the regression test to exclude this way. The actual tax rate used in this study is based on the total assets of the company, the number of employees and the amount of taxable income. It corresponds to tax rates of 10%, 20% and 25% of the preferential policies for small and micro enterprises mentioned above. The specific regression results are shown in Table 7.

Table 7: Tax Compliance and Actual Tax Rates

	(1)	(2)	(3)	(4)
rate	5.921***	4.309***	5.612***	4.082***
	(0.986)	(1.134)	(1.001)	(1.141)
refund		0.0867***		0.0859***

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[28] Due to the overall length limitations, no detailed description of Benford's law is included here. Detailed information can be found in Christian and and Gupta (1993), and Nigrini (1996, 2017).

[29] The Z-statistic used in Table 6 refers to the method proposed by Nigrini (1996). The formula is: $Z = (|p_a - p_e| - \frac{1}{2N})/\sqrt{(p_e * \frac{1-p_e}{N})}$, where p_a and p_e represent actual probability and Benford expectation, respectively, and N represents the number of samples.

		(0.0295)		(0.0300)
Cons	-0.0394	-0.690**	-0.440	-1.102***
	(0.219)	(0.301)	(0.267)	(0.345)
Control variables	No	No	Yes	Yes
Sample size	4107	4107	4107	4107

Table 7 shows that the actual tax rate has a significant positive effect on tax compliance, with or without a control variable. The significance level is 1%. Even if the tax refund is added as an explanatory variable, the effective tax rate is still significant. This means that instrumental variables may affect tax compliance through actual tax rates. Therefore, this study refers to the method proposed in Engström et al. (2015), adding the actual tax rate to the control variables to ensure that the instrumental variables are exogenous. In fact, because the effect of the actual tax rate on tax evasion is positive, even if there is such an estimation bias, when a tax refund is generated, the actual tax rate will decrease and the tax compliance will increase. Therefore, the bias will only underestimate the effect of the tax rebate on tax evasion, affecting the lower limit of the effect and therefore does not affect the direction of the conclusion. However, adding the actual tax rate to the control variable can eliminate this deviation as much as possible.

In addition to the possible additional influencers, there may be others, but it is believed that the others have been less affected if the major factors have been excluded. Therefore, the instrumental variable is reasonable.

6. Empirical Analysis

This part first discusses the basic effects of tax refund on tax compliance, and then presents some additional research in order to explore the question put forward by Webley (1991). The last section of this chapter presents the robustness test.

6.1 Basic Results

Table 8 shows the basic regression results of tax refund on tax compliance. Of these, (1) is the result of the OLS results without considering the endogeny. The conclusion is that a tax refund will help tax evasion and reduce tax compliance, but the reduction is small. (2) considered the endogeny and used the 2SLS results. The coefficient is improved but the effect direction remains same. Therefore, different with previous studies, the evidence has identified a counterexample in that a tax refund do not necessarily promote tax compliance. On the contrary, it may contribute to tax evasion. According to the analysis in the previous sections, if the taxpayer behaves according to the prospect theory, the increase of the prepaid tax refund will certainly increase their tax compliance (Hypothesis 3), and if the taxpayer behaves according to the expected utility theory, the tax refund may decrease their tax compliance (Hypothesis 1). This counterexample shows that the taxpayer is inclined to behave according to the expected utility theory. In addition, the research objects in this essay act according with the coefficient condition that satisfies Hypothesis 1. The smaller enterprises are inclined to focus on the short-term goals, and the prepaid system has a great influence on daily available funds.

(3) and (4) used the amounts of tax that should be assessed in 2013 and 2015 (the second year after the current year). It was found that the relationship between the amount of tax audit and the amount of tax refund was not significant in 2013, but it was significant for the second year, which is consistent with the analysis in the above. The tax administration seldom audits the tax compliance of current year, but previous year. The figures in 2014 or 2015 do not affect the conclusion, and the tax audit data of current year is not suitable to act as a variable pertaining to tax evasion.

Table 8: The Effect of Tax Refund on Tax Compliance

	(1)	(2)	(3)	(4)
	OLS	IV_14	IV_13	IV_15
refund	0.0859***	0.369***	0.190	0.541***
	(0.0300)	(0.116)	(0.121)	(0.100)
Cons	-1.102***	-3.287***	-1.325	-4.246***

	(0.345)	(0.940)	(0.971)	(0.831)
under identification test		150.264***	150.264***	150.264***
weak identification test		80.065***	80.065***	80.065***
over identification test		0.938	0.330	0.228
Control variables	*Yes*	*Yes*	*Yes*	*Yes*
Sample size	4107	4107	4107	4107

Notes: We report Cragg-Donald Wald F statistic as weak identification test, and report Hansen's p-value as over identification test.

6.2 Expansion Research – Webley's Doubts (1991)

Morita (2014) believes that taxpayers behave according to prospect theory or the expected utility theory because they may pay more attention to the expected value under some conditions and pay more attention to the change value relative to the reference point under other conditions. The basic regression results confirm that the taxpayer's compliance behavior adheres more closely to expected utility theory, but they do not explain the second issue. Under what conditions does one pay more attention to the expected value, and under what conditions is the focus primarily on the change value relative to the reference point? Below, this question is discussed from an indirect view.

Webley (1991) proposes that only when the amount of tax refund is large will the prediction result of the prospect theory be confirmed, as the numerous tax refunds used in the Robben's experiment (1990). If this conjecture is reasonable, the larger the tax refund, the weaker Hypothesis 1 is. The stronger Hypothesis 3 is, the weaker the tax refund's promotion of tax evasion. Gradually expanding the tax refund range by adjusting the samples used for regression will lead to a gradual decrease in the coefficient.

This part has tested this possibility. Table 9 is the regression results when the sample's tax refund is less than 200,000 CNY, 300,000 CNY, 400,000 CNY and 500.000 CNY, respectively. It was found that the effect of tax refunds on tax evasion become weaker with the expansion of the tax refund. This indicates that the larger the tax refund, the smaller promoting effect to tax evasion. It seems to prove the conjecture. However, it is not to be ignored that this attempt may change the exogenous variables

such as δ and r in the sample. Under the expected utility theory, the change of exogenous variables such as δ、r may also lead to the occurrence of this situation. This expansion research can only be one of the real evidence indirectly supports Webley's (1991) conjecture.

Table 9: The Regression Outputs of Expansion of Tax Refund

	(1)	(2)	(3)	(4)
	<200000	<300000	<400000	<500000
refund	1.008***	0.818***	0.670***	0.628***
	(0.343)	(0.249)	(0.215)	(0.195)
Cons	-8.661***	-7.171***	-5.925***	-5.537***
	(2.769)	(2.037)	(1.768)	(1.601)
under identification test	39.641***	62.810***	74.358***	84.852***
weak identification test	19.709**	31.811***	39.060***	45.247***
over identification test	0.606	0.579	0.596	0.590
Control variable	Yes	Yes	Yes	Yes
Sample size	2744	3043	3214	3334

6.3 Robustness Test

6.3.1 Will the Selection of Samples Affect the Conclusion?

This paper focuses on an enterprise sample which had less than 2,000,000 CNY of taxable income in 2013. Since this threshold is selected according to the distribution of tax income in 2013 of small and micro enterprises in 2012, it may have contingency. And the model we use may be more suitable for enterprises with one owner, which can decision whether or not evade tax by one person. all of these may influence the robustness of the conclusion. This study therefore attempts sole proprietorship sample to exclude the problem of fitness between model and sample. Then attempts smaller and larger sample to exclude contingency. Table 10, (1), (2), (3) and (4) present the results of these attempts. Column (1) uses sole proprietorship sample. Column (2) uses smaller samples (the taxable income in 2013 is less than 500,000 CNY). And column

(3) uses the maximum value of the taxable income in 2013 for small and micro enterprise sample from 2012, 10,577,000. Column (4) uses the full sample. From the results it can be seen that the coefficients of the columns (2) and (3) are not significantly different from the main regression coefficient, and the coefficient of sole proprietorship sample is higher, the coefficient of the full sample is lower. The reason may be that the tax compliance decision of sole proprietorship is done by one person. In the contrary, the larger enterprises is more complex as described in a previous section. It is a decision that involves the principal-agent problem, and the asymmetry information of the decision-makers, etc. Therefore, the impact of the tax refund may be smaller after multi-layer transmissions. Overall, Column (1), (2), (3) and (4) confirm that the sample selection does not affect the conclusion of this paper.

Table 10: The Regression Output of the Robustness Test

	(1) Sole proprietorship sample	(2) <500000	(3) <10570000	(4) All sample	(5) deficit IV
refund	0. 467**	0.371***	0.326***	0.257***	0.396***
	(0. 218)	(0.131)	(0.0997)	(0.0876)	(0.110)
Cons	−3. 735***	-3.263***	-2.575***	-1.781***	-3.494***
	(1. 370)	(1.084)	(0.754)	(0.616)	(0.844)
under identification test	54.75***	126.735***	167.987***	167.729***	157.186***
weak identification test	40.23***	61.324***	113.316***	145.196***	99.482***
over identification test	0. 141	0.899	0.742	0.353	0.642
Control variables	Yes	Yes	Yes	Yes	Yes
Sample size	1538	3262	5677	8747	4107

6.3.2 Does the Ignored Deficit Part of Instrumental variables Affect the Conclusion?

In the analysis of the instrumental variables, enterprises that enjoy the preferential policy may change the state, leading not only to a tax refund, but also possible tax deficit. For example, the small-micro enterprise qualification can't be valid in the

following year, leading to a tax deficit. The effect on the tax deficit of instrumental variables valued in this article is 0, and the enterprise in this state changing may still get a tax refund when the tax is prepaid, and the value of 0 may affect the conclusion. Therefore, this paper attempts to use the instrumental variables and assign the Δt to - 5%, -10% and -15%, respectively, and $\Delta T = \Delta t * I$. Table 10 (5) shows the regression results after considering the tax deficit of the instrumental variable. The coefficient does not change significantly. This shows that this ignored aspect does not have a significant impact on the conclusion.

7. Conclusion

Under the prospect theory, the prepayment system seems to be a perfect tax design. The tax authorities have a simple and low-cost way to improve tax compliance by allowing more taxpayers to stay in the tax refund interval. In the field of tax compliance, the prospect theory has solved many puzzles and has been supported by a lot of experimental research. The prospect theory and the prepayment system are well developed, but they not perfect. There is a lack of a significant counterexample to provide the opportunity to reflect the two theories, especially strong realistic evidence.

First, this paper presented two questions and referenced related research, and found contrary conclusions. With the increase of tax refund, the tax compliance of enterprises is reduced. Second, with the gradual expansion of the tax refund range, the effect of tax refund on tax compliance gradually decreases. It implies that for enterprises with smaller tax refunds, taxpayer may more likely tend to prospect theory. The data used in this study relate to 8747 enterprises with tax refunds included in *The National Tax Survey*, and the endogenous variables were eliminated by using the instrumental variable method.

The two basic questions were answered on the basis of realistic evidence. This study shows that the prepaid tax refund does not promote tax compliance but reduce the tax compliance of enterprises. The second main aspect of this study is the expansion research. It indirectly supports the conjecture of Webley (1991) that with a low tax refund, compliance is more consistent with the expected utility theory. Taxpayers are

more concerned with the expected value, and as the tax refund increases, this tendency may change. Taxpayers may gradually pay more attention to the value of change relative to the reference point. However, this conclusion requires further research.

Finally, this paper suggested that the prepaid system is not such a simple way to increase tax compliance as described in the previous literature. We need to face up to the drawbacks of the prepaid system in practice. It may not be beneficial for taxpayers to remain in the same tax refund interval as much as possible. Assessing the income as accurately as possible and reducing the difference between prepaid and actual taxes can promote tax compliance.

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