Research on the Relationship between Bank Card Payment and Tax Loss of Underground Economy

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Abstract

With the continuous development of the economy, people are more and more inclined to pay in cash. Bank cards are an important tool for people to make payments. The United States and Turkey actively promote cashless payment to control tax loss, indicating that non-cash payment can reduce tax loss to a certain extent and reduce tax avoidance. So is this the case in China? First, this paper uses the theory of information asymmetry to analyze that bank card payment will make people's income and expenditure more transparent, and tax authorities will have easier access to this information, which will form a taxpayer. This kind of deterrence reduces tax avoidance behavior. According to the prospect theory, it is concluded that taxpayers will overestimate the audit rate, thereby reducing tax avoidance and increasing tax losses. Finally, the use of bank cards can reduce the use of cash, while underground economic activities mainly use cash for transactions and cash use. The reduction can reduce tax losses in the underground economy. Further, this article uses panel data from mainland China and Hong Kong to analyze the impact of bank card payments on tax losses through empirical methods. It is found that as bank card payments increase, tax losses will decrease, and it is also found that macro tax burden has no effect on tax losses. Significant impact, increasing unemployment will reduce tax losses. Finally, according to the conclusions, the corresponding suggestions for reducing tax loss are put forward.

Keywords

Tax loss, underground economy, bank card payment, cash transaction.

1. INTRODUCTION

Tax loss has the same long history as taxation. Since the birth of taxation, taxation loss has been the topic of research by scholars in various countries. Taxation loss will affect the taxpayer's taxpaying behavior and will affect the public services received by citizens. In addition to losses, tax losses can also lead to mismatches in the use of resources, causing taxpayers to feel that they have been treated unfairly or even violated the law. Therefore, it is necessary to study what factors affect tax losses. The state can formulate relevant policies to Increase tax losses. On the other hand, with the use of bank cards more and more frequently, countries also use non-cash payment tools such as bank cards as an important tool to reduce tax losses. For example, the United States and Turkey have actively promoted non-cash payment tools. Foreign scholar Boryana Madzharova (2014) researched using data from 26 European countries and found that bank card payments have no significant effect on VAT income, and the use of cash will reduce VAT income; Giovanni Immordino, Francesco Flaviano Russo (2017) used 25 Panel data from European countries have empirically found that bank card payments can reduce tax avoidance and increase tax revenue. From the results of foreign studies, the impact of bank card payments on tax losses is uncertain, so will bank card payments in China be reduced? What

about tax loss? This is the main issue to be studied in this article. At the same time, the existing bank card payment and tax loss articles do not clearly explain the relevant theory of why bank card payment will reduce tax loss. This article will further explain the theory of bank card impact on tax loss, using the panels of mainland China and Hong Kong. The data validate the relationship between bank card payments and tax losses.

2. LITERATURE REVIEW AND THEORETICAL ASSUMPTIONS

There are many influencing factors of tax loss. Different scholars have explained the influencing factors of tax loss from different theories and angles. This article mainly explores the effects of bank card payments on tax losses from the following theories.

(1) Analyze the influencing factors of tax loss according to the prospect theory. Prospect theory was founded by Kahneman and Tversky (1979), who introduced the elements of experimental psychology and cognitive psychology into economic analysis and pioneered behavioral economics. Prospect theory is based on the assumption of "limited rationality", and restores decision-makers to more realistic, limited-rational decision-makers. It explains the decision-making behaviors of risk under uncertain conditions based on the psychological rules of decision-makers, thus explaining taxpayers well. Realistic behavior. Chang, Nichols, and Schultz (1987) were the first to apply prospect theory to the study of individual tax loss behavior. They conducted tax experiments to study the risk attitude of taxpayers in the face of tax evasion. Alm (1992) used the prospect theory to explain why the actual tax turnover is higher than the compliance derived from the expected utility theory. They believe that the reason why people pay taxes may be overestimating the probability of audit, because taxpayers are risk-averse Choose tax compliance to reduce tax losses. He Hongqu (2005) pointed out that according to the expected utility theory, most people should choose to avoid tax, but the proportion of people who avoid tax in real life is not large. What is the reason? The author explains this confusion based on the prospect theory. It is expected that a factor that affects tax loss in the theoretical model is the tax inspection rate. Taxpayers usually overestimate the tax inspection rate. So even if the tax inspection rate and fine rate in China are not high, However, taxpayers still choose to pay taxes according to law. Ruan Jiafu (2005) defined tax compliance in detail in his article, and analyzed the current situation of tax compliance and its impact. He used the prospect theory to explain the reasons for tax non-compliance. The greater the penalties, the less taxpayers' non-compliance, and the lower the seizure rate, the more they can induce taxpayer's non-compliance. The author believes that this seizure rate is not It must be the ratio of cases of non-compliance detected by the tax authorities to cases inspected. It can be the expected audit rate of the taxpayer. The higher the expected audit rate of the taxpayer, the fewer the non-compliance of tax payment. Payment information such as card payments will be recorded electronically. As the information is archived, it will be easier for tax authorities to check. As a result, taxpayers will further overestimate the tax audit rate, so tax losses will be further reduced.

(2) Information asymmetry theory. Foreign studies on tax loss are mainly based on the theory of expected utility and prospect theory. Based on these two theories, domestic scholars study tax loss from the perspective of information asymmetry. Li Linmu (2007) pointed out according to the information asymmetry theory that if tax authorities can obtain more relevant information about taxpayer transactions, the seizure rate of tax authorities will increase, and the tax loss of taxpayers will follow this rate. Increase. The author also cited the international experience of the third-party information reporting system, explaining the importance of the third-party reporting system in increasing tax losses, so he proposed the urgency of the tax authority to establish a third-party information reporting mechanism. He believed that third-party information The establishment of a reporting system can increase tax losses for taxpayers.

The information paid by bank cards will eventually be aggregated to the People's Bank of China, which can increase the transparency of taxpayer income and expenditure information. As a result, tax authorities can obtain information on taxpayer transactions and improve the seizure rate. As a result, taxpayers' tax losses will increase.

(3) Cash payments affect tax losses. There is less literature on the impact of bank card payments on tax losses. For example, Boryana Madzharova (2014) conducted research using data from 26 European countries and found that bank card payments have no significant effect on VAT income, and the use of cash reduces VAT income. Giovanni Immordino, Francesco Flaviano Russo (2017) used panel data from 25 European countries to empirically find that bank card payments can reduce tax avoidance and increase tax revenue; however, there are more studies on cash payments associated with bank card payments. James PF GORDON (1990) pointed out that cash sales will lead to sales tax avoidance and even income tax avoidance; Ilan Benshalom (2002) pointed out that the cash economy will cause or at least simplify tax avoidance plans because cash transactions are not recorded, Its regulators cannot monitor such transactions. Kenneth S. Rogoff (2014) pointed out that paper money or cash promotes tax evasion and illegal economic activities; Giovanni Immordino, Francesco Flaviano Russo (2018) pointed out in their article that restraining the use of cash can reduce tax avoidance and reduce tax loss.

According to the above literature analysis, it can be known that bank card payment will make taxpayer information more transparent. Boryana Madzharova (2014) also pointed out that the visibility of bank card payment can be used as a deterrent factor for tax avoidance behavior, because tax authorities can easily obtain taxpayer income. With such information, the probability of taxpayers being checked for tax avoidance will increase. If it is found out, taxpayers' reputation will be damaged, benefits will be lost, and the cost of tax avoidance will increase. According to the prospect theory, people will further overestimate Probability of being audited, thereby reducing tax avoidance and reducing tax losses. At the same time, with the use of bank cards, cash will be used less and less. With the decrease in cash transactions, people's transaction behavior will be more easily monitored, which can reduce tax avoidance and reduce tax losses.

Therefore, this article makes the assumption that bank card payment will reduce tax avoidance and reduce tax loss.

3. MODEL AND DATA SELECTION

In order to verify the relationship between bank card payments and underground economic tax losses, the following model is established in this paper:

$$\text{lnrtaxloss}_{it} = \beta_0 + \beta_1 \text{lncard}_{it} + \beta_2 \text{lntaxburden}_{it} + \beta_3 \text{lnunemployment}_{it} + \varepsilon_{it} \qquad (1)$$

To study the effect of card payment on tax loss, and considering the impact of tax burden unemployment rate on tax loss, this paper mainly selects bank card payment, tax loss, tax burden, and unemployment rate data for empirical research. And the data of Hong Kong, China from the third quarter of 2009 to the fourth quarter of 2017 form a 34 × 2 panel data to build a model.

Bank card payment is the main variable studied in this paper. The data of bank card payment is bank card consumption / GDP. The domestic bank card consumption data comes from the report of the People's Bank of China payment system. Database, Hong Kong bank card consumption data from the Hong Kong Monetary Authority, GDP and the Hong Kong Special Administrative Region Government Statistics Office.

Jia Shaohua (2002) used the cash ratio method to calculate the scale of the underground economy in China from 1990 to 1997, and calculated the scale of tax loss in the underground economy based on the scale of the underground economy and the macro tax burden. Hao Chunhong (2004) also used the cash ratio method to measure the scale of China's underground economy from 1983 to 2002, and calculated the scale of China's underground economy's tax loss. Song Xuguang (2006) used the cash ratio method to measure the scale of China's underground economy from 1995 to 2002, and calculated the scale of China's underground economy's tax loss. Zhao Sheng (2012) used the cash ratio method to calculate the scale of China's underground economy from 2000 to 2010, and calculated the corresponding tax loss ratio accordingly. Li Jianfang and Gao Yanrong (2014) used the cash ratio method to calculate the amount of China's underground economic tax losses from 1999 to 2014. Jia Shaohua (2016) used the improved cash ratio method to measure China's underground economic tax losses from 2001 to 2013. Lu Jianglin (2017) used the improved cash ratio method to estimate the tax loss of the underground economy in China from 1990 to 2016. Therefore, it can be seen that regarding the measurement of tax loss, the cash ratio method is relatively mature and has been recognized by many scholars. Therefore, this article will use the improved cash ratio method to calculate the underground economic tax loss as a proxy for tax loss. The lower the tax loss, the higher the tax loss.

$$Y_u = Y_0 \frac{M_1 - K_0 M}{(K_0 + 1)M} \qquad (2)$$

Among them, M1 represents the narrow money supply, M2 represents the broad money supply, M = M2-M1, K0 is the cash ratio of the open economy, that is, the ratio of the cash balance in the open economy to the demand deposit balance in the open economy, and Y0 is the income of the open economy Scale, Yu is the scale of the underground economy, the tax loss of the underground economy is Yu times the macro tax burden, the tax loss is taxloss = Yu × taxburden, and the tax loss rate (rtaxloss) is the tax loss / total tax. Calculate the relevant data of tax loss. The data for mainland China are from the Guotai'an database, and the data for Hong Kong are from the government of the Hong Kong Special Administrative Region. The calculated amount of underground economic tax loss and the rate of underground economic tax loss are shown in Table 1:

It can be seen from Table 1 that the absolute amount of underground economic tax loss in mainland China and Hong Kong has shown an upward trend, and the underground economic tax loss rate has shown a downward trend as a whole from the third quarter of 2009 to the first quarter of 2016. There is an upward trend after the second quarter.

Allingham and Sandmo (1972), Yitzhaki (1974), Clotfelter (1983), Cran and Nourzad (1992) point out that the tax rate will affect tax loss, and Liang Junjiao (2006) also pointed out that the macro tax burden will affect tax loss. As a control variable, taxburden data is expressed as a macro tax burden, and is expressed as total tax / gross domestic product.

Finally, considering that with the increase in the number of unemployed, people will switch to underground economic activities, resulting in tax loss. Therefore, this article also considers adding the unemployment rate as a control variable. Unemployment data The mainland is the urban unemployment rate. The data in Hong Kong is the proportion of the unemployed and working population in Hong Kong.

Table 1. Underground Economic Tax Loss in Mainland China and Hong Kong

Season	China Mainland		China Hong Kong	
	Underground Economic Tax Loss Rate	Underground economic tax loss	Underground Economic Tax Loss Rate	Underground economic tax loss
2009q3	0.294828179	4578.091968	0.077794078	2348.836589
2009q4	0.332107487	4803.599377	0.089636872	9904.874302
2010q1	0.311611379	5516.331593	0.094399006	7702.014872
2010q2	0.319845452	6687.62617	0.109318846	4254.252196
2010q3	0.305826058	5304.809878	0.063063877	2219.533147
2010q4	0.341410018	5890.49043	0.089966873	11312.43464
2011q1	0.308076895	7220.968139	0.0909884	8228.80891
2011q2	0.309209791	8221.758476	0.084267431	4517.071371
2011q3	0.284581761	6051.275424	0.085023912	3079.821153
2011q4	0.286581524	5286.486263	0.100876805	14244.51106
2012q1	0.230713926	5965.75685	0.0964085	9793.850317
2012q2	0.231474373	6729.844251	0.086693916	4590.789638
2012q3	0.219195257	4927.169627	0.086873616	3207.721382
2012q4	0.242324193	5622.939029	0.072256942	10884.42443
2013q1	0.212635868	5826.052665	0.094668224	10383.8735
2013q2	0.207783696	6620.281528	0.081596548	3993.335063
2013q3	0.195153022	4908.391238	0.076500073	3121.126481
2013q4	0.220806794	5767.162122	0.080517821	12094.42086
2014q1	0.182530802	5510.208816	0.07784788	8507.761285
2014q2	0.182528724	6220.745007	0.063454755	3332.262983
2014q3	0.16611907	4389.933974	0.062203616	3784.779008
2014q4	0.184227771	5246.832703	0.055600332	8749.323775
2015q1	0.153740643	4698.821407	0.029650913	3766.881696
2015q2	0.157902509	5675.537235	0.030853656	1934.771075
2015q3	0.159380732	4482.563958	0.0211951	1017.915856
2015q4	0.191939431	5813.983552	0.031855546	4988.164412
2016q1	0.186294166	6139.117464	0.02645757	3087.598423
2016q2	0.208342482	8184.103117	0.027168181	1625.390754
2016q3	0.211752175	6065.573293	0.017890437	1127.169086
2016q4	0.23695282	6985.414159	0.033245813	6537.689295
2017q1	0.222100185	8393.934463	0.035371347	4122.459782
2017q2	0.234942255	9933.473653	0.034541904	2115.380713
2017q3	0.234952472	7759.775295	0.033953144	1987.752835
2017q4	0.256017235	8002.855547	0.036846751	6739.970795

4. EMPIRICAL ANALYSIS

Before establishing panel regression, the unit root test must be performed on the data. The panel data test usually looks at the LLC test under the same root and the ADF-Fisher test under different roots. If both tests are stable, the variable is stable. The results are shown in Table 2:

Table 2. Unit root test results of each variable

Variable	LLC value	P value	ADF-Fisher value	P value
lnrtaxloss	-1.03073	0.1513	3.97434	0.4095
dlnrtaxloss	-5.32212	0	35.4019	0
lncard	0.06506	0.5259	2.061	0.7245
dlncard	-1.61117	0.0536	9.08363	0.059
lntaxburden	30.4375	1	4.45878	0.3475
dlntaxburden	-32.2242	0	48.0238	0
lnunemployment	-0.80096	0.2116	7.28022	0.1218
dlnunemployment	-3.04618	0.0012	24.0133	0.0001

It can be seen from the above table that the original sequence of each variable is not stable. The sequences after the first-order difference are all stable sequences, and all sequences have first-order single integers. Therefore, you can perform a co-integration test on the sequences to check whether the variables have Long-term equilibrium relationship. In this paper, Johansen Fisher method is used to perform panel co-integration test on the data. The test results are shown in Table 3:

Table 3. Co-integration test results

Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Prob.	Fisher Stat.* (from max-eigen test)	Prob.
None	74.6	0	51.5	0
At most 1	29.49	0	20.33	0.0004
At most 2	13.87	0.0077	14.44	0.006
At most 3	3.777	0.4371	3.777	0.4371

From the results in Table 3, it can be seen that there is a co-integration relationship between tax loss, card payment, tax burden, and unemployment rate. Therefore, a regression model can be established to explore the relationship between tax loss and card payment, tax burden, and unemployment rate.

Before performing regression on the model, first perform an F test on the model to test whether the model uses a fixed effect model or a mixed effect model. The F test results are shown in Table 4:

Table 4. F test

Effect test	statistics	degree of freedom	probability
Cross-section F	76.039747	(1,55)	0
Cross-section Chi-square	52.09005	1	0

It can be seen from Table 4 that the probability value of the F test is 0, and the null hypothesis of mixed effects is rejected. Therefore, the model should establish a fixed effect model. After the fixed effect model is determined, it is necessary to judge between the fixed effect and random effect models In this paper, the hausman method is used for testing. The test results are shown in Table 5:

Table 5. Hausman test results

Chi2 (1)	P>Chi2
36.50	0

From the results of the Hausman test, it can be seen that the P value is 0, and the assumption of establishing a random effect model is rejected, so a fixed effect model should be established.

The regression results of the model are shown in Table 6 below:

Table 6. Model regression results

	FE lnrtaxloss
lncard	-0.393***
	(-2.90)
lnunemployment	1.111**
	(2.44)
lntaxburden	0.138
	(1.16)
_cons	-3.814***
	(-6.70)
N	68

Note: The value of t is shown in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

From the above regression results, it can be seen that the regression coefficient of bank card payment is -0.393, and it is significant at the level of 1%, indicating that card payment has a significant negative impact on tax loss. For every 1% increase in card payment, tax loss will increase. A reduction of 0.40% indicates that the use of bank card consumption can reduce tax losses and increase tax losses; the regression coefficient of the unemployment rate is 1.111 and is significant at the level of 5%, indicating that as the unemployment rate increases, tax losses

will also increase, and the unemployment rate For every 1% increase, tax loss will increase by 1.11%; the impact of tax burden on tax loss is not significant.

5. ROBUSTNESS TEST

In order to test the robustness of the model, this paper uses the robust standard error 2-step generalized moment estimation method to perform the robustness test, using the bank card payment lag period as the instrument variable. The test results are shown in Table 7:

Table 7. Robustness test results

	(1) lnrtaxloss
lncard	-0.405*** (-5.76)
lnunemployment	1.201*** (2.88)
lntaxburden	0.110 (0.70)
District	control
Hansen test	No over-recognition
N	50

Note: The t value is shown in parentheses, * p <0.1, ** p <0.05, *** p <0.01, Hansen test is used to test whether there is a problem of over-identification of tool variables in tool variable estimation and generalized moment estimation.

The results obtained through GMM estimation using instrumental variables are basically consistent with the previous results, indicating that our model is robust.

6. CONCLUSIONS AND RECOMMENDATIONS

From the above analysis, we can draw the following conclusions: bank card consumption can reduce the tax loss of the underground economy and promote tax loss, because bank card consumption information is recorded in the major bank information systems, although China has not yet established tax authorities and banking systems. Information sharing mechanism, but according to the prospect theory, taxpayers are able to pay taxes consciously because they overestimate the audit rate of the tax authority. When the taxpayer's consumption information is recorded and performed, the prospect theory will play a greater role, that is, the tax authority Being able to more easily obtain this part of the information, taxpayers will further overestimate the probability of their being audited, thereby reducing tax avoidance and increasing tax losses. At the same time, with the popularity of bank card payments, the amount of cash transactions will decrease, thereby strengthening taxation. The government's ability to monitor income has reduced tax losses; at the same time, our analysis also found that the unemployment rate and tax losses show a positive correlation, indicating that the unemployment rate will affect tax losses, because the unemployed will turn to engage in some underground Economic activities that cannot be monitored So it can not be taxed, resulting in loss of tax revenue. Finally, this

paper finds that the relationship between tax loss and macro tax burden is not obvious. This is consistent with previous research. The impact of tax burden on tax loss is different. Different scholars have reached different conclusions. Yitzhaki (1974) pointed out that a higher tax burden rate would Increasing income declaration through income effects, Clotfelter (1983), Cran, and Nourzad (1992) have different views that a higher tax burden will lead to less tax loss.

Tax loss has always been a concern of the government. Based on the above conclusions, this article proposes the following: First, bank card payments can reduce tax losses. The government should vigorously promote the use of credit cards to suppress hard-to-track cash payments, thereby increasing tax losses. The taxation of cash use reduces the use of cash. Giovanni Immordino, Francesco Flaviano Russo (2018) also pointed out that taxation of withdrawals with ATM machines can reduce tax losses; according to the prospect theory, the government should accelerate the establishment of a third-party information sharing mechanism. Especially with the third-party sharing mechanism of the banking system, because without this mechanism, bank card payments can reduce tax loss through the prospect theory, then when this third-party sharing mechanism is established, bank card payments can be more To reduce tax losses, the government should actively promote employment and improve the job market and mechanism, so as to reduce tax losses and promote tax losses.

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