Does the Tax Cuts Policy Lower Firm Survival Risk? Evidence from China

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Abstract. This paper examines the effect of tax cuts policy on firm survival risk. We analyze a panel data of China’s listed companies over the period 2008-2021 based on two different techniques: Kaplan-Meier survival estimator and the Cox proportional hazards model. Our findings reveal that the tax cuts policy has positive and significant effect on improving firms’ survival probabilities. Moreover, compared with the income tax cuts, the value-added tax cuts play a more effective role on improving firms’ survival probability. By dividing firm locations into different regions, we also find that the tax cuts policy exerts a positive influence on firms’ survival probabilities in eastern region, while the positive effect in the central and western regions is relatively weaker. From the perspective of profitability heterogeneity, the results show that the beneficial effect from tax cuts policy on firm survival is more pronounced for firms with weaker profitability. Keywords: Taxation, Failure rate, Cox proportional hazards model.

1 Introduction

Firm survival means the possibility that an enterprise can continue to operate without exiting the industry [1, 2]. The continuous operation of enterprises shapes the competitive landscape of the economy and further impacts on the welfare of the economy [3]. The above beneficial effects have encouraged the government to optimize business environment for firm survival. In spite of the hard efforts made to improve the business environment of enterprises, a large number of enterprises in China have a very short lifespan [4]. According to the statistics from the Analysis Report on the Survival Time of National Domestic-funded Enterprises, nearly 50% of enterprises have survived for less than five years, and the 3 to 7 years after its establishment is the outbreak period for enterprises to exit the market. So, how to reduce the enterprises’ survival risk and prolong survival time is an extremely important topic for policy-makers and scholars.

In order to lower firm survival risk and promote economic growth, the government has issued a number of tax cuts policies, such as the reduction of the value-added tax rate for two consecutive years, inclusive income tax relief for small low-profit enterprises, etc. However, the expected impact of tax cuts policy on firm survival is uncertain. On the one hand, reduction of tax burden may decrease the user cost of capital and improve after-tax return

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on investment, which is advantageous to firm survival. On the other hand, reduction of tax revenue will lessen public resources available for infrastructure investment and the operation of government agencies, which is not conducive to creating a sound business environment for firm survival. The overall effect of taxation on firm survival risk depends on the relative weight of these two opposing effects, which can vary with the size of the government and the composition and efficiency of taxation [5, 6]. Therefore, the objective of this paper is to shed light on how tax cuts policy affects the survival probability of nonfinancial firms.

To explore the role of the tax cut policy in affecting the survival risks of enterprises, we use a dataset on Chinese nonfinancial firms from National Equities Exchange and Quotations (NEEQ) listed companies. Empirically analyze the relationship between tax cuts policy and firm survival risk, and explore whether there are differences in the impact of value-added tax and income tax cuts on the firm survival risk. Besides, firm profitability and geographical location are used as grouping variables for further study. Our study contributes to the existing literature in several ways: (1) This paper quantifies the micro-effects of tax cuts on the survival risk of enterprises, and provides a theoretical reference for further optimization of policy. (2) We further analyze the impact of firm location and profitability on the effect of policy implementation. (3) We employ propensity score matching method and Cox model to overcome the sample bias and right censoring.

The paper is organized as follows. Section 2 provides a brief overview of the related literature. Section 3 develops the hypotheses. Section 4 describes the data outlines the methods, and Section 5 presents the main results. Section 6 discusses the results of further analysis. Finally, Section 7 concludes the paper.

### 2 Literature Review

There is a substantial literature focusing on the economic consequences of tax cut policies, and these economic consequences can be analyzed from the macro and firm perspectives. From the macro perspective, tax cuts policies have played a positive role in promoting economic growth [7] and adjusting income distribution [8]. The value-added tax reform policies have a positive impact on expanding supply and increasing demand, significantly improving the level of macroeconomic equilibrium and promoting economic growth [9, 10]. At the firm level, taxation affect R &D investment and new product introductions [11]. Corporate taxation excessively encroaches on corporate profits, and hinder corporate investment and innovation [12, 13]. Tax cuts policies have indeed provided strong support for enterprises to cope with complex situations and economic downward pressure. Specifically, tax incentives can promote corporate human capital upgrading and increase business cash flow [14], and also have a positive impact on corporate investment and value [15].

There is extensive literature investigating factors that affect firm survival. Honjo (2000) [16] found that the economic cycle plays an important role in determining the survival and development of enterprises. Audretsch & Mahmood (1995) [17] pointed out that during the period of macroeconomic downturn, enterprises face a greater risk of death. There is a significant inverted U-shaped relationship between the macro tax burden and the survival time of enterprises [18]. Furthermore, undertaking R&D activities is assumed to be positively related to firms’ survival prospects. Innovation plays a positive role in preventing enterprises from exiting the market [19]. Innovative companies have better risk resistance ability than non-innovative companies, continuous innovation significantly reduces the survival risk of enterprises [20]. Furthermore, the survival risk may be associated with import and export behavior. With the increase of import intensity and import duration, the survival risk of enterprises gradually decreases [21]. Export behavior helps to increase the survival probability of enterprises and can prolong the existence of enterprises by 0.63 years on average [3].
A large body of studies examined the effect of regional macro-tax burdens on enterprise technological innovation [22] and failure rate. However, there is little literature on the impact of tax cuts policy on the survival of enterprises. This paper attempts to enrich relevant research by exploring the relationship between tax cut policies and the survival risk of Chinese enterprises.

3 Theoretical Analysis and Hypotheses

As the mandatory cost of an enterprise, taxation will lower the cash flow level, total factor productivity [23] and net operating profit, ultimately increase the survival risk. Moreover, the heavy tax burden is not conducive to firms’ innovation and venture capital investment, thus negatively impacting the long-term survival. Preferential tax policies such as value-added tax credit refund and extra tax deductions for R&D investment, effectively alleviate the pressure of endogenous financing constraints and survival pressure. Due to the characteristics of China’s tax system structure, the role of “automatic” tax stabilizers is relatively weak. When enterprise faces the survival dilemma, it is usually necessary to formulate and implement tax cuts policies. Enjoying tax cuts policies can reduce the tax payment of enterprises, increase the company’s retained earnings and operating cash flow, thereby indirectly improving firm survival probability. Therefore, Hypothesis 1 is put forward:

Hypothesis 1. The tax cuts policy can reduce the firm survival risk.

As is known to all, the corporate income tax and value-added tax are the main tax burdens of China’s enterprises. Corporate income tax cuts policy can increase the level of corporate after-tax profits by relaxing pre-tax deduction standards, lowering tax rates, and increasing the years for carrying forward losses. Value-added tax cuts policies usually increase cash flow for enterprises through tax refunds, lower value-added tax rates, and postponement of tax payment deadlines. Differences in collection time, methods and objects lead to different effects of value-added tax and income tax cuts policy. Value-added tax is levied at all stages of production, distribution or sales of products or services and should be paid monthly. The enterprise needs to pay the value-added tax of the previous link when purchasing inventory and raw materials, even though the products have not been sold and the income has not yet been obtained. There may be a problem that the income of the enterprise will decline and the value-added tax needs to be paid, which will bring financial and survival pressure to the company. Therefore, we put forward Hypothesis 2:

Hypothesis 2. Compared with income tax cuts, value-added tax cuts exert a more significant effect on reducing the survival risk of enterprises.

4 Data and Method

4.1 Sample Data

We take analysis samples from China’s National Equities Exchange and Quotations (NEEQ) listed companies in 2008-2021, and obtain data from the WIND database. In order to improve the accuracy of the estimated results, we did a preliminary screening. Firstly, we take the year 2008 as the base, delete enterprises existing before 2008 to avoid left censored data interfere with the estimation results. Second, we filter out firms that do not conform to accounting principles, such as current assets exceeding total assets, current liabilities exceeding liabilities. Third, we remove financial firms from research samples.
### Table 1. Description of matching variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Name</th>
<th>Measurement methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scale of enterprises</td>
<td>Size</td>
<td>The logarithm of the enterprise’s total assets</td>
</tr>
<tr>
<td>Human capital</td>
<td>Hr</td>
<td>The total number of employees</td>
</tr>
<tr>
<td>Cash flow level</td>
<td>Cash</td>
<td>The ratio of net cash flow from operating activities to total assets</td>
</tr>
<tr>
<td>Capital intensity</td>
<td>Capital</td>
<td>The ratio of fixed assets to employees</td>
</tr>
<tr>
<td>The nature of ownership</td>
<td>Soe</td>
<td>A dummy variable that equals to 1 if it is a state-owned enterprise, 0 otherwise</td>
</tr>
<tr>
<td>Asset liability ratio</td>
<td>Lev</td>
<td>The ratio of enterprises’ liabilities to assets</td>
</tr>
<tr>
<td>Research and development</td>
<td>R&amp;D</td>
<td>The ratio of R&amp;D investment to assets</td>
</tr>
</tbody>
</table>

### 4.2 Using PSM Method to Match Sample

Before designing a research methodology, we need to sort out the fact that a company with better survival prospects may be more productive and profitable on its own, not just because of tax cuts. To solve this problem, we artificially constructed a group of enterprises with similar main characteristics with those treated enterprises by using the propensity score matching method. The main steps of propensity score matching are as follows.

1. Identify the treated and the untreated group. Existing literature usually adopts two methods when analyzing the economic consequences of tax cuts policy. One is to use specific tax cuts and exemptions as a measurement method, which is more specific; the other is to use the actual tax burden rate as a measurement method, which is more comprehensive. It is generally recognized that the role of tax cuts policy is to reduce the actual tax burden of enterprises, so tax burden can reasonably reflect the preferential degree of tax cuts for different enterprises. We measured the actual tax burden by the ratio of the difference between various taxes paid and tax refunds received to the operating income. Enterprises whose actual tax burden level is lower than the average value are regarded as the treated group who have obtained tax cuts, and assigned a value of 1, 0 otherwise. We generate a dummy variable \( \text{reduction}_{it} = 0, 1 \). Set enterprises’ survival time as Time, then the average effect of the tax cuts policies on the enterprises’ survival time is:

\[
E(\text{time}_{it}^1 - \text{time}_{it}^0 | \text{reduction}_{it} = 1) = E(\text{time}_{it}^1 | \text{reduction}_{it} = 1) - E(\text{time}_{it}^0 | \text{reduction}_{it} = 0).
\]

Among them, \( \text{time}_{it}^1 \) and \( \text{time}_{it}^0 \) refer to survival time of the treated group and untreated group respectively. In the above formula, \( E(\text{time}_{it}^0 | \text{reduction}_{it} = 1) \) is a counter fact, so it is necessary to fit a set of observations to replace this counter fact.

2. Data matching. The purpose of data matching is to ensure the matching variables of successfully matched control group and experimental group as alike as possible. The matching variables need to be designated in propensity score matching, a factor that influences enterprises’ comprehensive tax burden and enterprises’ survival risk simultaneously. According to the existing theoretical and empirical literature, the matching variables we select are as shown in table 1.

3. Predicting the propensity score. This paper uses the Logit method to predict the propensity score of the enterprise, and finds the untreated group with the closest score to the treated group within 1/4 caliper of standard deviation of propensity score. In order to assess the effectiveness of our data matching, we also conduct the balancing property test and the results are reported in Table 2. The standard deviation reflects the inter-group differences in the distribution characteristics of variables. According to the research conclusions of Rosenbaum and Rubin (1985) [23], if the standard deviation after matching is kept within 20%, the matching result can be considered acceptable. The matching results in table 2 show that the absolute values of the standardized deviations of all variables after matching are significantly less than 10%. Therefore, it can be considered that the selection of matching variables is reasonable and the matching results are reliable.
### Table 2. Balance test results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Samples</th>
<th>Measured group</th>
<th>Standard deviation (%)</th>
<th>Decrease range of standard deviation (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Treated group</td>
<td>Untreated group</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>Unmatched</td>
<td>18.344</td>
<td>17.629</td>
<td>54.2</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>18.339</td>
<td>18.362</td>
<td>-1.7</td>
</tr>
<tr>
<td>Lev</td>
<td>Unmatched</td>
<td>0.4613</td>
<td>0.4714</td>
<td>-2.8</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>0.4610</td>
<td>0.4219</td>
<td>0.1</td>
</tr>
<tr>
<td>Capital</td>
<td>Unmatched</td>
<td>5.3e+05</td>
<td>2.7e+05</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>5.2e+05</td>
<td>4.5e+05</td>
<td>2.9</td>
</tr>
<tr>
<td>Hr</td>
<td>Unmatched</td>
<td>205.83</td>
<td>343.71</td>
<td>-13.6</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>205.78</td>
<td>221.55</td>
<td>-1.6</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Unmatched</td>
<td>0.1789</td>
<td>1.7425</td>
<td>-4.0</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>0.1790</td>
<td>0.1853</td>
<td>-0.0</td>
</tr>
<tr>
<td>Soe</td>
<td>Unmatched</td>
<td>0.0553</td>
<td>0.0342</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>0.0549</td>
<td>0.0446</td>
<td>5.0</td>
</tr>
<tr>
<td>Cash</td>
<td>Unmatched</td>
<td>0.1430</td>
<td>0.7480</td>
<td>-4.5</td>
</tr>
<tr>
<td></td>
<td>Matched</td>
<td>0.1431</td>
<td>0.1241</td>
<td>0.1</td>
</tr>
</tbody>
</table>

### 4.3 Measuring Survival Risk by the Cox Model

In order to examine whether tax cuts policy affects domestic firms’ probability of survival, the Cox model has been employed. The advantage of the Cox model is its ability to incorporate enterprises’ survival time with whether to withdraw from the market, and easily handle time-varying covariates. The Cox proportional hazards model assumes that the hazard denoting the probability of an event (firm exiting the market) depends on time $t$ and a set of relevant covariates, which can be decomposed into:

$$\lambda(t; x) = \lambda_0(t) e^{x'\beta}.$$

In this formula, $\lambda_0(t)$ is the baseline hazard function, which does not depend on the heterogeneity of individual enterprises and is only affected by the time factor, $e^{x'\beta}$ is the relative risk of the enterprise, which $x'$ is the set of covariates affecting the survival risk of the enterprise, $x' = (x_1, x_2, \ldots, x_n)$, and $\beta$ is the set of parameter vectors. We suppose that there are two types of enterprises i and j, and their covariate sets are $x'_i$ and $x'_j$, then the ratio of risk function of enterprise i and enterprise j is:

$$\frac{\lambda(t; x'_i)}{\lambda(t; x'_j)} = \frac{\lambda_0(t) e^{x'_i\beta}}{\lambda_0(t) e^{x'_j\beta}} = e^{(x'_i-x'_j)\beta}.$$

Obviously, the ratio of the risk function of firm i to firm j does not change with time, but only relate to $x_i - x_j$. This enables us to estimate $\beta$ even without designating the concrete function form for baseline hazard function $\lambda_0(t)$. Applied to the research of this paper, it can be seen that the risk rate faced by the experimental group relative to the control group is:

$$\frac{\lambda(t; x_{\text{reduction}=1})}{\lambda(t; x_{\text{reduction}=0})} = e^{(\Delta x)\beta}.$$

### 4.4 Variable Definition

1. Survival risk. In line with the literature, we consider a firm as failed in a given year when its shares are delisted [24]. The dependent variable is the probability of firm delisting in a given period conditional on surviving to that period. If the enterprise delisting in the t year, the value is assigned to 1, and if the enterprise still survives in the t year, the value is assigned to 0.
(2) Reduction. As mentioned above, the actual tax burden can reasonably reflect the preferential degree of tax cuts policy for different enterprises. We measure the comprehensive tax burden by the ratio of the difference between various taxes paid and tax refunds received to the operating income. When the comprehensive tax burden level of the enterprise is lower than the annual average, it is considered to obtain tax cuts and defined as 1, and 0 otherwise.

(3) Control variables. We control for main firm characteristics comprising asset-liability ratio, financing constraints, the nature of ownership, government subsidy, cash flow level, and R&D. In the empirical specification, we further include industry and province dummies to control for the overall evolution of risk. Table 3 summarizes the descriptions of variables.

<table>
<thead>
<tr>
<th>Category</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explained Variable</td>
<td>Survival risk</td>
<td>The probability of firm exit in a given period conditional on survival up to that period</td>
</tr>
<tr>
<td>Reduction</td>
<td>VatReduction</td>
<td>A dummy variable that equals 1 if the value-added tax burden level of the enterprise is lower than the annual average, 0 otherwise</td>
</tr>
<tr>
<td>IncReduction</td>
<td></td>
<td>A dummy variable that equals 1 if the income tax burden level of the enterprise is lower than the annual average, 0 otherwise</td>
</tr>
<tr>
<td>Control Variables</td>
<td>Lev</td>
<td>The ratio of corporate liabilities to assets</td>
</tr>
<tr>
<td></td>
<td>Fc</td>
<td>According to the cash ratio, firm size, firm age, liquidation ratio, the ratio of net fixed assets, accounts receivable ratio and other values, the sample is divided into five equal parts, and assigned 1-5 from high to low, and are summed up to construct the financing constraints index and standardize it</td>
</tr>
<tr>
<td></td>
<td>Soe</td>
<td>A dummy variable that equals 1 if it is a state-owned enterprise, 0 otherwise</td>
</tr>
<tr>
<td></td>
<td>Subs</td>
<td>The ratio of enterprise subsidy income to operating income</td>
</tr>
<tr>
<td></td>
<td>Cashflow</td>
<td>The ratio of net cash flow to total assets</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>The ratio of R&amp;D investment to corporate assets</td>
</tr>
</tbody>
</table>

5 Empirical Analysis

5.1 Firm Survival Curve and Risk Function

Cox proportional hazards model needs to meet the proportional hazards assumption, which means that the impact of covariates on survival does not change with time. For this reason, this paper uses the logarithmic-logarithmic graph to test the setting. The curves in the graph are parallel to each other, so the proportional hazard assumption is established.

From the estimation of the Kaplan-Meier survival curve in figure. 1, it can be seen that no matter whether the enterprise receive tax cuts, the survival curve shows a downward trend over time, as time goes by, the survival probability of the enterprise will gradually decrease. However, compared with enterprises that have not received tax incentives, enterprises that enjoy tax incentives have a relatively higher survival curve position, indicating that the probability of such enterprises exiting the market is relatively small. Further describe the risk functions of the two types of enterprises, as shown in figure. 2. We can find that the risk function trends of the two types of enterprises are relatively similar, but the survival risk of enterprises that have received tax cuts is significantly lower than other enterprises. This conclusion is mutually confirmed with the results in figure. 1.

\footnote{Due to space reasons, log-log plots are not listed here in this article.}
5.2 Regression Analysis on Tax Cuts and Firm Survival Risk

Employing the above-mentioned cox model, we empirically examine the impact of tax cuts policy on the survival probability of firms, results are as shown in Table 4. The coefficients of explanatory variable in columns (1) and (2) are both significantly negative, which shows that tax cuts policy plays a positive role in decreasing firms’ exit hazards and prolonging the survival time of enterprises, supporting Hypothesis 1. Specifically, a unit improvement in the level of tax cuts is linked to a 32.36% increase in firm survival probability. Column (1) only controls the variables of firm characteristics, and column (2) further controls the industry effect and province effect. Comparing the results in columns (1) and (2), it can be found that after controlling factors other than the internal characteristics of the enterprise, the logarithmic likelihood value of the Cox model increases. This means the survival risk of Chinese enterprises is not only affected by their own internal characteristics, but also by the characteristics of the industry and the regional environment they belong to.

To ensure the reliability of the regression results of tax cuts policy on corporate survival probability, this paper uses Weibull and Gompertz model to test the regression results’ robustness. Columns (3) and (4) in Table 3 show the test results of Weibull and Gompertz model respectively. The results show that tax cuts can significantly reduce the survival risk of enterprises, which is highly consistent with the baseline regression results in column (2). Results show that the results of the survival experiment will not change qualitatively due to the change of the model.

5.3 Regression Analysis on Different Types’ Tax and Firm Survival Risk

The estimated results of value-added tax cuts and income tax cuts on the survival risk of firms are shown in table 5. Regression results in Column (1) show that the value-added tax cuts policy can effectively improve the survival probability of enterprises, and reduce the survival risk of enterprises by 24.81% on average. On the one hand, the value-added tax is an integral part of the total price, the heavy value-added tax burden will squeeze the profit margin of the enterprise when the market price is difficult to change. On the other hand, the value-added tax needs to be paid monthly, while corporate income tax is settled and paid at the end of the year. The value-added tax will occupy cash in the production and operation process, which brings financial pressure and survival risk to enterprises. Therefore, compared with income tax cuts policy, value-added tax relief can effectively increase corporate profit margins and reduce capital occupation, thus increase the probability of corporate survival.

The estimated result in Column (2) shows that income tax cuts will reduce the survival probability of enterprises, but the result did not pass the significance test. The tendency of
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduction</strong></td>
<td>-0.3236 **</td>
<td>-0.3371 **</td>
<td>-0.5658 ***</td>
<td>-0.5114 ***</td>
</tr>
<tr>
<td></td>
<td>(0.1396)</td>
<td>(0.1410)</td>
<td>(0.1401)</td>
<td>(0.1415)</td>
</tr>
<tr>
<td><strong>Lev</strong></td>
<td>0.0881</td>
<td>0.0668</td>
<td>-0.0151</td>
<td>-0.0352</td>
</tr>
<tr>
<td></td>
<td>(0.1278)</td>
<td>(0.1334)</td>
<td>(0.1537)</td>
<td>(0.1621)</td>
</tr>
<tr>
<td><strong>Fc</strong></td>
<td>0.5442 ***</td>
<td>0.5594 ***</td>
<td>0.7244 ***</td>
<td>0.7124 ***</td>
</tr>
<tr>
<td></td>
<td>(0.1096)</td>
<td>(0.1138)</td>
<td>(0.1125)</td>
<td>(0.1126)</td>
</tr>
<tr>
<td><strong>Soe</strong></td>
<td>-1.8547 ***</td>
<td>-1.6834 **</td>
<td>-1.7399 **</td>
<td>-1.7561 **</td>
</tr>
<tr>
<td></td>
<td>(0.7107)</td>
<td>(0.7143)</td>
<td>(0.7143)</td>
<td>(0.7147)</td>
</tr>
<tr>
<td><strong>Subs</strong></td>
<td>-0.1752</td>
<td>-0.1613</td>
<td>-0.1403</td>
<td>-0.1551</td>
</tr>
<tr>
<td></td>
<td>(0.3074)</td>
<td>(0.3095)</td>
<td>(0.2940)</td>
<td>(0.3021)</td>
</tr>
<tr>
<td><strong>Cash</strong></td>
<td>0.0863 ***</td>
<td>0.0927 ***</td>
<td>0.1078 ***</td>
<td>0.1103 ***</td>
</tr>
<tr>
<td></td>
<td>(0.0271)</td>
<td>(0.0288)</td>
<td>(0.0281)</td>
<td>(0.0278)</td>
</tr>
<tr>
<td><strong>R&amp;D</strong></td>
<td>-0.2545</td>
<td>0.2679</td>
<td>0.2702</td>
<td>-0.2597</td>
</tr>
<tr>
<td></td>
<td>(0.1617)</td>
<td>(0.1665)</td>
<td>(0.1647)</td>
<td>(0.1634)</td>
</tr>
<tr>
<td><strong>Industry</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Province</strong></td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Loglikelihood</strong></td>
<td>-1666.77</td>
<td>-1642.02</td>
<td>-596.04</td>
<td>-626.15</td>
</tr>
<tr>
<td><strong>N</strong></td>
<td>3506</td>
<td>3506</td>
<td>3506</td>
<td>3506</td>
</tr>
</tbody>
</table>

Note: ***, ** and * represents the 1%, 5% and 10% significance, respectively. Inside the bracket is standard error.

Income tax cuts to the survival probability of enterprises is obviously contrary to our common sense although it is not statistically significant. It is likely to be a false relationship caused by reverse causality: the tax authorities may exercise discretion in tax collection, allow enterprises with better profitability and lower expected survival risk to bear higher corporate income tax burdens.

6 Further Analysis

6.1 Geographical Heterogeneity Analysis

The government services and economic openness in the region where the enterprise is located will affect the business climate and thereby the effect of tax cuts policy. To accurately measure whether the tax cuts policies have different impacts due to the location factors of the enterprises. We divide the sample enterprises into the eastern region, central region and...
Table 5. Regression results on different types of tax reduction on the survival risk

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VatReduction</td>
<td>-0.2481** (0.1392)</td>
<td></td>
</tr>
<tr>
<td>IncReduction</td>
<td>0.1346 (0.2855)</td>
<td></td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Province</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Loglikelihood</td>
<td>-1643.30</td>
<td>-1644.78</td>
</tr>
<tr>
<td>N</td>
<td>3506</td>
<td>3506</td>
</tr>
</tbody>
</table>

Note: ***, ** and * represent the 1%, 5% and 10% significance, respectively. Inside the bracket is standard error.

western region according to the province they located in. The results are as shown in Table 6.

The estimated results suggest that the tax cuts policy can significantly reduce the survival risk and prolong the survival time of enterprises in all regions, but only the regression results of the eastern region passed the significance test. The reason is that the economy in the eastern region is relatively developed, and enterprises can enjoy superior resource allocation, especially in terms of technology and talents. Preferential tax policies such as lower tax rates or taxes exemptions can promote technological innovation activities of enterprises, and the better business environment makes it easier for the tax cuts policies to take effect.

Table 6. Inspection results of enterprises in different geographical locations

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eastern Region</td>
<td>Central Region</td>
<td>Western Region</td>
</tr>
<tr>
<td>Reduction</td>
<td>-0.3713** (0.1686)</td>
<td>-0.4701 (0.3793)</td>
<td>-2.1728 (1.6293)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Province</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Loglikelihood</td>
<td>-1067.56</td>
<td>-168.94</td>
<td>-29.66</td>
</tr>
<tr>
<td>N</td>
<td>2150</td>
<td>629</td>
<td>247</td>
</tr>
</tbody>
</table>

Note: ***, ** and * represent the 1%, 5% and 10% significance, respectively. Inside the bracket is standard error.

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2 According to the standards listed in the “China Health Statistical Yearbook”, Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan are divided into eastern region; Heilongjiang, Jilin, Shanxi, Anhui, Jiangxi, and Henan, Hubei, and Hunan are divided into the central region; Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang are divided into the western region.
6.2 Heterogeneity Analysis of Profitability

Considering that profitability may have an impact on the tax cut policies enjoyed by enterprises, and then affect the suppression effect on the survival risk. This paper further explores whether the effect exists difference among enterprises with various profitability. We use the quartile of operating profit rate as the standard, divide the upper quartile and lower quartile enterprises into two types of enterprises with strong and weak profitability for analysis. The regression results are shown in table 7. We can find that, on the one hand, the coefficient of explanatory variable in Column (1) is significantly negative, which suggests that the tax cuts policy can reduce the survival risk and prolong the survival time of the enterprises with weak profitability. On the other hand, the coefficient of explanatory variable in Column (2) is less than 0 but does not statistically significant, such results show that profitable firms are better off in the market and do not rely on tax cuts to improve their survival chances.

Table 7. Regression results of enterprises with different profitability

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weak Profitability</td>
<td>Strong Profitability</td>
</tr>
<tr>
<td>Reduction</td>
<td>-0.5117 * (0.3102)</td>
<td>-0.4599 (0.3051)</td>
</tr>
<tr>
<td>Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Industry</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Province</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Loglikelihood</td>
<td>-283.48</td>
<td>-300.16</td>
</tr>
<tr>
<td>N</td>
<td>893</td>
<td>871</td>
</tr>
</tbody>
</table>

Note: ***, ** and * represents the 1%, 5% and 10% significance, respectively. Inside the bracket is standard error.

7 Conclusions and Suggestions

There is a vast and growing literature focusing on firm survival risk, but few papers analyzed the impact of tax cuts policy on firms’ survival risk at firm level. In this paper, we empirically investigate the relationship between the tax cuts policy and firm survival risk. Controlling for firm characteristics and systematic differences, we draw the following conclusions: First, the tax cuts policy can reduce the survival risk of enterprises and prolong the survival time; compared with income tax cuts, value-added tax incentives have a more positive effect on improving the survival probability of enterprises. Second, through the regional heterogeneity analysis, we found that compared with the central and western regions, the tax cuts policy has a stronger inhibitory effect on the firm survival risk in the eastern region. Third, the corporate profitability heterogeneity analysis reveals that tax incentives have a more positive effect on the survival probability of companies with poor profitability.

According to the above conclusions, we put forward following suggestions. On the one hand, it’s noteworthy that various tax cuts policies have different effects on the firm survival risk, the value-added tax cuts policies are more effective in improving firms’ survival probability. Therefore, the challenge for policy-makers is not simply reducing the statutory tax rate, but to alleviate survival pressure for all firms by adjusting the proportion of value-added
tax and income tax. And subsequent optimization of the tax system needs to gradually increase the proportion of direct tax. On the other hand, the tax cuts policy should be designed in consideration of the company’s profitability and location. For example, more favorable value-added tax cuts and exemptions policies can be provided to enterprises with poor profitability, and appropriate tax rebates can be given to enterprises in the western region.

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**References**