

技术创新能改善初创企业的生存吗

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摘要:

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关键词:

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一、问题提出

“ ”
2017 29.8 39.9%
50.6% 29.3%

1998–2011 6.64
17% 6.82 50%
6 10 10%

2013

Audretsch 1991 Zhang Mohnen 2013 2016a

2001–2007

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		Mahmood 2000			
		17	8	6	3
	11			4	2
				Ugur 2016	
					Czarnitzki
Toole 2013			Aghion 2014		
					Gilbert 2006

三、理论模型与研究假说

	Aghion 2014				
	L		k		
			Cobb-Douglas		
			$Z_i = \left(\frac{L_i}{\zeta}\right)^{\frac{1}{\eta}} k_i^{1-\frac{1}{\eta}}$		(1)
Z_i	L_i		ζ	k_i	
$1/\eta$			$\eta > 1$		$k + 1$
				$C(z_i, k) = \zeta \omega k z_i^\eta$	ω
$z_i \equiv Z_i/k$				$C(z_i) = \zeta \omega z_i^\eta$	
				$V_t(k) = k Y_t v$	$V_t(k)$
t	Y_t				$v = V_t(k)/k Y_t$

$$v = \frac{\pi - \zeta \omega z_i^\eta}{\rho + x - z_i} = \frac{\pi_A}{\rho + x - z_i} \tag{2}$$

π	π_A		ρ	x	
	z_i	v	2		z_i
v			$V_t(k)$		

McDonald Siegel 1985

$$V_t(k) = k Y_t v \cong V_0 e^{\left[\left(\mu - \frac{\sigma^2}{2}\right)t + \sigma \sqrt{t} N(0,1)\right]} \tag{3}$$

V_0 μ σ 3

$$E[t] \cong \frac{2}{2\mu - \sigma^2} [\ln(k) + \ln Y_t - \ln V_0 + \ln v] = \frac{2}{2\mu - \sigma^2} \left[\ln\left(k \frac{Y_t}{V_0}\right) + \ln \frac{\pi - x \omega z_i^h}{\rho + x - z_i} \right] \tag{4}$$

4 z_i $E[t]$ 4

$$\begin{aligned} \frac{\partial E[t]}{\partial z_i} &\cong \frac{2}{2\mu - \sigma^2} \times \frac{\rho + x - z_i}{\pi - \xi w z_i^\eta} \times \frac{[-\eta \xi w z_i^{\eta-1} (\rho + x - z_i) + (\pi - \xi w z_i^\eta)]}{(\rho + x - z_i)^2} \\ &= \frac{2}{2\mu - \sigma^2} \left[\frac{1}{\rho + x - z_i} - \frac{\eta \xi w z_i^{\eta-1}}{\pi - \xi w z_i^\eta} \right] = 0 \end{aligned} \quad (5)$$

$$\sigma < \sqrt{2\mu} \quad \frac{2}{2\mu - \sigma^2} > 0 \quad \frac{1}{\rho + x - z_i} = \frac{\eta \xi w z_i^{\eta-1}}{\pi - \xi w z_i^\eta} \quad v = \frac{\pi - \xi w z_i^\eta}{\rho + x - z_i} = \eta \xi w z_i^{\eta-1}$$

$$\frac{\partial^2 E[t]}{\partial z_i^2} \cong \frac{2}{2\mu - \sigma^2} \left[\frac{1}{(\rho + x - z_i)^2} - \frac{\eta(\eta-1) \xi w z_i^{\eta-2} (\pi - \xi w z_i^\eta) + (\eta \xi w z_i^{\eta-1})^2}{(\pi - \xi w z_i^\eta)^2} \right] \quad (6)$$

$$\pi - \xi w z_i^\eta = \pi_A \quad v = \eta \xi w z_i^{\eta-1} \quad \frac{\partial^2 E[t]}{\partial z_i^2} \cong \frac{2}{2\mu - \sigma^2} \left[\frac{1}{(\rho + x - z_i)^2} - \frac{\eta(\eta-1) v^{-1} \pi_A + v^2}{\pi_A^2} \right] \quad (7)$$

$$\frac{\pi_A^2}{(\rho + x - z_i)^2} - [(\eta-1) v^{-1} \pi_A + v^2] = v^2 - [(\eta-1) v^{-1} \pi_A + v^2] = -(\eta-1) v^{-1} \pi_A \quad (8)$$

$$1/\eta < 1 \quad (\eta-1) v^{-1} \pi_A > 0 \quad \frac{\partial^2 E[t]}{\partial z_i^2} > 0$$

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$$\frac{\partial^2 E[t]}{\partial z_i \partial \pi} \cong \frac{2}{2\mu - \sigma^2} \left[\frac{1}{(\pi - \xi w z_i^\eta)^2} \right] \quad (9)$$

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Bain 1951 Berger 1995 Slade 2004

Ugur 2016

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四、数据、模型及变量

2001–2007

500

“

failure "	failure	1	0	Duration Data
2001	left censoring		2001-2007	right
censoring	0		2008	1
		201 494		462 050
1			1	
4.15	7.90%		5	55.19%
7	12.28%			
3-5		2		
5.70%	8.10%	7		16.04%
11.93%				

表 1 样本期企业生存时间分布

企业类型	企业数量	平均生存时间	存活N年的企业数量占比(%)						
			N=1	N=2	N=3	N=4	N=5	N=6	N=7
所有企业	201 494	4.15	7.90	14.50	17.09	15.70	17.48	15.06	12.28
创新企业	17 198	4.44	5.70	12.28	15.46	14.82	18.12	17.57	16.04
非创新企业	184 296	4.12	8.10	14.70	17.24	15.77	17.42	14.83	11.93

注：企业数据来源于中国工业企业数据库。下同。

2013

6

表 2 不同类型企业生存时间描述性统计

企业类型		全样本		创新		非创新	
		观测值	均值	观测值	均值	观测值	均值
技术水平	高技术	74 961	4.87	13 142	5.17	61 819	4.80
	非高技术	387 089	4.70	28 665	5.00	358 424	4.68
产权性质	国有	6 028	4.75	1371	5.07	4 657	4.66
	集体	10 608	4.79	1 044	5.03	9 564	4.76
	法人	124 505	4.64	12 789	5.04	111 716	4.60
	私营	249 238	4.69	19 489	5.03	229 749	4.66
	外商投资	37 042	4.99	3 882	5.11	33 160	4.97
	港澳台	33 335	5.00	2 939	5.16	30 396	4.99

2

5.17

4.80

Ejerimo Xiao 2014 Prentice Zhao 2016

Product-limit Kaplan Meier 1958

Kaplan-Meier

$$S(t) = \prod_{j < t} \frac{N_j - D_j}{N_j} \tag{10}$$

t j N_j D_j

1 2

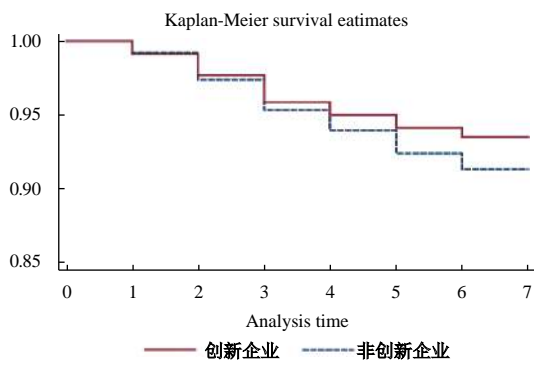


图 1 Kaplan-Meier生存曲线

1 1

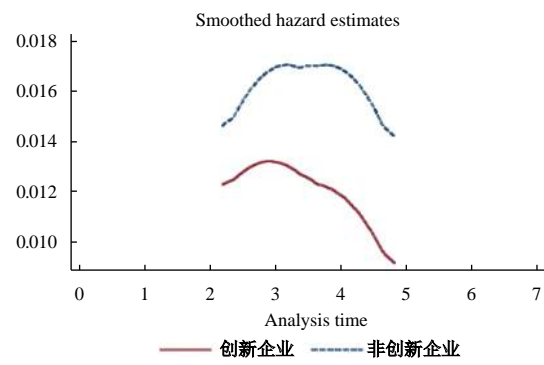


图 2 风险函数曲线

2

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2 1 U

1 2 2-5

Weibull

Log-normal Gamma Gompertz Weibull Howell 2015

Dzhumashev 2016 Cox

t x

$$\lambda(t|x) = \lambda_0(t) \exp(\beta x) \tag{11}$$

$\lambda_0(t)$	x	β	11
$\lambda_0(t) = pt^{p-1}e^{\beta_0}$	Weibull		
		$\ln \lambda(t x) = \beta_0 + x\beta + \ln p + (p-1) \ln t$	(12)
$p > 0, \gamma = e^{\beta_0 + x\beta} > 0$	$p > 1$	$\lambda(t)$	
	$p < 1$	$\lambda(t)$	
12			β
12			
		$\ln \lambda(t x) = \beta_0 + \ln p + (p-1) \ln t + \beta_1 \ln rd_{it} + \beta_2 \ln^2 rd_{it} + \beta_3 \ln rd_{it} \times HHI_{st} + \gamma X + \varepsilon_{it}$	(13)
	1	$\ln \lambda(t x)$	2
$\ln rd$		$\ln rd \times HHI$	
	$\ln^2 rd$	3	X
HHI^2	$\ln size$	$\ln^2 size$	$\ln age$
	$\ln TFP$	$profit$	$\ln capital$
$advert$	$export$	$debt$	$ownership$
$indus$	$year$	$prov$	ε_{it}
t	$\ln size$	$\ln sale$	$\ln employ$
$\ln asset$		3	

表3 主要变量描述性统计

变量名称	符号	测度方法	观测值	均值	标准差	最小值	最大值
研发强度	$\ln rd$	$\ln[\text{研发投入}/\text{销售收入}]$	462 050	-0.508 9	1.710 7	-14.636 3	0.935 8
市场集中度	HHI	$\sum_k (X_k / \sum_i X_i)^2$	462 050	0.015 4	0.044 3	0.001 00	0.889 6
企业年龄	$\ln age$	$\ln[\text{观测期}-\text{成立年份}+1]$	462 050	1.975 8	0.531 3	0	1.945 9
销售收入	$\ln sale$	$\ln[\text{销售收入}]$	462 050	9.943 8	1.177 8	-0.027 9	17.781 1
职工人数	$\ln employ$	$\ln[\text{职工人数}]$	462 050	4.523 5	0.994 6	2.302 6	11.315 3
资产总额	$\ln asset$	$\ln[\text{资产总额}]$	461 750	8.100 9	1.599 2	-0.230 2	16.866 7
全要素生产率	$\ln TFP$	LP半参数法	462 050	5.974 5	1.046 2	-4.416 3	12.212 7
销售利润率	$profit$	利润总额/销售收入	462 050	0.031 9	0.108 7	-6.581 2	0.693 1
资本密度	$\ln capital$	$\ln[\text{固定资产净额}/\text{职工数}]$	462 050	3.597 9	1.389 9	-6.733 4	10.196 8
人力决策	$resource$	有教育费取1, 否则为0	462 050	0.353 3	0.478 0	0	1
广告决策	$advert$	有广告费取1, 否则为0	462 050	0.142 7	0.349 8	0	1
出口强度	$export$	出口交货值/销售收入	462 050	0.157 3	0.363 1	0	25.717 2
资产负债率	$debt$	负债资产/资产总额	462 050	0.548 2	0.326 5	-7.208 6	104.390 2
产权性质	$ownership$	国有企业取1, 其他为0	462 050	0.013 0	0.113 4	0	1

注: 企业数据来源于中国工业企业数据库。下同。

五、实证结果与分析

4	Weibull		1	$\ln rd$
2		$\ln^2 rd$	3	
$\ln rd \times HHI$	4	Cox		

表 4 Weibull模型检验结果

变量	模型(1)	模型(2)	模型(3)	模型(4)
<i>lnrd</i>	0.005 2(0.003 9)	0.055 1 ^{***} (0.013 4)	0.055 0 ^{***} (0.013 4)	0.044 5 ^{***} (0.013 0)
<i>ln²rd</i>		0.007 2 ^{***} (0.001 8)	0.007 2 ^{***} (0.001 8)	0.006 7 ^{***} (0.001 8)
<i>lnrd×HHI</i>			-0.162 7 ^{**} (0.064 0)	-0.156 7 ^{***} (0.035 1)
<i>HHI</i>	1.382 1 ^{***} (0.204 0)	1.398 8 ^{***} (0.204 0)	1.393 3 ^{***} (0.203 8)	1.854 5 ^{***} (0.210 3)
<i>HHI²</i>	-0.820 4 ^{***} (0.226 7)	-0.832 0 ^{***} (0.227 7)	-0.845 8 ^{***} (0.227 5)	-1.133 3 ^{***} (0.354 9)
<i>lnsize</i>	-1.075 6 ^{***} (0.035 2)	-1.074 0 ^{***} (0.035 3)	-1.074 2 ^{***} (0.035 3)	-1.012 7 ^{***} (0.035 0)
<i>ln²size</i>	0.088 5 ^{***} (0.003 8)	0.088 3 ^{***} (0.003 8)	0.088 3 ^{***} (0.003 8)	0.084 4 ^{***} (0.003 8)
<i>lnage</i>	0.649 7 ^{***} (0.036 1)	0.648 9 ^{***} (0.036 1)	0.648 8 ^{***} (0.036 1)	0.475 9 ^{***} (0.034 5)
<i>ln²age</i>	-1.081 6 ^{***} (0.019 1)	-1.080 8 ^{***} (0.019 1)	-1.080 8 ^{***} (0.019 1)	-0.881 4 ^{***} (0.017 3)
<i>lnTFP</i>	-0.192 2 ^{***} (0.005 9)	-0.192 9 ^{***} (0.005 9)	-0.192 9 ^{***} (0.005 9)	-0.197 8 ^{***} (0.006 1)
<i>profit</i>	-0.438 4 ^{***} (0.032 4)	-0.438 7 ^{***} (0.032 5)	-0.438 7 ^{***} (0.032 5)	-0.437 5 ^{***} (0.036 3)
<i>lncapital</i>	-0.123 1 ^{***} (0.004 1)	-0.123 2 ^{***} (0.004 1)	-0.123 2 ^{***} (0.004 1)	-0.128 4 ^{***} (0.004 2)
<i>resource</i>	-0.185 9 ^{***} (0.013 3)	-0.183 7 ^{***} (0.013 3)	-0.183 6 ^{***} (0.013 3)	-0.185 9 ^{***} (0.013 3)
<i>advert</i>	-0.167 9 ^{***} (0.019 0)	-0.162 5 ^{***} (0.019 0)	-0.162 4 ^{***} (0.019 0)	-0.128 9 ^{***} (0.019 0)
<i>export</i>	-0.204 6 ^{***} (0.018 4)	-0.204 7 ^{***} (0.018 4)	-0.204 7 ^{***} (0.018 4)	-0.168 2 ^{***} (0.019 6)
<i>debt</i>	-0.039 2 [*] (0.020 1)	-0.041 0 ^{**} (0.020 1)	-0.040 9 ^{**} (0.020 1)	-0.027 2(0.020 3)
<i>ownership</i>	0.614 1 ^{***} (0.037 6)	0.615 8 ^{***} (0.037 6)	0.615 9 ^{***} (0.037 6)	0.650 6 ^{***} (0.038 6)
<i>_cons</i>	-0.005 3(0.090 3)	-0.002 5(0.090 4)	-0.002 1(0.090 4)	
<i>lnp</i>	0.609 0 ^{***} (0.004 9)	0.609 1 ^{***} (0.004 9)	0.609 1 ^{***} (0.004 9)	
<i>p</i>	1.838 644	1.838 726	1.838 737	
<i>N</i>	462050	462050	462050	462050
<i>likelihood</i>	-113245.28	-113237.83	-113235.87	-378078.82
<i>LR</i>	25827.41	25842.31	25846.23	27128.68

注：*、**和***分别表示10%、5%和1%水平上的统计显著性；括号内的数值为标准误。下同。

1	<i>lnrd</i>			
2	<i>lnrd</i>	<i>ln²rd</i>		
U				U
1	3 <i>lnrd×HHI</i>			
			2	4 Cox
Weibull				
		1 <i>HHI</i>		U
2013			2	<i>lnemploy</i>
<i>lnsize</i>		U		
			2012	3
U	4	<i>lnTFP</i>		
<i>profit</i>				5

2016a 6 *Inc capital* *resource* *advert*
export

2015 7 *debt*

8 *ownership*

2013

5

表 5 不同技术水平的回归结果

变量	全样本		高技术		非高技术	
	模型(1)	模型(2)	模型(3)	模型(4)	模型(5)	模型(6)
<i>lnrd</i>	0.114 5*** (0.012 3)	0.055 0*** (0.013 4)	0.131 8*** (0.020 6)	0.055 9** (0.023 3)	0.085 7*** (0.015 8)	0.045 6*** (0.016 8)
<i>ln²rd</i>	0.009 9*** (0.001 7)	0.007 2*** (0.001 8)	0.011 5*** (0.002 9)	0.006 9** (0.003 3)	0.006 7*** (0.002 1)	0.006 3*** (0.002 3)
<i>lnrd</i> × <i>HHI</i>		-0.162 7** (0.064 0)		0.194 4 (0.415 6)		-0.171 1*** (0.061 1)
<i>HHI</i>		1.393 3*** (0.203 8)		3.020 4*** (0.640 6)		1.516 1*** (0.245 9)
<i>HHI²</i>		-0.845 8*** (0.227 5)		-6.209 0*** (2.090 9)		-0.883 0*** (0.234 8)
<i>lnsize</i>		-1.074 2*** (0.035 3)		-1.267 7*** (0.072 3)		-1.034 4*** (0.040 6)
<i>ln²size</i>		0.088 3*** (0.003 8)		0.101 6*** (0.007 6)		0.085 9*** (0.004 4)
<i>lnage</i>		0.648 8*** (0.036 1)		0.637 6*** (0.084 9)		0.654 6*** (0.039 9)
<i>ln²age</i>		-1.080 8*** (0.019 1)		-1.078 3*** (0.044 1)		-1.080 1*** (0.021 2)
<i>lnTFP</i>		-0.192 9*** (0.005 9)		-0.144 3*** (0.013 5)		-0.207 7*** (0.006 6)
<i>profit</i>		-0.438 7*** (0.032 5)		-0.473 1*** (0.064 6)		-0.431 0*** (0.037 7)
<i>ln capital</i>		-0.123 2*** (0.004 1)		-0.124 1*** (0.009 5)		-0.121 5*** (0.004 6)
<i>resource</i>		-0.183 6*** (0.013 3)		-0.145 3*** (0.029 9)		-0.190 9*** (0.014 9)
<i>advert</i>		-0.162 4*** (0.019 0)		-0.143 9*** (0.038 0)		-0.163 9*** (0.022 0)
<i>export</i>		-0.204 7*** (0.018 4)		-0.231 3*** (0.044 5)		-0.200 0*** (0.020 2)
<i>debt</i>		-0.040 9** (0.020 1)		0.083 0* (0.046 9)		-0.063 0*** (0.022 2)
<i>ownership</i>		0.615 9*** (0.037 6)		0.520 0*** (0.082 9)		0.643 6*** (0.042 3)

续表 5 不同技术水平的回归结果

变量	全样本		高技术		非高技术	
	模型(1)	模型(2)	模型(3)	模型(4)	模型(5)	模型(6)
<i>_cons</i>	-5.082 9*** (0.014 1)	-0.002 1 (0.090 4)	-5.202 5*** (0.033 7)	0.099 3 (0.194 0)	-5.057 5*** (0.015 6)	-0.020 1 (0.102 5)
<i>lnp</i>	0.417 0*** (0.005 1)	0.609 1*** (0.004 9)	0.435 7*** (0.011 7)	0.626 3*** (0.011 4)	0.413 2*** (0.005 6)	0.605 1*** (0.005 5)
<i>p</i>	1.517 338	1.838 737	1.546 102	1.870 585	1.511 658	1.831 51
<i>N</i>	479 219	462 050	96 036	92 058	383 183	369 992
<i>likelihood</i>	-133 408.78	-113 235.87	-25 481.73	-21 225.75	-107 899.84	-91 965.13
<i>LR</i>	221.29	25 846.23	93.59	5 216.36	99.07	20 628.49

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1 3 5

5.58

5.33 3

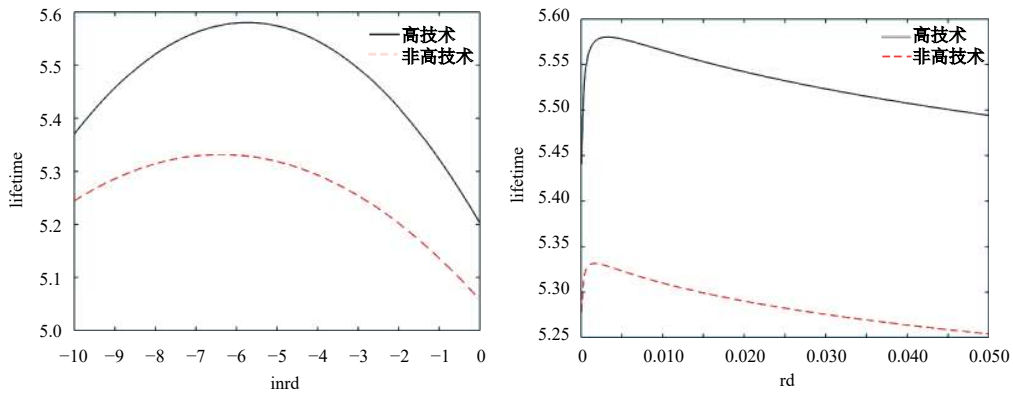


图 3 不同技术水平下研发强度与企业生存时间曲线图 (Matlab制图)

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表 6 不同产权性质企业的回归结果

变量	国有		私营		外商	
	模型(1)	模型(2)	模型(3)	模型(4)	模型(5)	模型(6)
<i>lnrd</i>	0.240 3*** (0.043 2)	0.128 2*** (0.048 2)	0.141 4*** (0.018 8)	0.074 0*** (0.020 3)	0.115 6** (0.049 0)	0.024 7 (0.054 9)
<i>ln²rd</i>	0.022 4*** (0.005 1)	0.017 1*** (0.005 6)	0.014 0*** (0.002 6)	0.010 3*** (0.002 8)	0.006 9 (0.006 6)	0.001 8 (0.007 5)
<i>lnrd×HHI</i>		1.339 8 (0.998 5)		-0.148 8 (0.184 8)		-0.031 4 (0.652 4)
<i>HHI</i>		0.610 2 (1.054 4)		1.429 0*** (0.285 5)		1.574 9* (0.954 5)
<i>HHI²</i>		-0.485 5 (1.200 6)		-0.769 5** (0.317 3)		-1.790 7 (1.914 7)
<i>lnsize</i>		-1.309 8*** (0.151 5)		-1.143 3*** (0.054 8)		-1.297 6*** (0.129 0)
<i>ln²size</i>		0.115 3*** (0.014 3)		0.099 2*** (0.006 2)		0.100 4*** (0.013 3)
<i>lnage</i>		0.761 3*** (0.211 4)		0.647 8*** (0.048 5)		0.615 2*** (0.174 7)
<i>ln²age</i>		-1.087 0*** (0.120 1)		-1.107 8*** (0.025 7)		-0.938 2*** (0.085 2)
<i>lnTFP</i>		-0.261 6*** (0.029 5)		-0.217 0*** (0.008 3)		-0.165 1*** (0.023 1)
<i>profit</i>		-0.075 7 (0.119 9)		-0.365 9*** (0.055 8)		-0.613 8*** (0.073 5)
<i>lncapital</i>		-0.066 7*** (0.023 7)		-0.120 8*** (0.005 7)		-0.133 0*** (0.016 3)
<i>resource</i>		-0.310 1*** (0.079 4)		-0.209 9*** (0.017 9)		-0.278 0*** (0.058 3)
<i>advert</i>		-0.211 1** (0.100 8)		-0.141 9*** (0.025 8)		-0.160 4** (0.080 7)
<i>export</i>		0.140 1 (0.198 0)		-0.121 7*** (0.027 1)		-0.127 2** (0.053 1)
<i>debt</i>		-0.002 2 (0.017 8)		0.193 7 (0.131 4)		-0.022 1 (0.352 7)
<i>_cons</i>	-4.010 8*** (0.078 0)	1.685 0*** (0.409 2)	-5.047 7*** (0.018 9)	-0.148 8 (0.184 8)	-5.819 6*** (0.067 2)	-0.031 4 (0.652 4)
<i>lnp</i>	0.275 8*** (0.031 3)	0.435 6*** (0.031 8)	0.416 1*** (0.006 8)	0.617 0*** (0.006 6)	0.534 2*** (0.021 3)	0.689 6*** (0.021 2)
<i>p</i>	1.317 568	1.545 871	1.515 97	1.853 304	1.706 148	1.992 917
<i>N</i>	6 553	6 028	257 194	249 238	38 786	37 042
<i>likelihood</i>	-3 091.226 9	-2 406.362 9	-72 897.555	-62 349.167	-8 013.201 7	-6 715.434 3
<i>LR</i>	41.60	712.17	116.95	14 422.77	23.91	1 417.70

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Logit Probit Cloglog

Weibull

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表 7 技术创新与企业生存: 稳健性检验 (1)

变量	企业规模			回归方法		
	职工人数	销售收入	资产总额	Logit	Probit	Cloglog
<i>lnrd</i>	0.055 0*** (0.013 4)	0.062 7*** (0.013 5)	0.051 2*** (0.013 5)	0.040 7*** (0.014 0)	0.019 6*** (0.006 7)	0.038 8*** (0.013 4)
<i>ln²rd</i>	0.007 2*** (0.001 8)	0.009 0*** (0.001 9)	0.006 9*** (0.001 9)	0.007 6*** (0.001 9)	0.003 7*** (0.000 9)	0.007 2*** (0.001 8)
<i>lnrd</i> × <i>HHI</i>	-0.162 7** (0.064 0)	-0.162 7** (0.063 7)	-0.150 8** (0.061 6)	-0.220 1** (0.100 0)	-0.122 8** (0.057 5)	-0.204 1** (0.077 8)
<i>HHI</i>	1.393 3*** (0.203 8)	1.699 7*** (0.203 8)	1.539 3*** (0.203 7)	2.921 5*** (0.219 9)	1.518 8*** (0.111 8)	2.711 7*** (0.210 4)
<i>HHI²</i>	-0.845 8*** (0.227 5)	-1.002 2*** (0.227 5)	-0.921 7*** (0.227 5)	-1.770 7*** (0.310 0)	-0.882 8*** (0.130 7)	-1.724 1*** (0.333 3)
<i>lnsize</i>	-1.074 2*** (0.035 3)	(0.024 0) 0.023 3***	(0.019 6) 0.014 1***	-1.008 9*** (0.037 1)	-0.510 7*** (0.018 5)	-0.948 2*** (0.034 9)
<i>ln²size</i>	0.088 3*** (0.003 8)	(0.001 3)	(0.001 2)	0.086 9*** (0.004 0)	0.044 3*** (0.002 0)	0.081 5*** (0.003 8)
<i>lnage</i>	0.648 8*** (0.036 1)	0.888 7*** (0.036 5)	0.645 6*** (0.036 1)	1.160 4*** (0.037 8)	0.554 3*** (0.018 5)	1.117 7*** (0.036 1)
<i>ln²age</i>	-1.080 8*** (0.019 1)	-1.146 8*** (0.019 2)	-1.086 8*** (0.019 1)	-0.919 5*** (0.019 8)	-0.442 1*** (0.009 5)	-0.884 1*** (0.018 9)
<i>lnTFP</i>	-0.192 9*** (0.005 9)	0.021 0*** (0.008 1)	-0.198 3*** (0.005 9)	-0.228 2*** (0.006 3)	-0.108 0*** (0.003 1)	-0.219 3*** (0.005 9)
<i>profit</i>	-0.438 7*** (0.032 5)	-0.247 1*** (0.034 0)	-0.436 7*** (0.032 7)	-0.627 0*** (0.042 8)	-0.354 7*** (0.023 0)	-0.471 9*** (0.030 9)
<i>lncapital</i>	-0.123 2*** (0.004 1)	-0.063 4*** (0.004 2)	0.128 8*** (0.006 7)	-0.148 2*** (0.004 3)	-0.072 8*** (0.002 2)	-0.140 1*** (0.004 1)
<i>resource</i>	-0.183 6*** (0.013 3)	-0.177 5*** (0.013 3)	-0.191 1*** (0.013 3)	-0.198 5*** (0.013 9)	-0.093 7*** (0.006 7)	-0.191 1*** (0.013 3)
<i>advert</i>	-0.162 4*** (0.019 0)	-0.164 5*** (0.019 0)	-0.158 8*** (0.019 0)	-0.088 6*** (0.020 0)	-0.042 9*** (0.009 6)	-0.084 2*** (0.019 2)
<i>export</i>	-0.204 7*** (0.018 4)	-0.204 9*** (0.017 9)	-0.204 5*** (0.018 3)	-0.134 5*** (0.019 1)	-0.064 5*** (0.009 0)	-0.127 0*** (0.018 3)
<i>debt</i>	-0.040 9** (0.020 1)	0.021 3*** (0.007 7)	-0.045 1** (0.020 1)	-0.018 5 (0.017 8)	-0.012 2 (0.009 3)	-0.011 9 (0.015 4)
<i>ownership</i>	0.615 9*** (0.037 6)	0.520 8*** (0.037 4)	0.641 0*** (0.037 6)	0.799 6*** (0.041 5)	0.401 2*** (0.022 1)	0.744 3*** (0.037 8)
<i>_cons</i>	-0.002 1 (0.090 4)	1.218 4*** (0.113 3)	-1.030 6*** (0.081 8)	2.013 3*** (0.095 0)	0.809 5*** (0.047 8)	1.723 0*** (0.088 6)
<i>N</i>	462 050	462 050	461 750	462 050	462 050	462 050
<i>likelihood</i>	-113 235.87	-112 832.24	-113 323.21	-105 974.04	-105 932.96	-105 999.11
<i>LR</i>	25 846.23	26 653.50	25 487.62	11 566.82	11 648.97	11 516.67

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表 8 技术创新与企业生存:稳健性检验(2)

变量	模型(1)	模型(2)	模型(3)	模型(4)
	OLS	IV	LIMI	IVFE
<i>lnrd</i>	0.002 9*** (0.000 7)	0.691 0*** (0.141 8)	0.691 0*** (0.149 2)	0.237 0*** (0.061 8)
<i>ln²rd</i>	0.000 4*** (0.000 1)	0.152 9*** (0.019 9)	0.152 9*** (0.020 5)	0.020 7** (0.009 9)
<i>lnrd×HHI</i>	-0.010 6** (0.004 1)	-0.499 8** (0.050 2)	-0.499 8 (0.304 8)	-0.058 2*** (0.017 2)
<i>HHI</i>	0.073 7*** (0.013 0)	-0.244 1*** (0.076 7)	-0.244 1** (0.113 9)	0.048 2* (0.025 5)
<i>HHI²</i>	-0.015 5*** (0.002 2)	-0.098 8** (0.014 7)	-0.098 8 (0.082 9)	-0.017 9*** (0.004 8)
<i>lnsize</i>	-0.071 4*** (0.003 1)	0.085 3*** (0.012 6)	0.085 3** (0.017 7)	-0.039 3*** (0.006 9)
<i>ln²size</i>	0.005 8*** (0.000 3)	-0.015 5*** (0.001 6)	-0.015 5*** (0.002 3)	0.003 2*** (0.000 8)
<i>lnage</i>	0.094 6*** (0.002 0)	0.044 3*** (0.008 4)	0.044 3*** (0.007 9)	0.100 3*** (0.003 8)
<i>ln²age</i>	-0.027 5*** (0.000 9)	-0.026 8** (0.004 3)	-0.026 8*** (0.004 2)	-0.012 9*** (0.002 6)
<i>lnTFP</i>	-0.010 6*** (0.000 4)	-0.053 9*** (0.003 5)	-0.053 9*** (0.003 7)	-0.010 4*** (0.001 6)
<i>profit</i>	-0.044 5*** (0.003 3)	-0.074 0*** (0.016 3)	-0.074 0*** (0.016 5)	-0.011 9* (0.006 3)
<i>lncapital</i>	-0.005 6*** (0.000 4)	-0.018 7*** (0.001 2)	-0.018 7*** (0.001 4)	0.004 4** (0.001 0)
<i>resource</i>	-0.005 6*** (0.000 8)	-0.133 9*** (0.013 7)	-0.133 9*** (0.016 4)	0.030 5*** (0.004 6)
<i>advert</i>	-0.005 0*** (0.001 1)	-0.341 3*** (0.037 1)	-0.341 3*** (0.045 1)	0.075 5*** (0.012 2)
<i>export</i>	-0.006 5*** (0.001 3)	0.001 9 (0.003 7)	0.001 9 (0.003 5)	-0.001 4 (0.002 4)
<i>debt</i>	-0.005 0*** (0.001 2)	-0.009 2 (0.006 2)	-0.009 2 (0.006 7)	-0.003 5 (0.002 9)
<i>wage</i>	-0.000 5*** (0.000 0)	-0.001 0** (0.000 3)	-0.001 0*** (0.000 3)	-0.000 1 (0.000 1)
<i>ownership</i>	0.035 6*** (0.003 4)	-0.029 2* (0.016 4)	-0.029 2 (0.025 4)	-0.007 8 (0.006 1)
<i>_cons</i>	0.334 3*** (0.007 9)	0.376 4*** (0.023 6)	0.376 4*** (0.032 7)	0.154 7*** (0.016 1)
<i>N</i>	462 048	405 785	405 785	405 785
<i>Chi2</i>	6 323.75	1 312.37	921.85	46 642.11

六、结论与启示

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Can Technological Innovation Improve the Survival of Start-ups? A Study of Theory and Experience

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Summary: Technological innovation is the source of power to enhance the core competitiveness and improve the survival and development of enterprises. In recent years, our government has encouraged enterprises to innovate and start businesses vigorously, advocating "mass entrepreneurship and innovation" and the vigor of innovation and entrepreneurship has burst out. A large number of high-tech enterprises have risen rapidly. To some extent, technological innovation has become a common choice for enterprises to survive and develop. However, while technological innovation enhances the competitiveness of enterprises, it also makes enterprises face the risk of market withdrawal. According to the statistics of the database of all state-owned enterprises and above-scale non-state-owned industrial enterprises of the National Bureau of Statistics, the average survival time of Chinese manufacturing enterprises was about 6.64 years from 1998 to 2011, with an average annual exit rate of 17%, and the average survival time of enterprises with scientific and technological innovation activities was about 6.82 years, of which nearly 50% of innovative enterprises were before entering the market. Within six years, less than 10% of innovative enterprises have survived for 10 years. The high market exit rate is a prominent problem faced by Chinese enterprises in the period of transition, and technological innovation affects the survival of enterprises through various channels. Therefore, it is an important research topic to reveal the mechanism of technological innovation affecting the survival of manufacturing enterprises and provide empirical evidence with Chinese characteristics.

Based on the construction of a Schumpeterian competition and innovation theory model, this article incorporates the scale effect of R&D investment and market concentration into the analytical framework, selecting the Weibull survival risk model to empirically test the impact of technological innovation on the survival of start-ups by using the data of all state-owned enterprises and above-scale non-state-owned industrial enterprises of the National Bureau of Statistics. We find that there is an inverted U-shaped relationship of diminishing scale effects between R&D intensity and enterprise survival. Moreover, the impact of R&D intensity and market concentration on the survival of enterprises is complementary. Given the intensity of R&D, the survival time of enterprises is longer if it is in a more concentrated industry. Finally, the relationship between technological innovation and enterprise survival is also affected by the technical level of the industry and the ownership structure of enterprises. The survival risk rate of enterprises in the high-tech industry is lower, and the level of R&D of state-owned enterprises is

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 dMSfa` eZ[b fa dVd hWfZWVa_ VefU egdb[ge USbSufk [fZW bcaUVte aX abf[[i [Y fZWTge[Vte
 Wh[ca` _ Wf? VŠ i Z[WfZWV bZSe aX YahVd _ Wf eVh[Vte S V egbbadfe eZagV TWEZ[VW
 Xb_ eSfWai ` W WfVbcdéVé SdVdS^MVWfVbcdéVé ` a` /ahVdUSbSufk [VgefdVte S V WfVbcdéVé [
 LaSfS^ SdVSe fa bdfhSfWVWfVbcdéVé e_ S^ S V _ W[ig_ /dS^MVWfVbcdéVé ahVdUSbSufk WfVbcdéVé
 S V WfVbcdéVé [[` S V SdVSež

Mg{"yqt fu"Tge[Vte Wh[ca` _ Wf-USbSufk gfi[fi Sfa` -YahVd _ Wf/WfVbcdéVdMSfa` eZ[b-
 Tge[Vte dMSfa` eZ[b-ahVdUSbSufk

* 8; +

Z[YZVd Tgf fZWegch[hS^d[e] dSfW[eZ[YZVd fZS fZSf aX` a` /eSfWai ` W WfVbcdéVé F ZVdVX` V[Ye
 WdLZ fZWdVdSdZ a` fZWdMSfa` eZ[b TVd WV fVZ` a` aY[US^ [` ahSfa` S V WfVbcdéVegch[hS^
 VVbW agd g` Vte S V[Y aX fZW [bSuf aX fVZ` a` aY[US^ [` ahSfa` a` fZW egch[hS^ aX
 WfVbcdéVé S V ZShWfZWdV[US^ S V W b[dUS^ [b[V Sfa` eXadYahVd _ Wf ba[V[Vte

Mg{"yqt fu"fVZ` a` aY[US^ [` ahSfa` -WfVbcdéVegch[hS^D` 6 [fWefk-egch[hS^d[e]