Big Data Reveals Corporate Development Strategy: Innovation-Oriented or Economy-Oriented?

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Abstract. In the context of a new round of global scientific and technological revolution and industrial transformation, new enterprises with technological advantages and market prospects are the main force leading cutting-edge technology and disruptive technology. However, there are target differences and governance conflicts between venture investors and new enterprises, which are mainly reflected in whether to give priority to R&D and innovation strategies with high risk, long cycle and large investment. Then, is the enterprise development innovation-driven or still based on the past economic-orientated? Based on Python and STATA software, this paper conducts big data analysis on 2,756,910 samples of Chinese enterprises, and finds that the innovation-driven strategy of enterprises is still at the strategic level, and the tactical level is still dominated by economic scale.

Keywords: Scientific and Technological Innovation, Corporate Development Strategy, Big Data Analysis

1. Introduction
Innovation is the primary driving force for development and the strategic underpinning for building a modern economic system. In the context of a new round of global scientific and technological revolution and accelerated industrial transformation, innovation-driven development has become the core strategy for countries to seek competitive advantages. Saridakis et al. (2009) pointed out that in the implementation and promotion of innovation-driven development strategy, enterprises are the direct participants and important micro subjects of technological innovation, influencing technological innovation through innovation decision-making, R&D investment and other activities [1].

In order to implement the innovation-driven development strategy, central and local governments often introduce a series of intensive fiscal subsidy policies, tax preferential policies and other policy support and incentives. This can ease the resource constraints faced by enterprises, and then carry out scale expansion or technological innovation. In the context of the global new round of scientific and industrial revolution, it is of great research significance to use Python and Stata software to select enterprises' operation and innovation behavior, and to explore how government incentive policies affect enterprises' experience and innovation activities.

In this paper, a model of enterprise behavior selection based on government incentive policies is constructed, indicators representing the economic scale and innovation activities of enterprises are...
selected and substituted into the model successively, and data analysis is carried out through Python and Stata. Select the government subsidy as the indicator of the government's financial incentive policy, and check whether the enterprise will choose to expand the operation scale, or take the scale economy as the orientation, or choose to innovate and increase the number of patents under the financial incentive of the government subsidy.

2. Related Research

Technological innovation is the core support for speeding up the construction of national economic system, fostering new impetus for economic development and enhancing comprehensive international competitiveness. However, Arrow (1962), Nelson (1971), Stiglitz (1989) and other large amounts of literature have shown that there is market failure when enterprises carry out innovation activities [2,3,4], Jones and Williams (1997) pointed out that this was due to the certain spillover of innovative knowledge, and the private return rate of enterprise innovation was lower than the social return rate, thus inhibiting enterprise innovation [5]. Clarysse et al. (2009) also agreed with this statement [6].

Aiming at the problem of innovation failure, European governments advocated earlier that governments reduce the innovation cost of enterprises through subsidies, promote technological innovation of enterprises, and use government subsidies to reduce the uncertain risk of enterprises engaged in innovation activities, so as to guide enterprises to actively invest in research and development. In 2012, based on the present and looking into the future, the Party and the state also put forward an innovation-driven development strategy, advocating actively guiding and promoting technological innovation through a series of technological innovation incentive policies in the central and local government systems, with government subsidies and tax incentives as the main incentives.

At present, most scholars at home and abroad, such as Spence (1984) and Hinloopen (1997 & 2000), have confirmed the crowding-in effect of government subsidies on innovation input of subsidized enterprises [7,8,9]. Cappelen et al. (2012) analyzed the impact of the tax incentive policy implemented by the Norwegian government in 2002 on the technological innovation activities of enterprises through empirical data, and found that the projects receiving tax credit would promote the research and development of new production processes and, to a certain extent, the research and development of new products [10].

3. Econometric Model and Data Analysis

3.1. Setting of Econometric Model

According to the above, we need to respectively verify the impact of the government's financial incentives on the business expansion and innovation capacity of enterprises. Therefore, this paper sets the econometric model as follows:

\[ \text{behavior}_{it} = \alpha_0 + \alpha_1 \text{subsidy}_{it} + \sum \beta X_{it} + \varepsilon_{it} \]  

The \( \text{behavior}_{it} \) of the equation is the explained variable of this paper, which is embodied in the \( \text{behavior}_{it} \) of the enterprise's economic scale indicator and the enterprise's innovation performance indicator respectively. According to fortune, an authoritative business ranking magazine, corporate income is the most reliable, powerful and meaningful measure of corporate economic growth and development. Therefore, this paper takes the general goods and services income of Enterprise \( i \) in the year \( t \) as the enterprise's economic scale index. In this paper, the patent license number of Enterprise \( i \) in the year \( t \) is used as its innovation index.

Relatively new Venture, \( \text{subsidy}_{it} \), shows how much I is turning up for government subsidies in \( t \). This is the main explanatory variable of this paper. According to the hypothesis of this paper, government subsidy income will have a positive impact on enterprise operation and innovation performance, so \( \alpha_1 \) should be greater than 0. According to previous studies, it is thought that the nature of the enterprise, exogenous, such as establishment of the endogenous nature of the enterprise,
including the reflect the characteristics of the enterprise production and operation variables, such as business productivity and profitability, solvency, and the "hidden" of the enterprise ability and the characteristics, such as technology innovation ability will be an influence to the enterprise to obtain the government subsidies. Therefore, this paper takes the labor productivity LP, net profit RP, Age and number of employees NW as control variables, and uses \( X_{it} \) to represent the variable combination reflecting the enterprise's characteristics, so as to control the influence of enterprise characteristics on its behavior selection as far as possible. It represents the random perturbation term. Where, the subscripts I and t respectively represent the enterprise and the year.

3.2. Data Analysis

Next, we used Python and Stata software to capture and process the data in this paper, and formed data with 2,756,910 Chinese enterprise samples. First of all, to verify the impact of government subsidies on enterprise size, we put the enterprise's general merchandise and service income into Equation (1), and the analysis results are shown in the Table 1:

As shown in Table 1, column (1) in Table 1 adopts a simple mixed regression for all samples and directly regressed the income of enterprises and the government subsidies received by enterprises without considering control variables. The regression results are consistent with the theoretical expectation, and the coefficient is significantly positive. Enterprises receiving government subsidies will expand their enterprise scale, thus increasing their income. Considering that the characteristics of the enterprise itself are not controlled, the control variable reflecting the enterprise itself is added into column (2), and the result shows that the bit order effect of subsidy is still significantly positive, but the coefficient decreases, which is the result of excluding the enterprise's own income to the enterprise. In addition, because the sample size is bigger, and some are not included in the model unobservable variables may be the result of the empirical or produce larger to put more time, industry and an observation factors are fixed on the level of city, in the column (3), (4), the paper respectively after joined the enterprise individual and year fixed effects, still significantly positive regression results, on the 1% level of statistical significant. In column (5), the year was fixed together with the enterprise individual effect. R2 was increased from 0.004 of column (1) to 0.821, and the degree of model fitting was continuously improved. Therefore, the result of column (5) was taken as the baseline regression result in this paper, the government subsidy was increased by 1 percentage point, and the enterprise income was increased by 0.00621 percentage points.

Table 1. Empirical Analysis of government subsidies on economic scale

| Variables | (1)     | (2)     | (3)     | (4)     | (5)     |
|-----------|---------|---------|---------|---------|---------|
| Subsidy   | 4.197 *** | 0.0411 *** | 0.00649 *** | 0.0408 ** | 0.00626 *** |
|           | (68.43) | (71.26) | (1.49)  | (2.24)  | (1.47)  |
| LP        | 2058.7 *** | 1574.7 **  | 2045.8 *** | 1561.4 **  |
|           | (136.01) | (2.10)  | (3.42)  | (2.09)  |
| RP        | 41785.8 *** | 12067.2 | 41868.3 | 12336.1 |
|           | (83.45)  | (0.62)  | (1.63)  | (0.64)  |
| NW        | 222.9 *** | 57.23 **  | 218.8    | 53.99 *  |
|           | (7.43)   | (2.01)  | (1.26)  | (1.91)  |
| Age       | 2930.9 *** | -780.5 *** | 4225.7 *** | 599.3 **  |
|           | (14.30)  | (-2.87) | (18.49) | (2.20)  |
| _cons     | 176074.4 *** | 59713.2 *** | 149845.5 *** | -13108.7 *** | 74878.0 *** |
|           | (2.62)   | (16.77) | (31.06) | (-3.29) | (13.95) |
| N         | 1306774 | 1280801 | 1280801 | 1280801 | 1280801 |
| R2        | 0.004   | 0.011   | 0.615   | 0.615   | 0.821   |
| Control variables | N | Y | Y | Y | Y |
| Individual fixed | N | N | Y | N | Y |
| Year fixed | N | N | Y | Y | Y |
Next, we substitute the number of enterprise patent authorization as an indicator of enterprise innovation performance into enterprise behavior selection for data analysis. The results are shown in Table 2:

In Table 2, column (1) is still a mixed regression, control variables are added in column (2), fixed effects of individual and year are added in columns (3) and (4) respectively, and column (5) is also the benchmark regression of this regression, and both individual and year are adopted.

As can be seen from the empirical analysis results in Table 2, there is no significant correlation between the government's financial subsidy and the increase in the number of patents of enterprises, and the incentive effect of the government's financial incentive policy on the innovation performance of enterprises is not significant. As we mentioned above, it is relevant that enterprise innovation activities, especially R&D and innovation of cutting-edge and disruptive technologies, are characterized by large investment, long cycle and high risk.

4. Conclusion

Through big data analysis, we find that the financial incentive policies of enterprises for the government still remain in the expansion of economic scale and the improvement of innovation performance. Although this is related to the three significant characteristics of innovation activities, such as large investment, long cycle and high risk, it has to be said that under the trend of global technologization and the national innovation-driven strategy, Chinese enterprises should not stop at scale expansion and should put more resources into innovation.

Theoretically speaking, every function in the enterprise value chain is likely to become an innovation point and the core competitiveness of the enterprise, which will be upgraded to the differentiation strategy of the enterprise once. Through innovation, your product is likely to be more useful than your competitors (product innovation); You may be closer than your competitors and consumers (marketing innovation); You can give consumers faster (production, logistics innovation), more convenient (channel innovation), cheaper (innovation to achieve cost leadership); You operate faster than your competitors (organizational innovation); You have a clearer understanding of your
business's strategy (innovations in finance, strategic thinking) than your competitors... all of these can lead to new growth activities for your business and the possibility of gaining an edge in your industry.

In a sense, in the era of rapid development, innovation is the basis for the survival and prosperity of enterprises. In a sense, in the era of rapid development, innovation is the basis for the survival and prosperity of enterprises. Since the reform and opening up, Chinese enterprises have created a miracle of China's economy and even the world economy! To help China's innovation-driven transformation will be a great mission bestowed on Chinese enterprises by The Times. We look forward to the future when Chinese enterprises stand on the high level of science and technology and continue to make great achievements for China's economy.

Acknowledgments
Two and a half years of academic career will come to an end in this season, but my life is just a comma, and I will face the beginning of another journey. In the past two years, under the strong support of teachers, relatives and friends, I have been working hard but also gained a lot. When the paper is about to be published, I am eager to pay my respect and praise to an ordinary person, my tutor. I am not an outstanding student of yours, but you are the most respectable teacher to me in my eyes. Your rigorous scholarship, erudition, profound thinking, magnificent vision, for me to create a good spiritual atmosphere. To teach fishing is better than teach them to fish, in which, narrative, osmosis, made me not only to accept new ideas, set up the magnificent academic goals, grasp the basic way of thinking, from paper topics chosen to essay writing guide, by your loving hands, after thinking again understanding, often let me have all have no way, scenes and village.

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