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# Understanding the divergence of manufacturing enterprises' profitability in China

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## ABSTRACT

The transition of the Chinese economy is placing increasing pressure on manufacturing enterprises to become more profitable. In this article, we first calculate and analyze the profitability of Chinese manufacturing enterprises based on data from the 2015 Chinese Enterprises–Employees Survey (CEES 2015), and find that there is an obvious profitability divergence tendency of manufacturing enterprises. We then analyze the different actions and strategies that may cause the profitability divergence and find that aggressive strategies in innovation, diversification, market development, and conservative strategies in production expansion tend to result in a good profitability, while the opposite strategies in each action lead a poor profitability. The different adoption of strategies in diverse actions may be the possible causes of profitability divergence.

**Abbreviations:** CEES: China Employer–Employee Survey, PGR: Profit growth rate, SME: Small and medium-sized enterprise

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## JEL CLASSIFICATION

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## 1. Introduction

Manufacturing industry is one of the most important powerhouses of China's economic growth. However, this industry faces many difficulties during the period of economy transition, such as constraints in resources and energy, the deterioration of the ecological environment, and excess production capacity, etc. In particular, increasing labor costs are driving the manufacturing industry into a slough (Hao and Li 2014). As a result, the profitability of many enterprises has been significantly affected. More and more enterprises are struggling to survive, with some on the brink of bankruptcy.

Profitability means the ability of an enterprise to obtain profit through the organization of production and competition through the market. What is the situation of Chinese manufacturing industry profitability on earth? This is a basic problem in the transformation of China's economy. Different scholars have different judgments on this question. Many people believe that Chinese manufacturing is facing unprecedented difficulties, and the whole economy is even facing a risk of a 'hard landing'. Others argue that there is a new opportunity for Chinese manufacturing industry, and many enterprises are in the process of transformation and upgrading. To figure out the

precise situation, we conducted the China Employer-Employee Survey (CEES) project among Chinese manufacturing enterprises in 2015 and collected 570 enterprises questionnaires including the data on profits, business operation, sales, technology, and salaries, etc. Based on the survey data, we conducted research and have come to the conclusion that Chinese manufacturing enterprises profitability shows a strong pattern of divergence.

Facing the impact of economic restructuring, the enterprise is supposed to take corresponding measures in its production and marketing strategy, with the aim of maintaining or improving profitability. Therefore, production and marketing strategies may cause the divergence of the profitability. There are many studies on improving profitability through production and marketing strategies. The findings can be divided into four main categories, namely the enterprise's innovation, diversification, market development, and production expansion strategies.

The relationship between innovation and profitability is extremely close, but the inherent mechanism is extremely complex (Geroski, Machin, and Van Reenen, 1993). On the one hand, it differs according to the enterprise type. Profitability is found to promote subsequent innovation by firms in high-technology industries but not by those in low-technology industries. By contrast, high growth generates more innovation by firms in low-technology industries, but not by those in high-technology environments (Audretsch 1995). Original equipment manufacturers and contract manufacturers play different roles in the market, but they are always bargaining with each other, focusing on innovation and profitability (Plambeck and Taylor 2005). On the other hand, the effect of innovation may influence profitability through other variables, such as education (Leiponen 2000) or competition (Roberts 1999).

Generally speaking, a diversification strategy can increase productivity and improve product quality, and thus have a significant positive effect on profitability. Theoretical arguments have been advanced predicting the association that will remain once the effects of varying industry profitability are removed (Spanos, Zaralis, and Lioukas 2004). Empirical tests have verified these predictions and enabled discrimination between the effects of industry characteristics and diversification strategies on profitability (Rumelt 1982). Qian (2002) empirically examines the individual and joint effects of multinationality and product diversification on profit using a sample of emerging small and medium-sized enterprises (SMEs). With the prominence of the competitive strategies, the effect of competitive strategies on profitability is a concern to researchers although consistent conclusions have not emerged.

However, we cannot overlook the importance of market-related factors such as market share, market positioning, industry structure, and competitive relationships. Szymanski (1993) performed a meta-analysis of 276 market share–profitability findings from 48 studies to address whether market share and profitability are positively related, and found that on average, market share has a positive effect on business profitability. Moguilnaia et al. (2005) holds that market share influences profit indirectly via the determining variable of technological innovation. Academics and marketing practitioners have observed for more than three decades now that business performance is affected by market orientation (Buzzell et al., 1975), but the key question is how to measure market orientation and analyze its effect on profitability (Narver and Slater

1990). In fact, market positioning has a complex relationship with innovativeness, quality, growth, and profitability.

Production expansion is the fourth important factor related to an enterprise's profitability. Production expansion mainly involves buying more equipment, building more factories, and hiring more workers with the aim of achieving profitability through an expansion of scale. The macroeconomic environment and a huge consumer market encourage Chinese companies to accumulate resources. As a result, Chinese manufacturing enterprises have a strong path dependence on economies of scale (Gu 1993; Qiu and Dan 2010). Morrison (1990) treats economies of scale, profit-maximizing markups, economic profitability, capacity utilization, and productivity growth within an integrated structural model, and finds that the relationship between economies of scale and profitability is complex, and is dependent on the stage of development.

These existing studies may be deficient in two aspects. First, the sample for the empirical profitability study consisted primarily of large listed companies, because data related to revenues, costs, profits, assets, debts and equity are available publicly from balance sheets, income statements, cash flow statements and statements of changes in equity. By comparison, the profitability of SMEs is not always easy to determine because there are limited ways of obtaining financial data for SMEs. Thus, research conclusions regarding profitability may not apply to SMEs. Second, existing studies have reached a consensus on the effects of these four aspects of production and marketing activity on profitability. However, we wish to explore the precise roles they play, especially in the current climate of economic restructuring in China. To achieve this aim, we require more accurate survey data.

Therefore, in this paper, we will analyze and show Chinese manufacturing enterprises' profitability divergence under the background of economic transformation. Furthermore, we will also analyse the effects of four kinds of production and market actions in promoting corporate profitability. Based on the CEES 2015 data, our study provides a panoramic view showing the divergence of profitability of manufacturing enterprises in the current climate of economic restructuring in China.

## 2. Analysis framework

Enterprises usually alter their production and marketing strategies such as innovation, diversification, market development, and expansion of production capacity, as noted above, especially when they are facing changes from the macroeconomic environment. There are two types of strategies that enterprises tend to adopt. One can be termed 'aggressive strategy,' which means that a firm focuses more on innovation, diversification, market development, and production expansion. The other is termed a 'conservative strategy,' whereby a firm reduces its focus on those activities. All the enterprises in our sample can be placed into one of these categories. Different enterprises may adopt different strategies in various actions. To understand the effects of each activity within the different strategies on the enterprises' profitability divergence, we construct an analysis framework, as shown in [Figure 1](#).

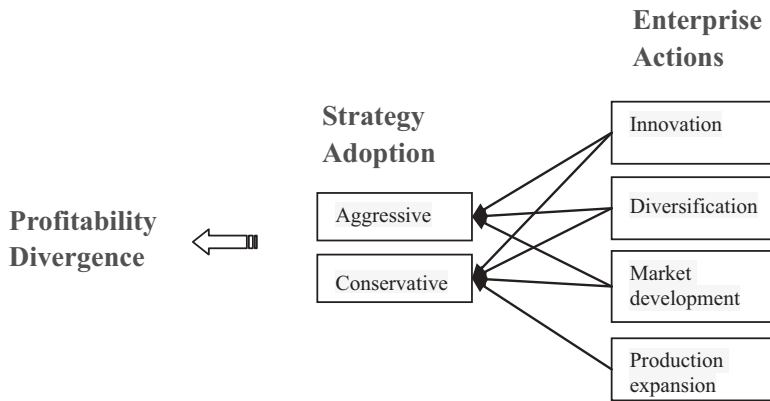


Figure 1. Analysis framework

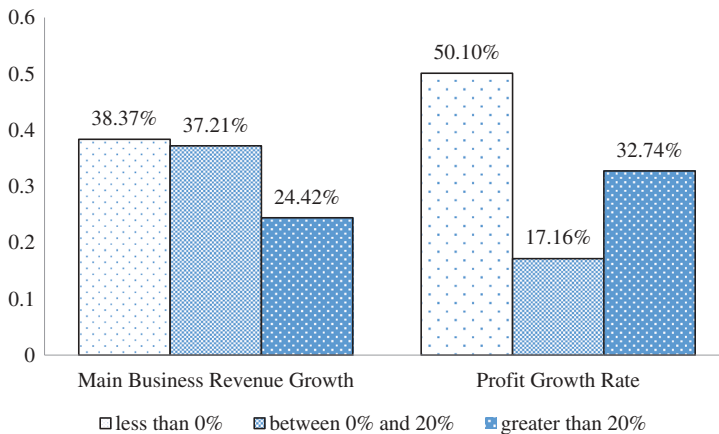


Figure 2. Overall profitability divergence.

### 3. Data and sample

The data are taken from CEES 2015 conducted by Wuhan University, the Hong Kong University of Science, Tsinghua University, and the Chinese Academy of Social Sciences in 2015. The sample includes manufacturing enterprises in Guangdong Province and the sampling frame is based on the third economic census in Guangdong Province, which including more than 300,000 manufacturing enterprises. In contrast with some existing employer–employee surveys, CEES2015 adopts strict stochastic stratified sampling. The survey randomly draws 13 prefecture-level cities from the 21 in Guangdong, and then selects 19 districts (counties) from within these 13 cities as the terminate survey units. Within each terminate survey unit, we want to collect at least 25 manufacturing enterprises’ information. Setting refusal rate as 30%, 36 manufacturing enterprises have been selected as the survey objectives in each survey unit. Finally, 874 questionnaires were issued, of which 570 were recovered and verified, the response rate of questionnaires is over 65%.

Importantly, the sample covers 93.1% of the manufacturing industry categories, and 84.48% are SMEs. Moreover, the questionnaire included key financial indicators of profitability, including profit, investment, sales income, production value, and costs.

#### 4. Enterprise profitability divergence

We will describe profitability by Profit Growth Rate (PGR), which measures continuous profitability, providing a dynamic perspective. First, we should set a standard to show what PGR indicates good profitability and what means poor profitability. Poor profitability can be easy to judge. If a firm has a negative PGR, it definitely can be regarded as having a poor profitability. To figure out the good profitability standard, here we use the data from National Bureau of Statistics. [Table 1](#) shows the average PGR disparity in different industries. The highest is computer, communications and other electronic equipment manufacturing industries, for which PGR is 11.92%. From the statistics, we find that no enterprises' PGR is more than 20%, so we can guess that enterprises whose PGR is more than 20% can certainly indicate good profitability. Thus, all enterprises were divided into three groups based on PGR: less than 0%, between 0% and 20%, and greater than 20%.

##### 4.1. Overall profitability divergence

With the analysis of PGR divergence, we can also compare the main business revenue growth of different enterprises. As [Table 2](#) and [Figure 2](#) show, we calculate 516 enterprises' main business revenue growth rate and 507 enterprises' profit growth rate<sup>1</sup>. 38.87% of enterprises had a main business revenue growth of less than 0%, while 24.42% of enterprises had a main business revenue growth of greater than 20%, suggesting that profitability divergence was obvious among different enterprises. Faced

**Table 1.** Profit growth rate in various industries (National Bureau of Statistics).

Industry	PGR
Electric machinery and equipment manufacturing industry	8.90%
Textile and apparel industry	3.13%
Non-metallic mineral products industry	2.24%
Computer, communications and other electronic equipment manufacturing industry	11.92%
Metal smelting and processing industry	-4.99%
Timber processing and furniture manufacturing industry	3.20%
Food processing and manufacturing industry	-1.98%
General equipment manufacturing industry	2.55%
Stationery manufacturing industry	5.77%
Rubber and plastic products industry	-0.60%
Pharmaceutical and chemical products manufacturing industry	11.14%
Transportation and special equipment manufacturing industry	11.62%

**Table 2.** Overall profitability divergence.

Index	N	≤0%		0%-20%		≥20%	
		N	p	N	p	N	p
Main business revenue growth	516	198	38.37%	192	37.21%	126	24.42%
Profit growth rate	507	254	50.10%	87	17.16%	166	32.74%

**Table 3.** Profit growth rate in various industries (CEES).

Industry	≤0%			0%-20%		≥20%	
	N	N	p	N	p	N	p
Electric machinery and equipment manufacturing industry	67	28	41.79%	8	11.94%	31	46.27%
Textile and apparel industry	88	43	48.86%	18	20.45%	27	30.68%
Non-metallic mineral products industry	39	22	56.41%	7	17.95%	10	25.64%
Computer, communications and other electronic equipment manufacturing industry	83	44	53.01%	10	12.05%	29	34.94%
Metal smelting and processing industry	51	21	41.18%	9	17.65%	21	41.18%
Timber processing and furniture manufacturing industry	18	9	50.00%	6	33.33%	3	16.67%
Food processing and manufacturing industry	20	12	60.00%	2	10.00%	6	30.00%
General equipment manufacturing industry	23	12	52.17%	5	21.74%	6	26.09%
Stationery manufacturing industry	46	26	56.52%	7	15.22%	13	28.26%
Rubber and plastic products industry	21	14	66.67%	4	19.05%	3	14.29%
Pharmaceutical and chemical products manufacturing industry	15	6	40.00%	5	33.33%	4	26.67%
Transportation and special equipment manufacturing industry	36	17	47.22%	6	16.67%	13	36.11%

with reduced demand, the majority of enterprises have to downsize, but at the same time, some of enterprises show a positive trend to upsizing.

Comparing the rate of main business revenue growth with profit growth rate, we find that profit divergences are even worse than revenue divergence. Under the impact of Economic Transition, some enterprises do well in upsizing their sales to cover rising costs. A larger proportion of enterprises try to reduce their costs rather than increase sales.

#### 4.2. Profitability divergence in different industries

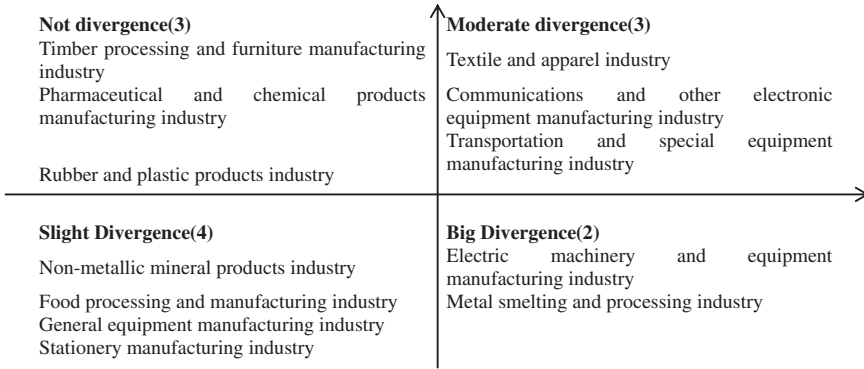
Overall, profitability divergence is obvious, and then we want to analyse the divergence among different industries. The divergences of profit growth rate are more obvious, so we only compare profit growth rate among different industries. We divided the enterprises into different industries according to China's national industrial classification (GB/T4754-2011). Some industries were only represented by a few enterprises, and so we merged these industries with the nearest similar industries to improve the accuracy of the results. Table 3 shows the PGR in various industries.

According to the level of divergence, we divide the industries into four categories: no divergence, slight divergence, moderate divergence and large divergence (see Figure 3).

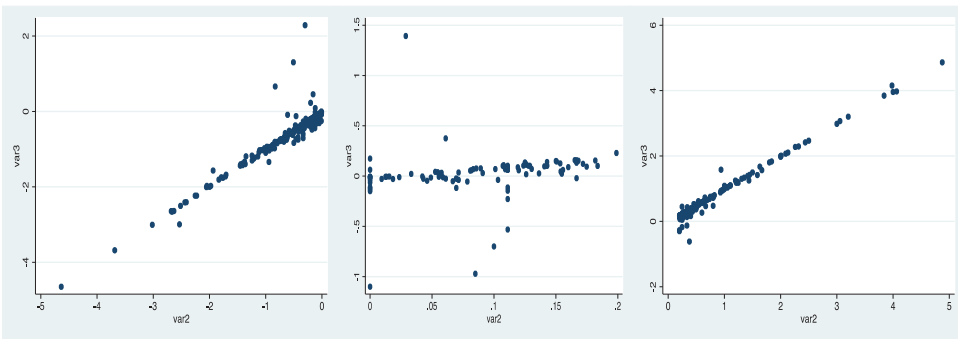
### 5. Understanding the possible causes of divergence

#### 5.1. Innovation strategies and profitability divergence

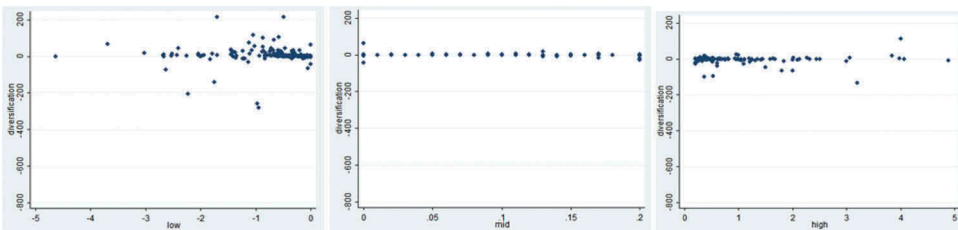
We study the effect of different strategies on the profitability of the enterprises. First we discuss technological innovative action. In the table below, we use different R&D actions between in 2014 and 2013 to reflect the different strategies conducted by the enterprises. Enterprises whose R&D actions are greater than 0 mean that the proportion of investment in technological innovation has increased, in other words, they choose aggressive strategy. In contrast, enterprises whose R&D actions are less than zero or equal to 0 shows that the proportion has reduced or is unchanged, therefore we regard them as taking a conservative strategy.



**Figure 3.** Different kinds of divergence



**Figure 4.** The divergences of innovation and profitability



**Figure 5.** Profitability of enterprises and diversification

Based on the result of Figure 4, the greater difference shows that the enterprise strategy of technological innovation is more aggressive. The smaller of difference shows that the enterprise strategy of technological innovation is more conservative. This paper uses profit growth rate (PGR) to measure the enterprises' profitability. In the table below, we take the PGR less than 0% and more than 20% as the standard to measure the differentiation status of the different innovation strategy enterprises' profitability.

The total proportion of PGR less than 0% and more than 20% is more than 50% in every industry. Furthermore, the proportion of every industry is over 70% except the textile and apparel industry whose proportion is over 55%, which presents a trend of



**Table 4.** Profitability of enterprises with different R&D action by industry-classification

Industry	PGR<0%		PGR>20%	
	Proportion (%)	Mean	Proportion (%)	Mean
Electric machinery and equipment manufacturing industry	41.79	-0.52	46.27	0.86
Textile and apparel industry	48.86	-0.48	30.68	0.83
Non-metallic mineral products industry	56.41	-0.64	25.64	0.66
Metal smelting and processing industry	41.18	-0.56	41.18	0.53
Computer, communications and other electronic equipment manufacturing industry	53.01	-0.61	34.94	0.75
Timber processing and furniture manufacturing industry	35.00	-0.71	16.67	0.73
General equipment manufacturing industry	52.17	-0.65	26.09	0.37
Rubber and plastic products industry	66.67	-0.71	14.29	0.85
Pharmaceutical and chemical products manufacturing industry	40.00	-0.36	26.67	0.55
Stationery manufacturing industry	56.52	-0.65	28.26	0.63
Transportation and special equipment manufacturing industry	47.22	-0.7	36.11	0.95
Food processing and manufacturing industry	60.00	-0.61	30.00	1.26

'less in the middle and more in the both sides'. This suggests that the profitability of different industry internal has already had a divergence trend.

From Table 4 we can see that, in this kind of differentiation of enterprises profitability, PGR less than 0%, namely poorer profitability accounted for more in some industries including non-metallic mineral products industry, rubber and plastic products industry, food processing and manufacturing industry, textile and apparel industry and computer, communications, and other electronic equipment manufacturing industry, in which the proportion of PGR less than 0% of food processing and manufacturing industry is above 50%, the proportion of PGR less than 0% of textile and apparel industry and transportation and special equipment manufacturing industry is nearly 50%; PGR more than 20%, namely better profitability accounted for more in some industries including electric machinery and equipment manufacturing industry and metal smelting and processing industry, whose proportion are all above 40%.

In PGR less than 0% enterprises, their average value of strategy was all below 0, in PGR more than 20% enterprises, their average value of strategy was all above 0, which means enterprises holding an aggressive strategy result in higher profitability, and the trend of differentiation is greater and greater.

In order to test whether there is a significant difference in the profit growth rate between the enterprises who adopt the aggressive strategy or conservative strategy, we do a t-test on the profit growth rate between the aggressive group and conservative group, and the specific results were shown as in Table 5. The original hypothesis of the t-test is that conservative group enterprises' profit growth rate is greater than the enterprises of the militant group. The results in the table shows that profit growth rate variables were rejected the original hypothesis under 1% of the significance levels, indicating that the aggressive group of enterprises' PGR is higher.

**Table 5.** T-test: Aggressive innovation vs. Conservative innovation

Variable	Aggressive = 1			Conservative = 0			difference		
	Obs	Mean	Std.err	Obs	Mean	Std.err	Mean	Std.err	T
Defective_rate	229	-0.5	0.04	229	0.61	0.05	0.02	0.06	-16.5***

From the analysis of different strategies, we can see that within the background of the current economic transition, enterprises which take the aggressive strategy on innovation action still can improve their profitability, and the trend of differentiation is greater and greater.

## 5.2. Diversification strategies and profitability divergence

We examine the effects of different strategies in relation to diversification. Once again, the firms were divided into two groups based on the proportion of total profits represented by profits from the firms' main operations. Generally, it is considered that an increased profit share from a firm's main business activity indicates a higher level of concentration and a weak diversification strategy, thus we define this situation as a conservative diversification strategy. On the contrary, if the proportion of total profits contributed by profits from the firm's main operations declines, this indicates that the firm has pursued a strategy of diversification, a situation we define as an aggressive diversification strategy. The profitability of the two groups is shown in Table 6.

Table 6 and Figure 5 show that firms that adopt an aggressive strategy on diversification have higher PGR, and firms that adopt a conservative strategy on diversification have a lower PGR. In particular, in a total of 12 industries, 11 industries that adopted an aggressive strategy on diversification had a PGR of more than 20%. In contrast, in a total of 12 industries, 10 industries that adopt an aggressive strategy had PGR of less than 0%. The table shows that in most industries, the firms that adopted an aggressive strategy on diversification have a higher PGR. Furthermore, we can define a large divergence of profitability between the firms which adopted a different strategy on diversification.

**Table 6.** Profitability of enterprises with different levels of diversification.

Industry	PGR $\leq$ 0%		PGR $\geq$ 20%	
	Proportion	Mean	Proportion	Mean
Electric machinery and equipment manufacturing industry	41.79%	4.86%	46.27%	-1.43%
Textile and apparel industry	48.86%	1.36%	30.68%	-4.01%
Non-metallic mineral products industry	56.41%	4.49%	25.64%	-1.89%
Metal smelting and processing industry	41.18%	13.43%	41.18%	-4.47%
Computer, communications and other electronic equipment manufacturing industry	53.01%	-11.09%	34.94%	-10.23%
Timber processing and furniture manufacturing industry	50.00%	16.78%	16.67%	-4.34%
General equipment manufacturing industry	52.17%	7.74%	26.09%	-0.02%
Rubber and plastic products industry	66.67%	5.57%	14.29%	-13.35%
Pharmaceutical and chemical products manufacturing industry	40.00%	5.89%	26.67%	-11.54%
Stationery manufacturing industry	56.52%	27.3%	28.26%	-1.4%
Transportation and special equipment manufacturing industry	47.22%	-0.03%	36.11%	3.95%
Food processing and manufacturing industry	60.00%	1.87%	30.00%	-4.69

**Table 7.** T-test: Aggressive diversification vs. conservative diversification

Variable	Aggressive innovation = 1			Conservative innovation = 0			Difference		
	Obs	Mean	Std.err	Obs	Mean	Std.err	Mean	Std.err	T
Defective_rate	222	0.28	0.06	249	-0.22	0.06	-0.5	0.06	-6.14***

Based on above analysis, firms that adopt a conservative diversification strategy enjoy slightly higher profitability if we consider the static point of view. However, from the dynamic perspective, firms that adopt an aggressive diversification strategy experience significantly higher continuing profitability than firms that adopt a conservative strategy. This suggests that in the current economic climate, there is an obvious risk for firms in adopting an aggressive strategy. Such a strategy is likely to place serious pressure on the profitability of enterprises in the short term. However, if we consider future development, an aggressive diversification strategy can significantly improve a company's future profitability.

In order to test whether there is a significant difference in the profit growth rate between the enterprises which adopt the aggressive strategy or conservative strategy, we do a t-test on the profit growth rate between the aggressive group and conservative group, and the specific results were shown in Table 7. The results in the table shows that profit growth rate variables were rejected the original hypothesis under 1% of the significance levels, indicating that the aggressive group of corporate profit growth rate higher.

We believe that the different choice on diversification strategy is a convincing explanation for the great divergence which has been observed in the CEES data. Therefore, given the current climate of economic transition, companies must carefully consider and evaluate the impact of diversification on their ability to survive in the short term, and then decide whether to adopt an aggressive diversification strategy.

### 5.3. Market development strategies and profitability divergence

Here, we focus on the effects of different market development strategies. The firms have been divided into two groups. Those that developed new international markets in 2014

**Table 8.** Profitability of enterprises with different levels of market development.

Industry	PGR≤0%		PGR≥20%	
	Proportion	Mean	Proportion	Mean
Electric machinery and equipment manufacturing industry	41.79%	4.17%	46.27%	18.75%
Textile and apparel industry	48.86%	16%	30.68%	5.26%
Non-metallic mineral products industry	56.41%	23.1%	25.64%	40%
Metal smelting and processing industry	41.18%	22.22%	41.18%	23.08%
Computer, communications and other electronic equipment manufacturing industry	53.01%	4.35%	34.94%	13.64%
Timber processing and furniture manufacturing industry	50.00%	0	16.67%	0
General equipment manufacturing industry	52.17%	0	26.09%	25%
Rubber and plastic products industry	66.67%	28.57%	14.29%	0
Pharmaceutical and chemical products manufacturing industry	40.00%	0	26.67%	0
Stationery manufacturing industry	56.52%	9.09%	28.26%	9.09%
Transportation and special equipment manufacturing industry	47.22%	7.14%	36.11%	7.69%
Food processing and manufacturing industry	60.00%	0	30.00%	50%

**Table 9.** T-test: Aggressive market development vs. conservative market development.

Variable	Aggressive = 1			Conservative = 0			Difference		
	Obs	Mean	Std.err	Obs	Mean	Std.err	Mean	Std.err	T
Defective_rate	45	0.15	0.06	278	0.02	0.06	-0.14	0.06	-10.96***

are defined as adopting an aggressive strategy, while those that did not develop new international markets in 2014 are defined as adopting a conservative strategy. The profitability of the two groups is shown in [Table 8](#).

We can learn from the table that firms who adopt an aggressive strategy on market development have a higher PGR, and firms who adopt a conservative strategy have a lower PGR. In particular, in a total of 12 industries, eight of them that adopted an aggressive strategy had a higher probability that their PGR of more than 20%. In contrast, in a total of 12 industries, 10 of them that adopt an aggressive strategy had a higher probability that their PGR of less than 0%. The table shows that in most industries the firms that adopted aggressive strategy have a higher PGR. Furthermore, we can define a greater divergence of profitability between the firms which adopted different strategy on market development.

In order to test whether there is a significant difference in the profit growth rate between the enterprises which adopt the aggressive strategy and adopt the conservative strategy, we do a t-test on the profit growth rate between the aggressive group and conservative group, and the specific results were shown in this table ([Table 9](#)). The original hypothesis of the t-test is that the conservative group enterprise's profit growth rate is greater than the enterprises of the militant group. The results in the table shows that profit growth rate variables cannot reject the original hypothesis under 1% of the significance levels.

This indicates that firms that adopt an aggressive strategy on market development have a higher PGR and higher profitability. This may be an important explanation for the great polarization which has been observed in the CEES data. This suggests that in the current economic environment, the development of new international markets is a good way for firms to improve their profitability.

#### **5.4. Production expansion and profitability divergence**

In this part, we make statistical comparison of production expansion in enterprises with good profitability and poor profitability. We use the difference of investment in fixed assets between 2014 and 2013 to reflect the different strategy conducted by the enterprises. If the difference is negative, it means the strategy is a conservative one, otherwise, it is an aggressive one. [Table 10](#) shows the results.

From [Table 10](#), we find that an industry with a negative difference of investment in fixed assets between the 2014 and 2013 tends to be more profitable, except the Non-metallic mineral products industry and Timber processing and furniture manufacturing industry. We should conduct further T-tests to support this result.

In order to test whether there is a significant difference in the profit growth rate between the enterprises which adopt the aggressive strategy or conservative strategy on production expansion, we do a t-test on the profit growth rate between the aggressive group and conservative group, and the specific results are shown in [Table 11](#). The results in the table shows that profit growth rate variables were rejected the original hypothesis under 5% of the significance levels, indicating that the profit growth rate of the conservative group corporate is higher.

From the analysis of different strategy on production expansion action we can see that in the background of the current economic transition, if enterprises take an aggressive strategy on production expansion action it does not mean this can improve

**Table 10.** Profitability of enterprises with different production expansion actions by industry-classified.

Industry	PGR<0%		PGR>20%	
	Proportion (%)	Mean	Proportion (%)	Mean
Electric machinery and equipment manufacturing industry	41.79	997.374	46.27	-1088.76
Textile and apparel industry	48.86	-46.25	30.68	-152.13
Non-metallic mineral products industry	56.41	1126.45	25.64	1272.2
Metal smelting and processing industry	41.18	253.56	41.18	-542.16
Computer, communications and other electronic equipment manufacturing industry	53.01	93.09	34.94	-156.99
Timber processing and furniture manufacturing industry	35.00	1571.85	16.67	2347.73
General equipment manufacturing industry	52.17	240.57	26.09	-241.58
Rubber and plastic products industry	66.67	275.79	14.29	-193.33
Pharmaceutical and chemical products manufacturing industry	40.00	966.91	26.67	-98
Stationery manufacturing industry	56.52	7.06	28.26	-392.92
Transportation and special equipment manufacturing industry	47.22	2163.24	36.11	-1011.08
Food processing and manufacturing industry	60.00	-1867.68	30.00	-2145.80

**Table 11** T-test: Aggressive production expansion vs. conservative production expansion.

Variable	Aggressive = 1			Conservative = 0			difference		
	Obs	Mean	Std.err	Obs	Mean	Std.err	Mean	Std.err	T
Defective_rate	253	0.05	0.01	177	0.02	0.01	-0.03	0.02	1.97**

enterprises' profitability with certainty, so enterprises should take full account of the impact of production expansion investment on its current survival situation, and to decide whether to conduct a conservative strategy on production expansion action.

## 6. Conclusions

The transition of the Chinese economy is placing pressure on manufacturing enterprises to increase profitability. First, we calculated the overall profitability of a sample group of enterprises and found that 70.56% of all enterprises had an ROS of less than 5%, while 46.58% had a negative PGR, which clearly indicates that overall profitability is declining. Furthermore, we analyzed profitability based on firm size and industry category, respectively. In relation to firm size, we found that the profitability of large-scale enterprises tends to be higher, while that of medium-scale enterprises tends to be lower. In terms of industry category, we found that the profitability of the rubber and plastic products industry is significantly lower than that of other industries, while the pharmaceutical and chemical products manufacturing industry shows high profitability.

In an attempt to alleviate the impact of rising labor costs and depressed demand, enterprises will alter both their production and marketing strategies. In this study, we constructed an analysis framework comprising four actions and two strategies. The four actions include innovation, diversification, market development, and expansion of production capacity, while strategies can be divided into aggressive strategies and conservative strategies. We investigated the effect on profitability of each action under different strategies using CEES2015 data. We found that an aggressive innovation strategy had a negative effect on current profits but a positive effect on future profits. This indicates that while increasing investment in innovation will promote future

profits, it places enterprises at greater risk in terms of their short-term survival. From the analysis of production expansion activities under different strategies, it can be seen that in the current climate of economic transition, enterprises that adopt an aggressive production expansion strategy can improve their profitability in the short term. However, from a dynamic point of view, a conservative strategy will be more likely to enhance future profitability. Firms that adopt an aggressive market development strategy achieve greater profitability. This suggests that in the current economic environment, the development of international markets is a good way for firms to increase profitability. In terms of diversification, although an aggressive strategy may improve profitability, there is an obvious risk for firms adopting an aggressive diversification strategy, and this is likely to place serious pressure on the ability of firms to survive in the short term.

## Note

1. We mentioned that 570 enterprises were surveyed in Section 3, but some of them didn't fill questionnaire completely to protect their business secret.

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## References

- Audretsch, D. 1995. "Firm Profitability, Growth, and Innovation." *Review of Industrial Organization* 10 (5): 579–588. doi:10.1007/BF01026883.
- Buzzell, R. D., B. T. Gale, and R. G. M. Sultan. 1975. "Market Share-A Key to Profitability." *Harvard Business Review* 53 (1): 97–106.
- Geroski, P., S. Machin, and J. Van Reenen. 1993. "The Profitability of Innovating Firms." *The RAND Journal of Economics* 198–211. doi:10.2307/2555757.
- Gu, Z. 1993. "Strategy and Economies of Scale of China's Steel Industry Development." *Economic Research* 10: 75–80.

- Leiponen, A. 2000. "Competencies, Innovation and Profitability of Firms." *Economics of Innovation and New Technology* 9 (1): 1–24. doi:10.1080/10438590000000001.
- Moguilnaia, N.A. Vershinin, K.V., Sweet, M.R., Spulber, O.I., De Souza, M.M. and Narayanan, E. S. 2005. "Innovation in Power Semiconductor Industry: Past and Future." *IEEE Transactions on Engineering Management* 52 (4): 429–439. DOI:10.1109/TEM.2005.856571.
- Morrison, C. J. 1990. *Market Power, Economic Profitability and Productivity Growth Measurement: an Integrated Structural Approach*[J]. Cambridge: Social Science Electronic Publishing.
- Narver, J. C., and S. F. Slater. 1990. "The Effect of a Market Orientation on Business Profitability." *The Journal of Marketing* 20–35. doi:10.2307/1251757.
- Plambeck, E. L., and T. A. Taylor. 2005. "Sell the Plant? the Impact of Contract Manufacturing on Innovation, Capacity, and Profitability." *Management Science* 51 (1): 133–150. doi:10.1287/mnsc.1040.0212.
- Qian, G. 2002. "Multinationality, Product Diversification, and Profitability of Emerging US Small-And Medium-Sized Enterprises." *Journal of Business Venturing* 17 (6): 611–633. doi:10.1016/S0883-9026(01)00080-5.
- Roberts, P. 1999. "Product Innovation, Product-Market Competition and Persistent Profitability in the US Pharmaceutical Industry." *Strategic Management Journal* 20 (7): 655–670. doi:10.1002/(SICI)1097-0266(199907)20:7<655::AID-SMJ44>3.0.CO;2-P.
- Rumelt, R. 1982. "Diversification Strategy and Profitability." *Strategic Management Journal* 3 (3): 359–369. doi:10.1002/smj.4250030407.
- Spanos, Y. E., G. Zaralis, and S. Lioukas. 2004. "Strategy and Industry Effects on Profitability: Evidence from Greece." *Strategic Management Journal* 25 (2): 139–165. doi:10.1002/smj.369.
- Szymanski, D. 1993. "An Analysis of the Market Share-Profitability Relationship." *Journal of Marketing* 57 (57): 1–18.
- Hao, W., and Y. Li. 2014. "China's Manufacturing Labor Costs Rise Substantially State and Strategies." *International Trade* 3: 10–15.
- Qiu, Y., and Z. Dan. 2010. "China's Manufacturing Economies of Scale Influencing Factors." *Number Technical Economics* 3: 42–54.