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Does CEO Turnover Affect Technical Innovation? Evidence from Chinese Listed Company

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Abstract: This study examines whether CEO turnover affects technical innovation or not in China, where most listed firms change CEO frequently. My proposition is that because of frequent turnover, CEO barely gain rewards from technical innovation, so he would restrain technical innovation. Data on 281 Chinese Listed Companies 1535 samples during 2005 to 2011 confirmed this judgment. More interestingly, the study also shows that turnover in non-state-owned enterprise has more significant negative influence on technical innovation than state-owned enterprise; Turnover in non-high-tech enterprises has more significant negative influence on technical innovation than high-tech enterprises; Turnover of old CEO has more significant negative influence on technical innovation than the young. These results suggest that companies need to reduce CEO turnover, strengthen the supervision of CEO short-term behavior, extend CEO assessment period and develop internal labor market.

Key words: CEO, CEO turnover, technical innovation, short-term behavior

INTRODUCTION

Technical innovation is one important way to maintain sustainable competitiveness for a company. How to improve technical innovation has become one hot topic for the academic and business. Prior researches insist that enterprise scale (Jin and Chen, 2001), leverage (Wang, 2002), industry (An *et al.*, 2006), ownership structure (Yang *et al.*, 2007), board characteristics (Zhou *et al.*, 2012), enterprise growth, profit level (Zhang *et al.*, 2012) and institution (Cai and Wan, 2012) affect technical innovation. However, as an important decision-maker, the role of CEO can't be neglected. Psychological motivation and value orientation will affect CEO's technical innovation decision-making. For example, the CEO with a short tenure and lower loyalty probably pay more attention to short-term surplus management, neglect long-term investment and hence inhibit technical innovation, while the CEO with a long tenure and higher loyalty probably pay more attention to the enterprise's sustainable development so as to enhance technical innovation. In the past decade, due to enterprise transformation, acquisition and restructuring, Chinese CEOs turnover frequently, the average tenure is just only 2.88 years. Does such a short tenure can make sure CEO get benefits from technical innovation? It is a pity that prior researches paid little attention to this problem. In view of this, we try to examine whether CEO turnover affect technical innovation or not?

In addition, it is worth noting that technical decision also was influenced by ownership, industry and CEO age. Different ownership of the enterprises have different governance levels and goals, which represent different degree of regulation for CEO's short-term behavior; Different industry, which means different rigidity of technical innovation, will influence technical innovation investments; CEOs at different age have different psychological characteristics, so their tendency to short-term earnings management is also different. Therefore, the second question in this study is whether ownership, industry and CEO age moderate the relationship between CEO turnover and technical innovation?

BACKGROUND AND PROPOSITIONS

CEO turnover and technical innovation: New institutional economics theory holds that people have short-term behavior such as opportunistic, seek short-term interest, draw on advantages and avoid disadvantages, etc., which is rooted in their own interests, external environment and expectations (Lu, 1996). Considering that the profit produced by technical innovation lags far behind investment and payback period is longer, outgoing CEO will expect that it difficult to obtain benefit for himself, so he will tend to reduce the projects that need to technical innovation and choose the projects that need less investment and earn financial return quickly such as

acquisition, bonds, stocks, etc. Grinstein and Hribar (2004) found that the CEO of acquiring firm won high payment in the year of mergers and acquisitions. The practice of Chinese enterprises also shows that many listed companies reap short-term gains by buying stocks and bonds of other companies.

When CEO turnover occurred, on the one hand, if it is due to poor performance, the successor probably be asked to improve company performance as soon as possible, which will lead the successor to squeeze costs and reduce technical innovation investment. Some researches support this viewpoint. Harrison and Fiet (1999) confirmed that CEO turnover has a positive influence to the enterprise return on assets while a negative influence on technical innovation investment. Huson *et al.* (2004) found that compulsory CEO turnover has increased short-term market income and accounting earnings significantly. Zhu (2004) also found that the successor bring high short-term profit surplus for the company. On the other hand, technical innovation requires a lot of information, such as market, product, technology, corporate culture, finance, etc. Compared with the former CEO, the successor has little information and sufferer larger risk of technical innovation investment, even will be fired when it failed. Moreover, even if the successor is trying to lower the risk of technical innovation, he also need to learn much more knowledge and collect much more information, which will increase the successor's learning cost and search costs undoubtedly. Therefore, the successor probably tends to reduce the technical innovation investment. Based on the above analysis, we propose: CEO turnover has a significant negative influence on enterprise technical innovation (Hypothesis 1).

CEO turnover and technical innovation in different ownership enterprises: Different ownership enterprises in China have different goals and governance efficiency, therefore, the willingness of CEO to technical innovation and the degree of regulation for CEO's short-term behavior are also different. Compared with non-state-owned enterprises, state-owned enterprises not only seek economic goals, but also seek political and social goals. State-owned enterprises are often been seen as one important carrier to implement the national economic and social development strategy, or one powerful tool to improve country status in international market competition (Huang and Yu, 2006). Guided by above goal orientation, the term assessment to CEO of state-owned enterprises is different with non-state-owned enterprises: First, it is not only refer to the result, but also focus on the process. Second, the content of it is not limited to

economic indicators, but also include non-economic indicators. Third, it pay more attention to the long-term development of the enterprise. Views on above perspectives, we argue that the pressure to improve short-term financial performance for CEO in state-owned enterprises is less than non-state-owned enterprises. In addition, in state-owned enterprises, the value of official-centered and seniority-based system weaken the relationship between CEO compensation and corporate performance. Tong *et al.* (2012) confirmed that the positive relationship between CEO compensation and corporate performance is stronger in non-state-owned enterprises than state-owned enterprises. Hence, we argue that the willingness of CEO in state-owned enterprises to increase short-term surplus and reduce technical innovation investment is lower than in non-state-owned enterprises.

As for governance efficiency, at different governance level, the CEO's short-term behavior has been supervised in varying degree. Under high governance level, the CEO's behavior of reducing technical innovation investment and strengthening short-term earnings management will also be controlled strongly. Some researches revealed that the governance level in state-owned enterprises is higher than in non-state-owned enterprises. For example, One study revealed that the listed company which the first majority shareholder is state-owned has higher management level than average (Programme Group, Research Center of Firm Management, Nankai University, 2006). The research of Hao *et al.* (2011) on governance efficiency index also showed that state-owned holding enterprises and solely state-owned enterprises have high management level than collectively-owned enterprises, private enterprises and Hong Kong, Macao and Taiwan enterprises. Therefore, we propose: CEO turnover in non-state-owned enterprises has more significant negative influence on technical innovation than in state-owned enterprises (Hypothesis 2).

CEO turnover and technical innovation in different industry: Different industry means different demand rigid of technical innovation investment. In high-new technology industry such as biological pharmaceutical, electronic information, new materials, new energy, new technique and so on, technical innovation become the key content of market competition. Because of product and technology upgrade rapidly, enterprises are required to carry out technology innovation continuous so as to ensure their competitiveness in marketplace, thus survival and get more development space in the fierce competition. Therefore, the successor reduces technical

innovation investment in a narrow range in high demand rigid industry, while in a wider range in lower rigid industry.

In China, the regulations of “the Administrative Methods for the Confirmation of New and High Technology Enterprises” and “the New and High Technology Areas with the Government's Primary Support” ruled that the cumulative percentage of technology innovation investment accounts for gross sales in the last three years must fulfill the following requirements: gross sales less than 50 million Yuan in recent year, not less than 6%; gross sales between 50 million to 200 million Yuan in recent year, not less than 4%; gross sales more than 200 million Yuan, not less than 3%; gross sales of high-new technology product accounted for total revenue more than 60%. According these policy, we propose: CEO turnover in non-high-new technology industry has more significant negative influence on technical innovation than in high-new technology industry (Hypothesis 3).

Different age of CEO turnover and technical innovation:

CEOs at different age have different psychological characteristics, which will affect CEO behavior. First, old successor is more conservative than young successor and he more tend to risk-averse. Due to the higher risk of technical innovation, old successor more tends to reduce technical innovation. Next, compared with young CEO, old CEO is more likely to be changed than young CEO by reason of age. Due to the benefits of technical innovation lag behind the investment, CEO will expect that it is difficult to obtain personal rewards derived from technical innovation. Last, the strength and energy of old successor is limited, in the process of learning the knowledge and technical information related to technical innovation, their cost is higher than that young successor. Accordingly, we propose: Old CEO turnover has more significant negative influence on technical innovation than young CEO (Hypothesis 4).

RESEARCH DESIGN

Sample and data selection: The sample for this study was drawn from 281 listed companies during 2005 to 2011. The data of CEO turnover was collected from annual reports of listed companies. The data of technical innovation come from the annual report notes “other cash payment related to operating activities”, administration expense “project and director's report”, other financial data from CSMAR database. After excluding part missing data values, we got 1535 observed values.

Table 1: Control variables defined

| Symbol | Variable value method |
|-----------|--|
| Size | Ln (total assets) |
| Lev | Total debt/total assets |
| Oigr | Annual growth rate of operating income |
| Lncon | Top 5 large shareholder shareholding |
| Industry | High-new technology = 1, otherwise = 0 |
| State-own | Yes = 1, No = 0 |
| Area | West area = 1, otherwise = 0 |
| Age | The age of CEO |
| Year | Current year = 1, otherwise = 0 |

Table 2: Comparison of technical innovation investment during 2005 to 2011

| | Turnover (%) | No turnover (%) | Average (%) |
|---------|--------------|-----------------|-------------|
| 2006 | 0.61 | 1.24 | 1.13 |
| 2007 | 1.24 | 1.26 | 1.26 |
| 2008 | 0.87 | 1.37 | 1.29 |
| 2009 | 1.23 | 1.73 | 1.65 |
| 2010 | 1.38 | 1.75 | 1.68 |
| 2011 | 1.31 | 1.99 | 1.91 |
| Average | 1.11 | 1.56 | 1.49 |

Variable measure: Considering that operating income is an important reference standard for technical innovation decision, therefore, we use “the ratio of technical innovation investment to operating income” as the dependent variable (Tech-Innova). The independent variable is CEO turnover, which is a dummy variable, turnover as 1, otherwise as 0.

Other control variables defined as shown in Table 1. Model:

$$\text{Tech - Innova} = \beta_0 + \beta_1 \text{Turnover} + \beta_2 \text{Size} + \beta_3 \text{Lev} + \beta_4 \text{Oigr} + \beta_5 \text{Lncon} + \beta_6 \text{Industry} + \beta_7 \text{Stateown} + \beta_8 \text{Area} + \beta_9 \text{Age} + \beta_{10} \text{Year} + e$$

DATA ANALYSES AND RESULTS

Descriptive statistics: Table 2 shows that the average technical innovation investment of Chinese listed companies accounts for operating income just only 1.49%. However, some statistics show that the average technical innovation investment of global top 500 companies accounts for operating income 10-20%. It suggests that the technical innovation level of Chinese enterprises is lower generally. As for the growth of technology innovation investment, the ratio of technical innovation investment to operating income has increased from 1.13% in 2005 to 1.91% in 2011 and has grown by an annual average of 11.07%, grew slowly. In addition, compared with the companies which not change CEO, the companies which change CEO invested less on technical innovation.

Table 3 describes the situation of CEO turnover. According to Table 3, there is 33.46% (= 1-22.78-43.76%)

Table 3: Statistical characteristic of CEO turnover during 2005 to 2011

| Frequency of CEO turnover | | | Annual distribution of executive change | | | | |
|---------------------------|-----------|---------|---|----------|---------|-------------|---------|
| Times | Companies | Percent | Year | Turnover | Percent | No turnover | Percent |
| 0 | 64 | 22.78 | 2005 | 54 | 19.22 | 227 | 80.78 |
| 1 | 123 | 43.76 | 2006 | 47 | 16.73 | 234 | 83.27 |
| 2 | 68 | 24.20 | 2007 | 59 | 21.00 | 222 | 79.00 |
| 3 | 19 | 6.76 | 2008 | 46 | 16.37 | 235 | 83.63 |
| 4 | 6 | 2.14 | 2009 | 49 | 17.44 | 232 | 82.56 |
| 5 | 0 | 0.00 | 2010 | 54 | 19.22 | 227 | 80.78 |
| 6 | 1 | 0.36 | 2011 | 37 | 13.17 | 244 | 86.83 |
| 7 | 0 | 0.00 | Total | 346 | 123.15 | 1621 | 576.85 |
| Total | 281 | 100.00 | Average | 49.43 | 17.59 | 231.57 | 82.41 |

Table 4: Descriptive statistics of variables

| | N | Min | Max | Mean | St.d |
|-------------|------|--------|--------|--------|-------|
| Tech-innova | 1535 | 0.000 | 0.245 | 0.015 | 0.021 |
| Size | 1535 | 19.245 | 27.346 | 27.730 | 1.131 |
| Lev | 1535 | 0.012 | 2.401 | 0.502 | 0.213 |
| Oigr | 1535 | -1.000 | 7.767 | 0.218 | 0.568 |
| Lncon | 1535 | 0.130 | 0.961 | 0.503 | 0.144 |
| Age | 1535 | 27 | 69 | 47.080 | 5.992 |

of CEO turnover twice or more during 2005 to 2011, which demonstrates that the average tenure of CEO is no more than two terms. It's worth noting that even part of CEO turnover more than three times and the average tenure of CEO is no more than two years. Using data from 454 listed companies during 2001 to 2004. Liu and Liu (2007) showed that the average tenure of CEO is just only 2.88 years. The annual distribution data of CEO turnover shows that 17.59% companies changed CEO every year. However, Barron *et al.* (2011) found that in 17268 samples during 1993 to 2005 in USA, there are only 1787 CEO turnover samples, the percentage of CEO change is just only 10.3%. By comparing we can see that Chinese listed companies change CEO frequently.

Table 4 reports the minimums, maximums, means, standard deviations for all the variables used in this study. We can see that the minimum of Tech-Innova is less than 0.0001 while the maximum is 0.245, which demonstrates that the gap of technical innovation investment is larger. The youngest CEO is 27 years old and average age is 47.08, which shows that CEO tend to be younger.

Measurement model results: Table 5 lists measurement model results. We use the technical innovation data that post one year of CEO change as the dependent variable. Model1, model 2-3, model 4-5 and model 6-7 were used to test hypothesis 1-4, respectively. Hypothesis 1, which predicts that CEO turnover has a significant negatively related to enterprise technical

innovation, was supported ($b = -0.173, p < 0.01$, see model 1). The results indicated that outgoing CEO will reduce the technical innovation investment and enhance short-term surplus, so as to maximize short-term gain for themselves.

Model 2-3 test the moderating effect of ownership on the relationship between CEO turnover and technical innovation. Although, CEO turnover in state-owned enterprises was negatively related to technical innovation ($b = -0.082$), it is not significant (see model 2). In non-state-owned enterprises, CEO turnover was significantly negatively related to technical innovation ($b = -0.356, p < 0.01$, see model 3). Hence, Hypothesis 2, which predicts that CEO turnover in non-state-owned enterprise has more significant negative influence on technology innovation than state-owned, was supported.

Model 4-5 test the moderating effect of industry on the relationship between CEO turnover and technical innovation. Although CEO turnover in high-new technology industry was negatively related to technology innovation ($b = -0.031$), it is not significantly (see model 4). In non-high-new technology industry, CEO turnover was significantly negatively related to technology innovation ($b = -0.158, p < 0.01$, see model 5). Hence, Hypothesis 3 was supported, which predicts that CEO turnover in non-high-new technology industry has more significant negative influence on technology innovation than high and new technology industry.

Model 6-7 test the moderating effect of executive's age on the relationship between CEO turnover and technical innovation. Although, both of young and old CEO turnover were negatively related to technical innovation ($b = -0.217$, see model 6, $b = -0.136$, see model 7), their significant level are different, the former is $p < 0.05$ while the latter is $p < 0.1$. Hence, Hypothesis 4 was also supported.

Table 5: Results of CEO turnover and technical innovation

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 |
|--------------------|-----------|--------------------|--------------------------|-------------------------|-------------------------------|------------------|--------------------|
| Constant | 0.256 | State-own 0.133 | No-state-own 1.002*** | High-new-tech -0.677 | Non-high-new-tech 0.842*** | Age>45 0.253* | Age≤45 0.283*** |
| Turnover | -0.173*** | -0.082 | -0.356*** | -0.031 | -0.158*** | -0.217** | -0.136* |
| Size | -0.084*** | -0.112*** | -0.238*** | -0.476*** | -0.089*** | -0.230*** | -0.051 |
| Lev | -0.181*** | -0.165*** | -0.182*** | -0.684*** | -0.131*** | -0.215*** | -0.132*** |
| Oigr | -0.027 | -0.004 | -0.039 | 0.352 | -0.036* | -0.036 | -0.015 |
| Lncon | 0.018 | 0.070*** | 0.036 | 0.014 | 0.027 | 0.135*** | -0.024 |
| Area | 0.166*** | 0.088* | 0.285*** | 0.604** | 0.128*** | 0.293*** | 0.032 |
| State-own | -0.286*** | | | -0.291 | -0.254*** | -0.285*** | -0.263 |
| Industry | 0.649*** | 0.538*** | 0.765*** | | | 0.532*** | 0.793 |
| Age | -0.005 | -0.003 | -0.015** | 0.029 | -0.012*** | | |
| Year | Control | Control | Control | Control | Control | Control | Control |
| Adj.R ² | 0.160 | 0.156 | 0.155 | 0.185 | 0.155 | 0.203 | 0.195 |
| F | 33.443*** | 15.145*** | 8.591*** | 4.486*** | 19.799*** | 15.724*** | 15.534*** |

Turnover year:2005-2010, The year of tech-innovation:2006-2011; *p<0.1, **p<0.05, ***p<0.01, All two-tailed tests

CONCLUSION

This study mainly discussed the relationship between CEO turnover and technical innovation and the moderating effect on its relationship. We found that CEO turnover is significantly negative with technical innovation. In Chinese Listed Companies, frequent CEO turnover leads CEOs have a short tenure and lower loyalty. In order to maximize short-term benefits in the limited tenure, CEOs strengthen short-term surplus management while neglect technical innovation investment. We also found that ownership, industry and CEO age moderate the relationship between CEO turnover and technical innovation. Compared with non-state-owned enterprises, state-owned enterprises have various goals and prefer to long-term development, hence weaken the incentives of CEO to pursue short-term benefits. Besides, high corporate governance levels in state-owned enterprises can also effectively supervise the short-term behavior of CEO. Therefore, CEO turnover in non-state-owned enterprise has more significant negative influence on technical innovation than state-owned enterprise. Compared with non-high-new technology industry, in high-new technology industry, technical innovation has been the main content of market competition and the demand rigid of it is high, hence inhibited the short-term behavior of CEO, so CEO turnover in non-high-tech enterprises has more significant negative influence on technical innovation than high-tech enterprises. Compared with young CEO, old CEO more tend to avoid risk and technical innovation, hence it has more significant negative influence on technical innovation than young.

Based on the above research, we suggest that: Chinese enterprise should establish long-term employment mechanism to extend the CEO term and lower the frequency CEO turnover, thus make CEO can form a long term forecast and reduce short-term

opportunism; Enterprises especially non-state-owned enterprises should extend the performance-appraisal cycle of CEO, improve corporate governance and other ways to help executives establish a long-term business plan; The board of directors can set an upper limit and lower limit of technology innovation investment according to the industry and competition of the enterprise; Increase the proportion of young people in executive team appropriately; Establish and perfect internal labor market in enterprise.

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