

Executive marketing background, corporate trademark and brand management

Executive
marketing
background

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Abstract

Purpose – With many years' economic transformation from "Made in China" to "Created in China," the State Council has set May 10th as annual "China's Brand Day" from 2017. This action indicates the implementation of brand strategy and the new national policy of promoting China's brands. The purpose of this paper is to examine the influence of marketing background of top management team (TMT) on trademark and brand output.

Design/methodology/approach – Using the trademark application data of Chinese-listed companies, this paper constructs a multiple linear regression model and uses the OLS method. This research also uses two-stage regression to examine the effect of endogeneity on the results.

Findings – Our results show that the higher the proportion of executives with marketing background in TMT, the more the number of trademark applications. Furthermore, we document that the positive impact of TMT marketing background on the number of trademark applications is more pronounced in non-state-owned enterprises, companies with more patent output and companies whose CEO has marketing background, indicating that when TMT can play a bigger role, companies have better innovation ability and team collaboration is more efficient, the promoting role of TMT marketing background on the number of corporate trademark applications will be stronger.

Originality/value – This research focuses on the world's largest emerging economy – China, which is different from the existing literature that is mainly based on western developed countries. With China's economy stepping into a new normal and consumption upgrading, it is important and worthy of a deep discussion about which factors affect the company's trademark and brand management.

Keywords Upper echelons theory, Executive marketing background, Trademark and brand management, Trademark application

Paper type Research paper

1. Introduction

In today's society, brand and brand management have become the characteristics of the modern economy and the focus of business theory and business practice (Desai and Waller, 2010). The successful creation of a brand, a powerful and valuable business tool, is an indispensable element for Chinese companies to step onto the international stage in the future. On May 9, 2017, the State Council announced that May 10 of each year will be designated as "China's Brand Day," which indicates that "playing the leading role of the brand" has been raised to an unprecedented level as a national strategy. At the symposium on promoting the country's manufacturing sector and the transformation of economic structure, Dr Li Keqiang, Premier of the State Council, pointed out that enterprises should play a major role in enhancing the varieties, quality and brand of products, increase brand awareness and strive to build more world-renowned Chinese manufacturing brands. This shows that corporate brands are becoming a booster from "Made in China" to "Created in China."

Brands are critical to a company's market competitiveness. First, in the process of marketing and promoting products or services, brands become a valuable intangible asset, creating long-term benefits for the company (Fan, 2000). Second, the psychology and behavior



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of customers will change through brand marketing. Brands become an important factor influencing customer purchase decisions (Jiang and Lu, 2006). Finally, brands that are well known and recognized by customers provide opportunities for companies to enter new business areas and launch new products or services, which gives companies access to new revenue streams (Monga and John, 2010). Therefore, examining the factors of the company's brand management strategy has important theoretical contributions and practical significance.

Since Hambrick and Mason (1984) proposed the upper echelons theory, studies have examined the impact of executive functional background on corporate strategy (Barker and Mueller, 2002; Chen and Sun, 2008; Chen and Jian, 2010; Jiang *et al.*, 2009; Lei and Liu, 2015), information disclosure (Bamber *et al.*, 2010; Cai *et al.*, 2015), internal controls and corporate performance (Chi *et al.*, 2014; Wang *et al.*, 2013). However, there is still a lack of research on how the functional background of executives affects the corporate trademark and brand management. At present, China's economy has entered a critical period when brands lead the economic transformation and upgrade. Brands have become the core factors affecting the company's market competitiveness and profitability. This research uses the company's trademark application behavior to describe the company's trademark strategy. Exploring the role of executive functional background in the company's trademark output not only fills in relevant research, but also provides reference for the company's trademark and brand building.

The basis for this research to use the company's trademark application behavior to measure the company's trademark and brand strategy is as follows. First, China's Trademark Law defines a trademark as "any visible mark that distinguishes the goods of natural persons, legal persons or other organizations from those of others," including text, graphics, letters, numbers, three-dimensional signs and color combinations, and the combination of the above elements, which is in line with the definition of brand, a name, term, design or combination thereof that distinguishes it from other competitors' products or services (Bennett, 1995). Second, the purpose of the trademark legal system – promoting brand development through the protection of trademark exclusive rights – provides a fundamental legal basis for brand protection. Previous studies have also highlighted the important role of trademarks in protecting brand value (Heath and Mace, 2017; Morrin *et al.*, 2006; Morrin and Jacoby, 2000). Third, trademarks can essentially play the role of leading customers to purchase goods through brand recognition, which is in line with the economic purpose and role of the brand. Producers and entrepreneurs hope to demonstrate the differences in their products or services from competitors by trademark and brand. A trademark that is well known and highly recognized by the public is the starting point for the company to build a brand with a good reputation and popularity. Fourth, regarding the institution, the State Administration for Industry and Commerce (SAIC) proposed and actively promoted the implementation of the trademark strategy in order to fully implement the National Intellectual Property Strategy Outline promulgated by the State Council on June 5, 2008. On May 17, 2017, the SAIC issued the Opinions on Deeply Implementing the Trademark and Brand Strategy to Promote China's Brand Building, modifying the "Trademark Strategy" to "Trademark and Brand Strategy." The combination of trademark and brand highlights the legal protection role of trademarks in brand building and management, which is conducive to giving full play to the effectiveness of the trademark legal system and the realization of trademark functions and promoting the leading role of the brand. Previous studies also consider trademark application behavior as a reflection of the company's brand management strategy (Cohen, 1986; Krasnikov *et al.*, 2009).

The main contributions of this research include the following aspects. First, with regard to marketing theory, this research is based on the assumption that executives with marketing functional background have better understanding of the fact that trademarks can influence customers' purchasing behavior, and thus pay more attention to the company's trademark application and brand management strategy, which enriches the relevant literature on the

influencing factors of the company's marketing strategy. Previous research focuses on the impact of brand marketing strategies on customers (Jun *et al.*, 2008; Müller *et al.*, 2013; Xu *et al.*, 2016), but seldom explores the factors that affect the company's trademark and brand management behavior. This research finds that the marketing functional background of top management team (TMT) has a positive effect on the company's trademark and brand management, which helps to understand the company's brand marketing behavior. Second, different from previous research, this research uses trademark application behavior as an entry point to examine the company's brand management strategy, and finds that the marketing functional background has a positive impact on the company's trademark application, indicating that the trademark application behavior also has other implications than product or service innovation. Most foreign literature treats trademarks as a measure of product or service innovation (Faurel *et al.*, 2017; Hsu *et al.*, 2017; Li, 2016; Potepa and Welch, 2017), but it rarely links trademarks to brands. Nowadays, China's economy has entered a new normal where the domestic market embraces the wave of consumption upgrades. Brand has become an important consideration for customers' shopping decisions, and it is also a key factor in enhancing the competitiveness of Chinese enterprises in global trade. Taking the reality of China into consideration, this research investigates the company's trademark application behavior from a new perspective, which expands the research area of trademark and brand. Third, this research supplements the literature on the upper echelons theory and company's trademark and brand management, verifying the impact of the TMT on organizational output. Although applying for a trademark does not guarantee the establishment of a company's brand, good trademark management is an important way to build a well-known brand. Therefore, clarifying the influence of the TMT functional background on the company's trademark application behavior is conducive to deepening the understanding of the company's trademark and brand management.

2. Literature review

2.1 Trademark and brand

Resource-based theory regards the brand as a special asset of the company, which Srivastava *et al.* (2001) call market-based asset. Market resources generated by marketing activities will become a unique intangible asset of the company, bringing resource advantage to the company, and ensuring long-term and stable economic profits. A study by Monga and John (2010) shows that brand building has an important impact on the company's operation and development. The view that trademarks, product packaging, advertising and other visual elements can convey brand image and symbolic meaning is widely recognized by marketers and brand managers (Karjalainen and Snelders, 2010; Orth and Malkewitz, 2008). Among the above elements, the trademark is considered to be the most important medium for delivering brand image (Henderson and Cote, 1998). Companies usually invest more in "permanent media" such as trademarks than other marketing communication tools (such as advertising) (Shennan, 1986). The reason that companies do not hesitate to invest heavily in trademarks is that trademarks can effectively influence customers' purchasing decisions: trademarks can help customers identify goods and accelerate product purchases (Morrow, 1992); trademarks can also play an important role in attracting customers' attention, arousing the emotional reaction of customers, improving customers' attitude and purchase intention of products, and finally establish trademark loyalty (Jun *et al.*, 2008; Müller *et al.*, 2013). Base on the traditional theory that marketing campaigns such as advertising, promotion and public relations can influence customers' perception of brands, Xu *et al.* (2016) find that customers' perception of brands may stem from the small differences of the capitalization of company's trademarks. With China's economy stepping into a new normal and consumption upgrading, it is important and worthy of a deep discussion about which factors affect the company's trademark and brand management.

Trademark is the legal carrier and main form of the brand. Trademark registration is the main way for brands to obtain legal protection. How to effectively protect brands by preventing trademark counterfeiting or infringement has always been the focus of the legal profession. Morrin and Jacoby (2000) find that advertisements with trademark dilution will weaken brand recognition. Trademark dilution refers to the use of a subsequent mark on a non-similar goods or service that is the same or similar to the prior well-known mark to impair customers' associative thinking of the brand name and its original product category, jeopardizing the value of the original brand (Peterson *et al.*, 1999). In 1995, the United States enacted the first Federal Trademark Dilution Act (FTDA) to protect brand value by preventing trademark dilution. Morrin *et al.* (2006) construct a hierarchical Bayesian association network model of brand information to measure the degree of brand value damage caused by trademark dilution. Discussing brand value with trademark protection, Heath and Mace (2017) find that the issuance of FTDA has enabled companies with stronger trademark protection to extend protected brands to new product markets. Krasnikov *et al.* (2009) use trademarks as a measure of customers' brand awareness and brand association, finding that the number of trademarks is related to financial indicators such as cash flow, Tobin's *Q* and stock returns, estimating the financial impact of the brand on the company. Existing literature also regards trademarks as proxy variables for product and service innovation (Faurel *et al.*, 2017; Hsu *et al.*, 2017; Li, 2016; Potepa and Welch, 2017). Specific to the urgent needs of Chinese enterprises in brand building, this research assumes that not only do trademarks reflect the company's innovation in products and service, they also reflect the company's brand-building strategy. This research is focused on the world's largest emerging economy – China, which is different from the existing literature that is mainly based on Western developed countries. This is also one of the contributions of this research.

2.2 Upper echelons theory

The upper echelons theory proposed by Hambrick and Mason (1984) assumes that professional experience has shaped managers' perspectives on current strategic opportunities and challenges. Managers' career paths will influence their strategic choices. The strategies pursued by managers are often consistent with their professional skills. With regard to corporate operation strategy, Barker and Mueller (2002) examine the impact of CEO characteristics on the company's R&D spending, finding that when the CEO has a functional background in marketing and engineering, the company's R&D expenditure will be higher. Chen and Sun (2008) argue that strategic decision makers with a background in production functions such as finance will have lower preferences for diversification and weaker ability to acquire heterogeneous resources through social networks. Their findings support this hypothesis that companies whose entrepreneurs have financial backgrounds are less diversified. Jiang *et al.* (2009) find that the financial, accounting and economic management work experience of the chairman in a state-owned enterprise is negatively related to the over-investment of the company. They interpret this result as a fact that work experience in finance, accounting and economic management has made managers aware of the complexity of reality and the connection between risks and benefits, which has impact on leadership and management behavior. Chen and Jian (2010) find that entrepreneurs with background in production functions are more inclined to choose a fully controlled mode of foreign direct investment. Taking the city commercial banks as the object of investigation, Lei and Liu (2015) find that there is a positive correlation between the experience of city commercial bank executives in state-owned banks and joint-stock commercial banks and the proportion of interbank assets, indicating that the experience of city commercial bank executives in state-owned banks and joint-stock commercial banks has promoted the development and innovation of the bank's interbank business. As for information disclosure and internal

control, Bamber *et al.* (2010) find that the financial disclosures of companies whose executives have financial, accounting and legal functional background are more conservative, and the financial disclosures of companies whose executives have financial and accounting functional background are more accurate. Chi *et al.* (2014) find a significant positive correlation between the financial accounting or other economic management work experience of the chairman of the board of supervisors and the quality of internal control. They suggest that this may be due to the relevant work experience enables the chairman of the board of supervisors to understand the internal control more comprehensively and systematically, to evaluate and respond to risks more carefully and thus judge the effectiveness of internal control more objectively and professionally, play a better supervisory role. Different from the research that executives' past work experience has positively influenced the company, Cai *et al.* (2015) find that the auditing background of executives may lead to a decline in the quality of corporate financial reports and an increase in audit risk. Regarding the functional background and corporate performance, Wang *et al.* (2013) find that the TMT whose members' backgrounds are mainly in production functions (production, process development and finance) has the biggest positive impact on both short-term and long-term performance, innovation performance and overseas performance.

Based on the above literature, we can see that existing literature has examined the impact of executive functional background on the company's operation strategy (R&D expenditure, diversification, over-investment, foreign direct investment and bank risk management), information disclosure, internal control and corporate performance from the perspective of the upper echelons theory, but has not yet investigated how the functional background of executives affect the company's trademark and brand management. With the gradual advancement of China's economic transformation and the urgent need to establish China's brand in manufacture, exploring the role of the executive functional background in the company's trademark output can not only enrich the relevant literature on the upper echelons theory, but also provide a reference for the company to build its own brand.

3. Research hypotheses

Executives' personal values and cognitive styles will influence their companies (Wally and Baum, 1994), which is reflected in the company's decision-making process (Norburn, 1989). Managers with different functional backgrounds differ in attitudes, knowledge and cognition (Dearborn and Simon, 1958)[1]. Those differences may result in part from their different educational backgrounds. However, their work experience in different fields further shapes their perceptions and ideas, which will influence executives' decisions on the entire marketing and trademark and brand management process: the functional background will determine what issues executives will consider to be important, how to express these issues, the subsequent solutions, how to evaluate those solutions, and their involvement in the implementation process (Bantel and Jackson, 1989).

The marketing functional background of TMT will affect the company's trademark application is based on the following three premises: TMT has the right of decision making in terms of trademark application. Based on the resource-based theory, trademark and brand management is the key to the company's revenue, which is related to the company's operation and future development. The management will pay close attention to the company's marketing strategy and make relevant decisions such as trademark application according to their preferences (Low and Fullerton, 1994). Thus, TMT has the right of decision-making on trademark application of the company (Hall, 1992). The trademark application decision is decided by the entire TMT. As the sample of this research is big Chinese-listed companies and the company's trademark and brand management is an important management decision, the possibility that the company's trademark application decision is determined by TMT after consultation is greater than only determined by a

senior individual (e.g. CEO) (Xu and Pang, 2008). Prior studies also show that the characteristics and operations of the entire TMT have greater predictive ability for the organizational results (Hambrick *et al.*, 1996). The preference of TMT on the number of trademark applications is related to the observable characteristics of TMT. According to upper echelons theory, the psychological structure of managers such as cognitive ability, perception ability and value, determines the process of strategic selection and corresponding performance results. However, as it is difficult to measure the psychological structure of TMT, and demographic background characteristics, such as age, tenure, occupation, education, are closely related to the cognitive ability and values of managers, upper echelons theory can be studied from such aspects as the number of TMT members, education background, gender, age and so on.

Managers often show some biases in their decision making, and these biases reflect the thinking mode of the functional areas of the company where managers are trained. The experience gained from the goals, reward mechanism and methods of a specific functional department enables managers to perceive and interpret relevant information with their professional training (Dearborn and Simon, 1958). According to the theoretical researches, executives with work experience of output function (e.g. R&D/engineering and marketing/sales) prefer innovation strategy, because output function emphasizes the promotion of growth through the development of new products and markets (Finkelstein and Hambrick, 1996; Hambrick and Mason, 1984). The working experience in marketing makes managers believe that the investment in products, market development, brand building and promotion is appropriate and worthwhile, especially when they need to make strategic decisions in the face of uncertainty in the complicated real world (Barker and Mueller, 2002). Trademark is a mark that can distinguish the goods or services of an enterprise from those of other enterprises, and it is the intellectual property right protected by the law. The company often applies for new trademarks when developing new products or services. Thus, trademark can reflect the innovation of the company in product and market development to some extent (Faurel *et al.*, 2017). After the development of new products or services and the successful acquisition of registered trademark, the company can promote products under the protection of laws such as the Trademark Law, and eventually establish a brand. Thus, TMT with marketing functional experience is more likely to promote the company's trademark application behavior as a means of product and market development innovation and brand establishment and promotion. Thomas *et al.* (1991) find that the CEO of companies adopting marketing and product innovation strategies in the computer industry often had the working experience in marketing, sales and R&D. Changanti and Sambharya (1987) study TMT in tobacco companies, finding the similar results. Based on the above analysis, *H1* is proposed as follows:

H1. The higher the proportion of the executives with marketing functional background in TMT is, the more trademark applications the company has.

Different functional backgrounds make executives have different knowledge and ideas, which will affect their decisions on corporate operation and management. However, since the companies have the differences in development goals and resources, it is possible that the executives with the functional background of marketing play different roles in different types of companies. In China, an emerging market in economic transition, the ownership nature distinguished by the type of actual controlling shareholders is a company characteristic that cannot be ignored, with their important influences on the company's product innovation ability and marketing strategy (Tang and Zuo, 2014). Compared with the non-state-owned enterprises that take shareholders' interests maximization as the goal and all business activities focus on the economic benefits, the state-owned enterprises have the goal of state-owned assets appreciation, and also take the responsibilities to expand employment and

maintain social stability, with more attention to social and political goals, and lack of focus on economic benefits of the company (Yao and Zhang, 2001). Previous studies show that the non-state-owned enterprises have higher technical efficiency than the state-owned enterprises (Zhang *et al.*, 2003; Yao and Zhang, 2001). Thus, in the state-owned enterprises with low innovation capacity, product and market development innovation will be hindered. In the absence of new products or services, it is difficult for TMT to use its marketing functional background to promote the establishment of the company's trademark and brand.

Meanwhile, the state-owned enterprises tend to have better external environment, and can obtain more economic resources and preferential policy (Kong *et al.*, 2013), which may make the state-owned enterprises ignore the value of intangible assets, and lack the awareness of protecting trademark and brand; this problem can be witnessed from the trademark dispute on "Wang Lao Ji" between Guangzhou Pharmaceuticals Corporation and Hongdao Group. Time-honored brand or trademark previously held by state-owned enterprises are gradually abandoned by foreign-funded enterprises and withdrawn from the market when flowing into foreign-funded enterprises in the flood of foreign investment or neglected after the market is fully opened with the products or services collapse in competition. Managers attach great importance to the preservation and appreciation of tangible assets of the state-owned enterprises, but pay few attention to the preservation and appreciation of intangible assets, which makes it difficult for the executives' marketing functional background to play an effective role in the corporate environment where the characteristics and value of intangible assets such as trademark and brand are not fully recognized.

Finally, most executives of the state-owned enterprises are appointed by the government, with the double identity of both officials and entrepreneurs (Quan *et al.*, 2010). The executives of state-owned enterprises cannot be called real entrepreneurs or professional managers, and they are more like "entrepreneurial government officials" to some extent; the inherited government background makes the executives of the state-owned enterprises prefer the incentive methods with administrative promotion in a relatively short and uncertain term and pay more attention to short-term goals and short-term earnings (Tang and Zuo, 2014), which may cause they ignore the company's long term goals such as trademark and brand building. Thus, the marketing functional background of executives cannot fully affect the company's trademark application behavior. Based on the above analysis, the marketing functional background of TMT in state-owned enterprises cannot play an effective role due to the lack of innovation in product and market development, weak awareness of brand protection and lack of incentive methods:

- H2.* The marketing functional background of TMT has a positive impact on the number of trademark applications of the company, which is more significant in non-state-owned enterprises than in state-owned enterprises.

Trademark is a mark to distinguish the source of goods or services. Each registered trademark is designated for a certain kind of goods or services. There is no trademark that exists independently from the goods or services. Thus, each trademark corresponds to a kind of goods or services. Trademark application is often related to the release of new products or services, which reflects the innovation of the company in product and market development to some extent (Faurel *et al.*, 2017). According to the western literatures, trademark is usually regarded as a proxy of product and service innovation (Faurel *et al.*, 2017; Hsu *et al.*, 2017; Li, 2016; Potepa and Welch, 2017).

Based on upper echelons theory, the sales, marketing and product R&D are generally regarded as the output functions of the organization in prior studies (Barker and Mueller, 2002; Hambrick and Mason, 1984). The executives with rich work experience in the output function pay more attention to the growth brought by the development of new products and new markets, and thus they prefer innovation strategy (Finkelstein and Hambrick, 1996).

Therefore, the executives with marketing functional background not only pay more attention to the company's market development and brand strategy, but also have a keen intuition of the company's product and service innovation. Taking trademark as a measure of the company's product and service innovation, the executives with marketing functional background will also promote the company's trademark application because they attach importance to the company's innovation.

If the company does not have new products or services, it is impossible to apply for trademark registration. Thus, in order to obtain more trademarks, the enterprise must have certain innovation ability, which can be measured by the R&D output of the company such as patent (Hall *et al.*, 2005). If the company has strong research and innovation ability as well as more patent outputs, it will provide a foundation for the application of new technology in the upgrading of products, and provide an opportunity for the executives who attach more importance to product and service innovation to implement innovation strategy, which is conducive for them to promote the product and service innovation. In addition, the success of innovation comes from the feasibility of technology and the identification of market demand (Gruber, 1981). Gupta *et al.* (1986) discuss the interaction mechanism of R&D and market development on product innovation process, and put forward that the better the integration effect of R&D and market development was, the higher the probability of innovation success was.

Based on the above analysis, the executives with marketing functional background will pay attention to the company's innovation strategy, which is conducive to the company's product and service innovation and promotes the company's trademark application. When the company's R&D capability is strong, TMT has more opportunities to put the ideas and plans of product and service innovation into practice, and the possibility of innovation success is higher. Thus, *H3* is proposed in this research:

- H3.* The positive influence of TMT's marketing functional background on the number of trademark applications is more significant in the companies with more patents than those with fewer.

If there is a certain demographic characteristic of TMT members, such as functional background, is different, the team members may be divided into the small opposite groups, which will usually inhibit the communication and coordination within the team, bringing about some negative results (Sun *et al.*, 2006). By contrast, with greater mutual trust and collaboration, the similarity of TMT's background helps members to have unified assumptions in the decision-making process, prompt the agreement on the understanding of some decisions, reduce the defensive consciousness and behavior of the members, and improve the quality and quantity of information communication (O'Reilly *et al.*, 1993). As the head of the executing agency, CEO plays a vital role in the company's closed-loop process of planning, organizing, leading, and controlling. Thus, when CEO has the functional background of marketing, he can better communicate and coordinate with other executives with similar working experience in the team, which is in conducive to the integration of TMT members' behaviors, make them more easily complete the work in the common task, improve the efficiency of making and implementing decisions. All of these will promote the positive impact of TMT's marketing functional background of the company's trademark application behavior. In addition, according to the upper echelon theory, when CEO has the marketing functional background, he will pay more attention to the company's marketing activities, which is helpful for the company to develop and implement brand strategy, and strengthen the correlation between the marketing functional background of TMT and the company's trademark application. Thus, *H4* is proposed:

- H4.* The marketing functional background of TMT has a positive impact on the number of trademark applications of the company, which is more significant in the company whose CEO has the marketing functional background than the company whose CEO does not have the marketing functional background.

4. Research method

4.1 Sample selection

This research takes the non-financial listed companies in the A-share markets of Shanghai and Shenzhen as the research sample, and the sample period is from 2008 to 2015. The reason for the sample period starting from 2008 is as follows: China Securities Regulatory Commission published Administration for Information Disclosure of Listed Companies in 2007, which officially regulates that the annual report shall record the qualifications, shareholding changes and annual payments of directors, supervisors and senior managers, which makes this research have the data of the personal characteristics of the executives of listed companies. After deleting the company samples with missing variable data during the sample period, we acquire 10,056 firm-year panel data of companies. The personal characteristics data of executives used in this research comes from the CSMAR database, the trademark application data is obtained by searching the China Comprehensive Query System of Trademark, R&D expenditure data is acquired from the WIND database, and other data come from the CSMAR database.

4.2 Model design and variable definition

This research constructs the following multiple linear regression model and uses the OLS method to examine the research hypotheses:

$$\begin{aligned} LnTrdmk_{it} = & \beta_0 + \beta_1 TMT_Mkt_{it} + \beta_2 TMT_Fml_{it} + \beta_3 TMT_Tenure_{it} + \beta_4 TMT_Degree_{it} \\ & + \beta_5 TMT_Age_{it} + \beta_6 TMT_Salary_{it} + \beta_7 TMT_Shr_{it} + \beta_8 Sales_{it} \\ & + \beta_9 R\&D_{it} + \beta_{10} SalesExp_{it} + \beta_{11} Lev_{it} + \beta_{12} Size_{it} + YrDum + InduDum + error\ term. \quad (1) \end{aligned}$$

The dependent variable, *LnTrdmk*, is the Natural logarithm of the number of trademark applications plus one. The independent variable, *TMT_Mkt*, is the characteristics of the marketing functional background of TMT, which is measured by dividing the number of executives with marketing functional background in TMT by the total number of executives in TMT. The definition of the executive follows the information disclosed in the annual report of a listed company. Referring to Faurel *et al.* (2017), sales revenue, R&D expenditure, sales expense ratio (*SalesExp*), asset-liability ratio (*Lev*) and company size are added into Model (1) to control the impact of product R&D, marketing efforts and important financial characteristics of the company on the number of trademark applications in this research. Gender, education background and age of executives are important demographic characteristics (Dai and Kong, 2017; Hu *et al.*, 2017), and tenure, compensation and shareholding ratio of executives are also key factors influencing their behavioral decisions in the company. Thus, in Model (1), it controls the influence of the proportion of female executives, *TMT_Fml*, the tenure of TMT, *TMT_Tenure*, the educational level of TMT, *TMT_Degree*, the age of TMT, *TMT_Age*, the salary of TMT, *TMT_Salary*, and the proportion of shares held by TMT, *TMT_Shr*. Finally, with the consideration of the fixed effects of the year and industry, Model (1) controls the differences of the number of company trademark applications in two dimensions of time and industry. In order to reduce the influence of abnormal value on the research results, winsorize is conducted on all continuous variables at the levels of 1 and 99 percent in this research. Table I shows the definitions of the variables.

5. Result analysis

5.1 Descriptive statistics

Table II reports the descriptive statistics of main variables. The mean value of *Trdmk* is 6.024 and the standard deviation of *Trdmk* is 25.731, indicating that sample companies

Variable	Introduction	Definition
<i>LnTrdmk</i>	Natural logarithm of the number of trademark applications	Natural logarithm of the number of trademark applications plus one
<i>Trdmk</i>	Number of trademark applications	Number of trademark applications
<i>TrdmkDum</i>	Whether to apply for trademark registration	If the company applies for trademark registration, the variable takes 1; otherwise, the variable takes 0
<i>TrdmkKinds</i>	Number of trademark classifications	Number of classifications of trademarks the company applies for registration ^a
<i>TMT_Mkt</i>	Marketing functional background of TMT	Proportion of executives with marketing functional background in TMT
<i>TMT_Fml</i>	Female executive ratio	Proportion of female executives in TMT
<i>TMT_Tenure</i>	TMT tenure	Average tenure of TMT members
<i>TMT_Degree</i>	TMT education	Average education level of TMT members (1 = secondary school and below, 2 = junior college, 3 = undergraduate, 4 = master, 5 = PhD)
<i>TMT_Age</i>	TMT age	Average age of TMT members
<i>TMT_Salary</i>	TMT salary	Natural logarithm of the average salary of the TMT members plus one
<i>TMT_Shr</i>	TMT shareholding	Average shareholding ratio of TMT members
<i>Sales</i>	Sales	Natural logarithm of the sales plus one
<i>R&D</i>	R&D expenditures	R&D expenditures/Sales
<i>SalesExp</i>	Sales expense ratio	Sales expense/Sales
<i>Lev</i>	Leverage	Liabilities/Assets
<i>Size</i>	Company size	Natural logarithm of the assets plus one

Notes: ^aAs a member of the Nice Union, China adopts the International Classification of Goods and Services for the Purposes of the Registration of Marks (i.e. the Nice Classification). Applicants should apply for a trademark registration in accordance with the Nice Classification. The current Nice Classification divides goods and services into 45 categories, with goods ranging from 1 to 34 and services ranging from 35 to 45

Table I.
Variable definition

Variable	Sample size	Mean	Standard deviation	25 quartile	Median	75 quartile
<i>LnTrdmk</i>	10,056	0.654	1.185	0.000	0.000	1.099
<i>Trdmk</i>	10,056	6.024	25.731	0.000	0.000	2.000
<i>TMT_Mkt</i>	10,056	0.233	0.193	0.071	0.200	0.364
<i>TMT_Fml</i>	10,056	0.149	0.153	0.000	0.143	0.250
<i>TMT_Tenure</i>	10,056	2.722	1.960	1.000	2.400	4.000
<i>TMT_Degree</i>	10,056	3.279	0.519	3.000	3.300	3.667
<i>TMT_Age</i>	10,056	45.752	3.647	43.250	45.750	48.333
<i>TMT_Salary</i>	10,056	12.695	0.691	12.258	12.690	13.135
<i>TMT_Shr</i>	10,056	0.015	0.028	0.000	0.000	0.016
<i>Sales</i>	10,056	21.005	1.482	20.011	20.857	21.833
<i>R&D</i>	10,056	0.032	0.043	0.000	0.025	0.044
<i>SalesExp</i>	10,056	0.072	0.082	0.022	0.044	0.088
<i>Lev</i>	10,056	0.410	0.232	0.223	0.392	0.578
<i>Size</i>	10,056	21.683	1.283	20.803	21.483	22.308

Table II.
Descriptive statistics
of main variables

apply for 6.024 trademarks on average from 2008 to 2015, and there are huge differences in trademark application behaviors among the companies. The median of *Trdmk* is 0.000, indicating that more than half of the sample companies do not apply for trademark registration during the sample period. The mean (median) of *TMT_Mkt* is 0.233 (0.200), indicating that 23.3 percent of executives in TMT have the marketing functional

background on average. Descriptive statistics of other variables of TMT characteristics show that the average proportion of female executives in TMT is 14.9 percent, the average tenure of TMT members is 2.7 years, and the average education level is above bachelor degree. The average age of TMT members is 45.8 years old, the average salary is 326 (= (e12.695-1)/1,000) thousand yuan, and the average shareholding ratio is 1.5 percent. In terms of company characteristics, the R&D expenditure ratio and sales expense respectively take 3.2 and 7.2 percent of sales on average, and the average leverage ratio is 41.0 percent on average.

Table III shows the statistics of the number of annual trademark applications. The results show that the average number of trademarks applied by listed companies increase year by year, from 4.0 in 2008 to 8.3 in 2015.

Table IV shows the correlation coefficients between main variables. The results show that the marketing functional background of TMT is significant positively correlated with the number of trademark applications of the company without controlling for other factors, indicating that the higher the proportion of executives with marketing functional background in TMT is, the more trademarks the company applies for, which preliminarily verifies *H1* of this research. In addition, there is a significant positive correlation between TMT tenure, education level, tenure, shareholding ratio and the number of trademarks, indicating that the longer the tenure of TMT members is and the higher the education level, tenure, shareholding ratio and the number of trademark applications are, the more trademarks the company applies for. The correlation coefficient between the company characteristics and the number of trademark applications shows that the higher the R&D expenditure and sales expense are, the lower the leverage ratio is and the larger the company size is, the more trademarks the company applies for.

5.2 Regression analysis

Regression results of TMT's marketing functional background and company trademark application are listed in Table V. Table V (1) shows the results of regression coefficients of TMT's marketing functional background *TMT_Mkt* is positive at 1 percent significance level, indicating that the higher the proportion of executives with marketing functional background is, the more applications of trademark the company takes after controlling for other factors that affect the company's trademark application number, and the marketing functional background of executives has a promoting effect on the trademark application behavior of the company. In terms of control variables, the regression coefficient of TMT's age, *TMT_Age*, is significant negative, and TMT's salary, *TMT_Salary*, and shareholding ratio, *TMT_Shr*, are significant positive, indicating that the smaller the age of TMT members is and the higher the salary and shareholding ratio are, the higher the number of company trademark applications are. Sales, R&D expenditure and sales expense is significant positively correlated with the number of trademark applications, indicating that higher sales, R&D expenditure and sales expense can promote the output of corporate trademarks, which is consistent with the research result of Faurel *et al.* (2017).

The company's trademark application behavior may have continuity, that is, the number of trademark applications in the current period will be greatly influenced by the number of

Year	Sample size	Mean of <i>Trdmk</i>	Year	Sample size	Mean of <i>Trdmk</i>
2008	658	4.047	2012	1,436	5.629
2009	761	4.067	2013	1,491	5.970
2010	1,108	5.876	2014	1,496	6.447
2011	1,330	5.171	2015	1,776	8.333

Table III.
Annual number of
trademark
applications

Table IV.
Correlation coefficient

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. <i>LnTrdnk</i>	1.00												
2. <i>TMT_Mkt</i>	0.15*	1.00											
3. <i>TMT_Fnl</i>	0.01	0.00	1.00										
4. <i>TMT_Tenure</i>	0.03*	0.06*	-0.09*	1.00									
5. <i>TMT_Degree</i>	0.05*	0.04*	-0.09*	0.05*	1.00								
6. <i>TMT_Age</i>	-0.08*	-0.11*	-0.14*	-0.11*	0.06*	1.00							
7. <i>TMT_Salary</i>	0.17*	0.14*	-0.04*	0.21*	0.31*	0.19*	1.00						
8. <i>TMT_Shr</i>	0.07*	0.08*	0.08*	-0.04*	-0.12*	-0.15*	-0.05*	1.00					
9. <i>Sales</i>	0.12*	0.08*	-0.16*	0.14*	0.25*	0.28*	0.44*	-0.26*	1.00				
10. <i>R&D</i>	0.10*	0.16*	0.04*	0.09*	0.08*	-0.13*	0.07*	0.24*	-0.30*	1.00			
11. <i>SalesExp</i>	0.26*	0.11*	0.06*	0.04*	0.02*	-0.09*	0.03*	0.09*	-0.20*	0.23*	1.00		
12. <i>Lev</i>	-0.07*	-0.09*	-0.11*	-0.01	0.14*	0.13*	0.04*	-0.31*	0.43*	-0.39*	-0.23*	1.00	
13. <i>Size</i>	0.10*	0.04*	-0.15*	0.18*	0.31*	0.31*	0.46*	-0.27*	0.89*	-0.24*	-0.18*	0.42*	1.00

Note: *Means the significance level of 5 percent

Variable	(1) <i>LnTrdmk</i>	(2) <i>LnTrdmk</i>	(3) <i>TrdmkDum</i>	(4) <i>TrdmkKinds</i>
<i>TMT_Mkt</i>	0.305*** (3.125)	0.173** (2.468)	0.605*** (3.268)	0.621*** (2.953)
<i>LLnTrdmk</i>		0.441*** (21.513)		
<i>TMT_Fml</i>	0.010 (0.092)	0.034 (0.408)	-0.029 (-0.120)	-0.010 (-0.039)
<i>TMT_Tenure</i>	-0.009 (-0.846)	-0.008 (-0.962)	0.001 (0.028)	-0.016 (-0.675)
<i>TMT_Degree</i>	-0.012 (-0.344)	-0.002 (-0.092)	-0.036 (-0.471)	-0.141 (-1.583)
<i>TMT_Age</i>	-0.034*** (-6.256)	-0.021*** (-5.274)	-0.071*** (-6.280)	-0.062*** (-5.034)
<i>TMT_Salary</i>	0.150*** (4.891)	0.082*** (3.553)	0.223*** (3.330)	0.196*** (2.908)
<i>TMT_Shr</i>	2.660*** (3.749)	1.872*** (3.368)	5.357*** (4.207)	3.745*** (2.699)
<i>Sales</i>	0.144*** (5.157)	0.102*** (4.970)	0.345*** (5.015)	0.129* (1.799)
<i>R&D</i>	2.318*** (4.096)	1.644*** (4.156)	4.792*** (4.995)	1.810** (2.156)
<i>SalesExp</i>	3.000*** (8.814)	1.830*** (7.810)	4.843*** (8.404)	3.150*** (6.617)
<i>Lev</i>	-0.132 (-1.506)	-0.084 (-1.356)	-0.639*** (-2.852)	-0.567** (-2.266)
<i>Size</i>	0.048 (1.469)	0.019 (0.758)	0.025 (0.335)	0.341*** (3.979)
<i>YrDum</i>	Y	Y	Y	Y
<i>InduDum</i>	Y	Y	Y	Y
Constant	-3.317*** (-6.321)	-2.037*** (-5.349)	-7.310*** (-7.213)	-7.874*** (-7.268)
Observations	10,056	7,728	10,054 ^a	10,056
Adjusted R ² /Pseudo R ²	0.184	0.341	0.1353	0.341

Notes: Robust *t*-value in brackets of Columns (1) and (2), robust *z*-value in brackets of Columns (3) and (4). Use company-level clustering robust standard errors. When the industry dummy variables are added to the model, the regression coefficient of industry C43 is negative infinity and cannot be estimated. Therefore, two samples of industry C43 have to be deleted to estimate the coefficients. ^aThe reason why the sample size of Logit regression is less than 10,056 is that there are only two samples in the metal products and machinery and equipment repair industry (C43), and *TrdmkDum* of those two samples is equal to 1. *, **, ***Significant of 10, 5 and 1 percent levels, respectively

Table V. Executive marketing functional background and company trademark application

trademark applications in the previous period. Thus, in order to control the influence of the continuity of trademark application behavior on the relationship between the marketing functional background of TMT and the number of trademark applications of company, the number of previous trademark applications, *LLnTrdmk*, is added in Model (1). Table V (2) shows the regression coefficient of TMT's marketing functional background, *TMT_Mkt*, is positive at 5 percent significance level, and the regression coefficient of trademark applications, *LLnTrdmk*, in the previous period is positive at 1 percent significance level, indicating that TMT's marketing functional background still have a significant promoting effect on trademark application behavior of the company after controlling the correlation of trademark application number in time dimension.

Table V (3) and (4) show the results of Logit and Poisson regression of the dependent variables of whether the company applies for trademark registration and the number of trademark types applied. The results show that no matter whether dummy variable that the company applies for trademark registration, *TrdmkDum* or trademark type number that the company applies for, *TrdmkKinds*, is as dependent variable, the regression coefficient of *TMT_Mkt* is positive at 1 percent significance level, indicating that the higher the proportion of executives with marketing functional background is, the greater the possibility of the company applying for trademark registration, the more abundant the trademark type applied by the company is, and the marketing functional background of executives has a promoting effect on the company's trademark application behavior.

5.3 Further research

The research results showed above indicate that the marketing functional background of executives has a promoting effect on the trademark application of company. The further

research question is what circumstances this promoting effect will be strengthened or weakened. Based on the prior analysis, this research further examines whether the influence of the marketing functional background of TMT on the number of trademark applications of company is more significant in non-state-owned enterprises than state-owned enterprises. Then, it examines whether the influence of the marketing functional background of TMT on the number of trademark applications is more significant in the companies with more patents than those with less patents. Finally, it examines whether the influence of the marketing functional background of TMT on the number of trademark applications of the company is more significant in the company whose CEO has marketing functional background than those whose CEO does not have marketing functional background.

Table VI shows the test results for *H2-H4*. The results show: the positive correlation between the marketing functional background of TMT and the number of trademark applications of the company is only significant in the sample of non-state-owned enterprises ($SOE = 0$) (significance level is 1 percent). *TMT_Mkt* regression coefficient of the sample of state-owned enterprises ($SOE = 1$) is positive, but not significant; *TMT_Mkt* regression coefficient of the sample with more patent output ($Patent = Many$) and the sample with less patent output ($Patent = Few$) is positive at the 5 and 10 percent significance level, respectively; the regression coefficient of the former (0.333) is greater than the latter (0.196), indicating that positive correlation between TMT's marketing functional background and the trademark application of the company is more significant in the case of more patent output; *TMT_Mkt* regression coefficient of the sample whose CEO has marketing functional background ($CEO_Mkt = 1$) and the sample whose CEO does not have marketing functional background ($CEO_Mkt = 0$) are positive at 5 and 10 percent significance level respectively; the regression coefficient of the former (0.496) is twice more than the latter (0.201), indicating that compared with the company whose CEO does not have the market marketing functional background, TMT marketing functional background on the company's trademark application is more significant when the company's CEO has marketing functional background. The above results support the hypotheses *H2-H4* of this research, indicating that the positive influence of TMT's marketing functional background on the company's trademark application behavior is stronger when TMT can play a greater role, the company has stronger innovation ability and TMT has better collaboration[2].

5.4 Robust test

The robustness of the research results is tested by using lag independent variables, Poisson regression, two-stage regression, matched samples, changing measurement of independent variables and considering the distribution of trademark registration samples and the influence of the changes of TMT members within one year.

The results of Panel A (1) in Table VII show that the regression coefficient of marketing functional background of TMT is significant positive at the level of 5 percent when the independent variables are lagged by one period, indicating that the higher the proportion of executives with marketing functional background in TMT is, the higher the number of future trademark applications of the company is. Since the number of trademark applications of the company is discrete counting data, the main test takes natural logarithm of the number of trademark applications plus one to transform it into a continuous variable, and then uses the least square method to conduct regression on Model (1). Panel A (2) in Table VII shows the results of Poisson regression fitting Model (1) with the original count data of trademark application number as the dependent variable. The results show that the regression coefficient of TMT's marketing functional background is significant positive at the level of 1 percent, indicating that the positive correlation between the marketing functional background of TMT and the number of trademark applications is not influenced by the regression methods.

Variable	(1) SOE = 1	(2) SOE = 0	(3) Patent = Many	(4) Patent = Few	(5) CEO_Mkt = 1	(6) CEO_Mkt = 0
TMT_Mkt	0.271 (1.562)	0.326*** (2.780)	0.333** (2.328)	0.196* (1.857)	0.496** (2.222)	0.201* (1.668)
TMT_Fml	-0.222 (-0.973)	0.089 (0.700)	0.146 (0.873)	-0.027 (-0.210)	-0.119 (-0.466)	-0.007 (-0.055)
TMT_Tenure	0.011 (0.601)	-0.016 (-1.263)	-0.031** (-1.973)	0.002 (0.210)	0.016 (0.618)	-0.016 (-1.502)
TMT_Degree	-0.045 (-0.680)	0.016 (0.369)	0.032 (0.653)	-0.083** (-2.118)	-0.184** (-2.154)	0.034 (0.952)
TMT_Age	-0.044*** (-4.075)	-0.025*** (-4.008)	-0.035*** (-4.474)	-0.032*** (-5.002)	-0.043*** (-3.558)	-0.033*** (-5.687)
TMT_Salary	0.131*** (2.761)	0.134*** (3.510)	0.144*** (3.118)	0.120*** (3.606)	0.219*** (3.364)	0.131*** (4.000)
TMT_Str	11.169 (1.383)	2.642*** (3.621)	2.681*** (2.887)	2.594*** (2.956)	2.415* (1.740)	2.746*** (3.485)
Sales	0.132*** (3.079)	0.165*** (4.479)	0.245*** (3.932)	0.060*** (2.344)	0.175*** (2.694)	0.140*** (4.770)
R&D	2.628** (2.263)	2.360*** (4.011)	2.344*** (2.954)	2.045*** (3.101)	4.844*** (4.141)	1.443** (2.304)
SalesExp	3.229*** (4.082)	2.954*** (8.007)	4.090*** (7.348)	2.056*** (6.242)	2.739*** (4.324)	3.053*** (7.929)
Lev	-0.052 (-0.380)	-0.170 (-1.481)	-0.195 (-1.024)	-0.050 (-0.630)	-0.197 (-0.911)	-0.157* (-1.708)
Size	0.040 (0.813)	0.081* (1.894)	-0.023 (-0.382)	0.099*** (2.971)	0.113 (1.491)	0.028 (0.833)
YrDum	Y	Y	Y	Y	Y	Y
IndulDum	Y	Y	Y	Y	Y	Y
Constant	-2.236*** (-2.821)	-4.691*** (-6.203)	-3.434*** (-3.639)	-2.368*** (-4.539)	-5.522*** (-4.635)	-2.723*** (-5.048)
Observations	3,287	6,769	4,828	5,228	2,114	7,942
Adjusted R ²	0.238	0.169	0.221	0.163	0.227	0.175

Notes: Robust *F*-value in brackets. Use company-level clustering robust standard errors. ***, **, * Significant at 10, 5 and 1 percent levels, respectively

Table VI.
Further studies

Table VII.
Robust tests

Variable	(1) Use lags of independent variables	(2) Poisson regression	(3) Number of executives with functional background	(4) Matched samples without trademark application	(5) Delete samples without trademark application	(6) Zero-inflated Poisson model	(7) <i>TradmkDum</i>	(8) <i>LnTradmk</i>
<i>TMT_Mkt</i>	0.273*** (2.359)	1.032*** (3.435)	0.068*** (4.390)	0.083* (1.709)	0.616** (2.246)	0.761*** (2.797)		0.298*** (3.094)
<i>TMT_Mkt_N</i>								
<i>TMT_Mkt_D</i>								
<i>ProbTradmk</i>								
<i>TMT_Fnl</i>	0.147 (1.154)	-0.239 (-0.726)	0.016 (0.141)	0.140 (0.790)	-0.240 (-0.836)	-0.223 (-0.776)		2.681*** (11.697)
<i>TMT_Tenure</i>	-0.013 (-1.089)	-0.051* (-1.647)	-0.003 (-0.282)	-0.019 (-1.164)	-0.061** (-2.214)	-0.060** (-2.213)		0.005 (0.047)
<i>TMT_Degree</i>	0.034 (0.856)	-0.064 (-0.588)	-0.011 (-0.317)	-0.007 (-0.126)	-0.018 (-0.205)	0.013 (0.143)		-0.010 (-0.986)
<i>TMT_Age</i>	-0.035*** (-5.588)	-0.096*** (-5.279)	-0.033*** (-6.075)	-0.024*** (-3.017)	-0.055*** (-3.389)	-0.059*** (-3.535)		-0.022 (-0.629)
<i>TMT_Salary</i>	0.146*** (4.194)	0.360*** (4.112)	0.148*** (4.893)	0.132*** (2.929)	0.237*** (2.971)	0.311*** (3.838)		-0.033*** (-6.115)
<i>TMT_Shr</i>	3.145*** (3.878)	4.968*** (2.927)	2.835*** (3.988)	2.439** (2.232)	2.489 (1.623)	2.543 (1.631)		0.136*** (4.563)
<i>Sales</i>	0.165*** (4.990)	0.288*** (3.230)	0.133*** (4.756)	0.092** (2.186)	0.104 (1.230)	-0.234*** (-8.328)	0.325*** (10.302)	2.787*** (3.982)
<i>R&D</i>	1.884*** (2.842)	3.581*** (3.577)	2.104*** (3.754)	1.792** (2.038)	1.187 (1.333)	-6.034*** (-7.515)	6.492*** (6.809)	
<i>SalesExp</i>	3.189*** (8.208)	4.167*** (6.553)	2.926*** (8.625)	2.755*** (5.890)	2.466*** (4.012)	-6.403*** (-11.223)	5.352*** (9.243)	
<i>Lev</i>	-0.194** (-2.016)	-0.615* (-1.762)	-0.140 (-1.622)	-0.170 (-1.549)	-0.260 (-0.774)	-0.293 (-0.956)		-0.123 (-1.521)
<i>Size</i>	0.031 (0.781)	0.320*** (3.248)	0.040 (1.226)	0.085* (1.681)	0.318*** (3.662)	0.385*** (7.513)		0.047** (2.067)
<i>YrDum</i>	Y	Y	Y	Y	Y	Y	Y	Y
<i>InddDum</i>	Y	Y	Y	Y	Y	Y	Y	Y
Constant 1	-3.424*** (-5.677)	-10.435*** (-7.791)	-2.983*** (-5.875)	-3.595*** (-5.055)	-6.271*** (-5.257)	-6.270*** (-5.163)	-7.163*** (-10.246)	-1.283** (-2.447)
Constant 2						6.429*** (10.602)		
Observations	7,728	10,056	10,056	2,116			10,054	10,054
Adjusted R ²	0.194		0.190	0.181			0.116	0.193
Pseudo R ²								
Panel B: take TMT members change into consideration								
	(1)	(2)	(3)	(4)	(5)			
Variable	<i>LnTradmk</i>	<i>LnTradmk</i>	<i>LnTradmk</i>	<i>LnTradmk</i>	<i>LnTradmk</i>			
<i>TMT_Mkt</i>	0.305*** (3.124)	0.277** (2.357)	0.337*** (2.887)	0.305*** (3.124)				
<i>TMT_Chg</i>	0.002 (0.074)							
<i>TMT_ChgP</i>								
<i>TMT_Mkt_Chg</i>	0.010 (0.091)	-0.031 (-0.245)	0.026 (0.181)	-0.050 (-1.470)	0.040** (2.000)			
<i>TMT_Fnl</i>	-0.008 (-0.803)	-0.013 (-1.008)	-0.001 (-0.054)	0.011 (0.096)	0.004 (0.039)			
<i>TMT_Tenure</i>				-0.013 (-1.209)	-0.003 (-0.300)			

(continued)

<i>TMT_Degree</i>	-0.012 (-0.347)	0.016 (0.407)	-0.043 (-0.928)	-0.011 (-0.300)	-0.013 (-0.379)
<i>TMT_Age</i>	-0.034*** (-6.260)	-0.034*** (-5.616)	-0.035*** (-4.927)	-0.034*** (-6.236)	-0.036*** (-6.612)
<i>TMT_Salary</i>	0.150*** (4.873)	0.161*** (4.541)	0.136*** (3.445)	0.148*** (4.811)	0.157*** (5.093)
<i>TMT_Shr</i>	2.662*** (3.737)	2.704*** (3.097)	2.772*** (3.301)	2.624*** (3.699)	2.770*** (3.912)
<i>Sales</i>	0.144*** (5.155)	0.137*** (4.192)	0.150*** (4.282)	0.144*** (5.156)	0.152*** (5.423)
<i>R&D</i>	2.317*** (4.096)	2.502*** (3.653)	2.038*** (3.135)	2.320*** (4.096)	2.343*** (4.136)
<i>Sales:Exp</i>	2.999*** (8.811)	3.279*** (8.935)	2.506*** (5.812)	3.004*** (8.822)	3.038*** (8.911)
<i>Lev</i>	-0.132 (-1.509)	-0.161 (-1.575)	-0.090 (-0.827)	-0.130 (-1.484)	-0.146* (-1.679)
<i>Size</i>	0.048 (1.467)	0.040 (1.073)	0.067 (1.578)	0.049 (1.483)	0.042 (1.282)
<i>YrDum</i>	Y	Y	Y	Y	Y
<i>IndDum</i>	Y	Y	Y	Y	Y
Constant	-3.318*** (-6.319)	-3.291*** (-5.515)	-3.441*** (-5.229)	-3.294*** (-6.275)	-3.314*** (-6.286)
Observations	10,056	6,091	3,965	10,056	10,056
Adjusted R ²	0.184	0.191	0.181	0.185	0.183

Notes: Robust *t*-*z*-value in brackets. Use company-level clustering robust standard errors. *, **, ***, Significant of 10, 5 and 1 percent levels, respectively

Table VII.

Panel A (3) and (4) in Table VII, respectively, show the regression results of the number of executives with marketing functional background and using the dummy variable of executives with marketing functional background in TMT as independent variables. In order to further control the influence of company size, industry and year, the sample of 2,504 TMTs with the executives having no functional background in marketing is matched with the sample of 7,552 TMTs with executives having marketing functional background in terms of company size, industry and year, and the matched samples are used to examine whether the company's trademark output is more when the company's TMT has a functional background in marketing. The results show that the regression coefficient of *TMT_Mkt_N* is significant positive at the level of 1 percent, and the regression coefficient of the dummy variable of executives with marketing functional background, *TMT_Mkt_D*, is significant positive at the level of 10 percent, indicating that the results of this research are not influenced by the measurement methods of independent variables.

Since there are more than half of the samples that do not apply for trademark registration, robust test deletes the samples that do not apply for trademark registration, and uses the zero-inflated Poisson Model to test whether the sample distribution influences the results. The results of Panel A (5) and (6) in Table VII show that the regression coefficient of *TMT_Mkt* is positive at least 5 percent significance level when the samples that do not apply for trademark registration are deleted and the zero-inflated Poisson Model is used, indicating that the results are not influenced by the distribution of the samples. This research adopts all listed companies rather than the listed companies applying for trademark registration as the research sample, because trademark and brand management and product and service innovation are crucial strategic decision for all companies, and if the sample is limited to the trademark application sample, it may weaken the reference value to the samples without trademark application.

This research uses two-stage regression to examine the effect of endogeneity on the results of this research. According to Faurel *et al.* (2017), we select the influential factors of the number of trademark applications including *Sales*, *R&D* and *SalesExp*, and control the influence of industry and year, with the Logit Model to estimate the probability of sample trademark applications, *ProbTrdmk*. Then *ProbTrdmk* and other independent variables as well as control variables are used for the regression of *LnTrdmk*. The results of Panel A (8) in Table VII show that the marketing functional background of executives still has a significant positive effect on the company's trademark application behavior after considering the influential factors of the company's trademark application decision.

In order to examine the impact of personnel changes in TMT within one year on the results of the research, we adopt the following methods to conduct robust test. Add the dummy variable *TMT_Chg*, whether the members of TMT change in one accounting year into the model: if new members of TMT join or quit, the variable is 1; otherwise, the variable is 0. Divided the sample into two groups according to whether TMT members change during an accounting year, and the relationship between the proportion of executives with marketing functional background and the number of trademark applications in the two groups is tested respectively. Add the change proportion of TMT members into the model, *TMT_ChgP*: the number of executives who join or quit TMT during one year divided by the total number of TMT members in the same year. The change ratio of TMT members, *TMT_ChgP*, multiplied by the proportion of executives with marketing functional background, *TMT_Mkt*, construct new variable *TMT_Mkt_Chg* as independent variable, which is equivalent to weighting whether TMTs change on the proportion of executives with marketing functional background to consider the effect of the changes in TMT members.

Panel B in Table VII shows the regression results. The results show that whether to add the variables in the model to control the change of TMT members or to conduct group regression according to whether TMT members change, or to weight whether TMTs change on the proportion of executives with marketing functional background, the regression

coefficients of the dependent variable, *TMT_Mkt* and *TMT_Mkt_Chg*, are positive at least 5 percent significance level, indicating that TMT's marketing functional background still has a positive influence on the company's trademark and brand management after considering the changes in TMT members.

6. Conclusion and discussion

6.1 Research conclusion

This research uses the data of registered trademark application of listed companies in China to investigate the influence of TMT's marketing functional background on trademark and brand management behavior of the company for the first time. Taking Shanghai and Shenzhen A-share listed companies of non-financial industries from 2008 to 2015 as samples, this research finds that the higher the proportion of executives with marketing functional background in TMT is, the larger the number of trademark applications of the company is, indicating that TMT's marketing functional background has a positive correlation with the company's trademark application. Further research shows that the positive influence of TMT's marketing functional background on the number of the company's trademark application is more significant in the non-state enterprises and the sample companies with larger patent output and whose CEO has the marketing functional background, indicating that the promoting effect of TMT's marketing functional background on the number of the company's trademark applications is stronger when TMT can play a greater role, the company's innovation ability is stronger, and the coordination of TMT is better.

6.2 Theoretical contribution and practical significance

The theoretical contributions of this research are mainly in the following three aspects. First, in the field of brand marketing research, this research discusses the influencing factors of trademark and brand management behavior of the company for the first time. The idea that visual elements such as trademark, product packaging, advertisement, and so on can convey brand image and symbolic meaning has been widely recognized by marketers and brand managers (Karjalainen and Snelders, 2010; Orth and Malkewitz, 2008). The reason why companies do not hesitate to heavily invest in trademark is that trademark can effectively influence consumers' purchasing decisions (Jun *et al.*, 2008; Müller *et al.*, 2013). However, there are few preliminary studies investigating which factors will influence the company's trademark and brand management strategy. This research shows that TMT's marketing functional background has a promoting effect on the company's trademark and brand management behavior, which enriches the research on the influencing factors of brand marketing. Second, this research examines trademark application behavior as the breakthrough point of the company's brand management strategy, showing that TMT's marketing functional background has a positive influence on the company's trademark application, indicating that the trademark application behavior also has other meanings than product or service innovation, which is different from most of the western literatures which takes trademark as a measure for product or service innovation (Faurel *et al.*, 2017; Hsu *et al.*, 2017; Li, 2016; Potepa and Welch, 2017). Thus, this research explores the company's trademark application behavior from a new perspective, which is an extension of the research on trademark and brand. Finally, this research combines marketing theory with upper echelon theory to verify the influence of top management's functional background on important organizational output and to supplement relevant literatures on corporate brand management and upper echelon theory.

In addition to the above theoretical contributions, this research has the following practical significance. The United States has 227 brands listed in the 2016 World Top 500 Brand, continuing to maintain the brand-strong status. China only has 36 brands listed in the Top 500. As a country with 1.3bn people and the world's second largest economy, Chinese brand

building requires more efforts and investment. Compared with those who struggle to establish independent brands, the threshold for OEM production is relatively low. In the early stage of development, with the advantage of low cost, Chinese enterprises entered the OEM production and temporarily gained a place in the market competition. However, with the increase of energy and raw material price as well as the sharp rise of labor cost, the past development model relying on low cost, less profit, high energy consumption and high pollution is no longer sustainable. The structural upgrading and transformation from “made in China” to “created in China” and the independent brand building are the only way to achieve sustainable development. This research shows that TMT’s marketing functional background has a significant positive effect on the company’s trademark and brand management, providing a reference for the company’s trademark and brand building from the perspective of an important human resource, that is, executives and TMT.

6.3 Research limitations and prospect

The limitations of this research mainly include the following aspects. First, the sample of this research is listed companies in China, whose size is relatively larger than that of non-listed companies. Thus, whether the conclusions of this research are applicable to non-listed companies remains to be further tested. Second, after adding the number of trademark applications in the previous period into the model, the regression coefficient of TMT’s marketing functional background is larger in the sample group whose CEO has marketing functional background, but it is not significant. The reason for this may be that after adding time-delay terms, the size of the sample whose CEO has marketing functional background loses nearly 20 percent, which may have an impact on the test efficiency. Krasnikov *et al.* (2009) divide trademark into brand identification and brand association. Trademarks of brand identification are directly related to brand name, while trademarks of brand association contain a lot of content and are relatively weak in brand reflection. Thus, in the future research, it can further examine whether the marketing functional background of TMT has different impacts on the number of trademark application of these two types.

Notes

1. Dearborn and Simon (1958) let middle managers read a vague business case, and then identify the main problems faced by the case companies. In their samples, production managers tend to raise production issues, while sales managers tend to raise sales issues.
2. Considering that the company’s trademark application behavior may have continuity, we also add the number of trademark application in the previous period in the further research. After the addition of lag terms, the regression coefficient of *TMT_Mkt* is still larger and more significant in the sample group of state-owned enterprises or more patent output. The regression coefficient of *TMT_Mkt* is larger but not significant in the sample group whose CEO has marketing functional background. The reason for this result may be that the sample size of the sample group whose CEO has marketing functional background reduces from 2,114 to 1,696 after adding time-delay terms, which may influence the test efficiency.

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