



Impact of corporate entrepreneurial strategy on firm performance in China

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Abstract

Implementing corporate entrepreneurial (CE) strategies is a panacea for established firms achieving high performance and gaining sustained competitive advantage in a fast-changing business environment. This paper investigates the effects of CE strategy on firm performance at both overall and individual sub-category (investing in R&D, brand equity, organisational capital and human capital) levels with Chinese listed companies over the period 2010 to 2018. The empirical results indicate two points. (1) Adopting CE strategies has a positive effect on firm performance. When investigating the influence of the specific sub-category, only investing in R&D and human capital influences firm performance significantly, while the effects of investing in brand equity and organisational capital are insignificant. (2) The effects of CE strategy and its sub-categories on firm performance exist heterogeneity across firm ownership and industry context. Specifically, the effect of CE strategy in state-owned (manufacturing) firms is larger than that in privately-owned (service) firms; state-owned firms' performance is driven by R&D investment, while privately-owned firms' performance is driven by R&D and human capital investment; manufacturing firms' performance is driven by R&D and brand equity investment, while service firms' performance is driven by human capital investment.

Keywords Corporate entrepreneurial strategy · Firm performance · Heterogeneity · China

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Introduction

It is an essential issue how established firms achieve high performance and gain sustained competitive advantage in a fast-changing business environment. Some studies suggest that implementing corporate entrepreneurial (CE) strategies can be a panacea (Covin and Miles 2007; Ireland et al. 2009; Bierwerth et al. 2015; He et al. 2019). Covin and Miles (2007), for example, find that firms that embrace entrepreneurship as core to their strategies will outperform those that do not over the long run. Ireland et al. (2009) propose a CE strategy model and illustrate that the exploitation of entrepreneurial opportunities is positively related to the strength of the organisation's competitive capability. Bierwerth et al. (2015) find that the pursuing of corporate entrepreneurship positively influences overall, subjective and objective firm performance by using a meta-analysis. He et al. (2019) point out that entrepreneurship is one of the key driving forces of sustained economic development in China. Despite the widespread acknowledgement of the contribution of CE strategies to firm performance, Mckenny et al. (2018) point out that firms may intentionally emphasise different aspects of entrepreneurship. Obviously, adopting different CE strategy matrixes has different performance implications, which means that the impact of CE strategies on firm performance could be very complex. Therefore, despite the growing amount of literature, research specifying distinctive categories of CE strategies on firm performance is still insufficient.

Although CE strategy is a multidimensional firm-level concept (Simsek and Heavey 2011), the elements and characters of which are still elusive, a widely recognised consensus is that the existence of a CE strategy implies that a firm's strategic intent is to continuously and deliberately leverage entrepreneurial opportunities for growth – and advantage-seeking purposes by means of strategic renewal, innovation and corporate venturing (Ireland et al. 2009; Kuratko et al. 2015; Kreiser et al. 2019). Consistent with this view, this paper treats the firms' strategic choices in investing intangible assets, specifically, investing in R&D, brand equity, organisational capital and human capital, as CE strategy, which allows firms to invent new products, renewing organisation capital, and exploiting the distribution network (Cucculelli and Bettinelli 2015; Ireland et al. 2001). The importance of intangible assets, which are usually regarded as a firm's strategic resource for entrepreneurship, has been confirmed in the fields of both strategic management and entrepreneurship (Al-Jinini et al. 2019; Ireland et al. 2001; Alvarez and Busenitz 2001; Barney 2001; Wiklund and Shepherd 2003). However, as pointed by Alvarez and Busenitz (2001), resource is the basic unit of analysis in entrepreneurship theory, which mainly focuses on the heterogeneity in beliefs about the value of resources. The investment behaviours in intangible assets fully reflect the firm's beliefs about the value of resources. This links to the characteristics of intangible assets (R&D, brand equity, organisational capital and human capital) investigated in this work, which have emerged as an essential role for entrepreneurial firms to identify new opportunities and become pioneers ahead of their competitors (Wales 2016; Pitelis and Teece 2010). It is reasonable to treat those investments as CE strategy.

As a firm's intangible assets take many forms and emphases, how much these kinds of entrepreneurial strategic investment really matter, and under what conditions this effect should be better exploited. In order to achieve corporate entrepreneurship successfully, firms have to trade off in configurations of resources in order to

accumulate different forms of assets simultaneously. If firms only focus on investing one specific asset, this can result in abandoned investments in other assets, and thus inability to transfer these investments into competitive advantages efficiently (Andersen 2011). However, a substantial literature studies the specific assets in isolation, or regards intangibles as a whole. This study contributes to the literature by simultaneously investigating empirical effects of investing in a comprehensive set of intangible assets defined as CE strategy on firm performance in China. An unbalanced panel model of annual micro-data of Chinese listed companies over the period 2010 to 2018 is constructed to evaluate the effect of both overall construct and individual category of CE strategy on firm performance.

It is worth noting that the contextual factors would change the degree or nature of the entrepreneurship-performance relationship (Anderson and Eshima 2013). This study also investigates the influence of two potential contextual factors: firm's ownership (state-owned vs. privately-owned) and industry context (manufacturing vs. service) on the relationship between entrepreneurial strategies and firm performance. Different types of ownership may influence entrepreneurial behaviour. In the case of the largest transition economy in the world, China, state-owned enterprises (SOEs) always get easier access to financial support and can tolerate consequences of risky entrepreneurial behaviours more compared to privately-owned enterprises (POEs). When it comes to the industry context, services are intangible, difficult to standardise and inseparable in production and consumption compared to goods of the manufacturing sector; such difference leads to different managerial challenges (Vomberg et al. 2015), thus affects a firm's entrepreneurial behaviours.

Different from most existing literature in the field of entrepreneurship which measures CE strategy or the synonymous concept of entrepreneurial orientation (EO) by examining the psychometric properties and gathering data through questionnaire surveys, this paper provides an alternative measurement with objective expenditure on intangibles inspired by the macro approach of Corrado et al. (2005). Such measurement can effectively alleviate response bias due to the adoption of subjective metrics in psychometric methods (Bontis 2001; Chareonsuk and Chansa-ngavej 2010). As firms' executives are subject to constant pressure to demonstrate results with any strategic direction (Kuratko et al. 2015), the actual impact of CE strategies should be measured precise. Our results with objective data could offer specific guidance for implementation of CE strategies in practice.

The second contribution is providing empirical evidence of the relationship between CE strategies and firm performance in a transition economy such as China. Despite the recent expansion in CE research, empirical knowledge about corporate entrepreneurial behaviour in transition economy still warrant deeper understanding (He et al. 2019; Bruton et al. 2013), as the institutional characteristics are quite different from a developed economy. In particular, this study introduces the contextual factor, firm ownership, which represents a unique institutional factor in China (Peng and Luo 2000; Tang et al. 2007; Chang et al. 2019). In the background of China's new national economic development strategies, 'mass entrepreneurship and innovation', our empirical results provide important implications for further policy making in simulating existing ventures' entrepreneurial activities.

The remainder of this paper is structured as follows. Section 2 conducts a literature review, then proposes the hypothesis. Section 3 describes the data source, proxy's

construction and econometric methodology. Section 4 discusses the empirical results and section 5 summarises the main findings and discusses the policy implications.

Literature reviews and hypotheses

Relationship between CE strategy and firm performance

Corporate entrepreneurship, a firm-level entrepreneurship, focuses on those organisational characteristics and behaviours aimed at innovation and strategic renewal. Implementing strategies for CE requires ‘change in the pattern of resource deployment of creation of new capabilities to add new possibilities for positing markets’ (Kazanjian et al. 2017). According to this viewpoint, investing in intangible assets could be thought of as the important part of CE (Pitelis and Teece 2010). Resource-based view (RBV) regards intangible assets as the potential strategic resources of a firm which are valuable, rare, inimitable and non-substitutable, thus investing intangible assets to help a firm gain comparative advantages and outperformance (Barney 2001). Knowledge-based view (KBV) acknowledges that specific knowledge converted into intangible assets is the basis for firm innovation (Teece 1998). That is, a firm can leverage resource and knowledge in its innovation and venturing to enhance its performance during intangible assets’ generation processes.

Instead of focusing on overall contents, this paper mainly focuses on firms’ investments in R&D, brand equity, organisational capital and human capital. Erickson and Jacobson (1992) claim that investing in R&D and brand equity are means by which entrepreneurial behaviours can be carried on and new products and services invented and commercialised. This study argues that investing in organisational capital and human capital are another two essential strategic choices for new products and services inventing and commercialising, as the former refers to business processes, management structures and organisational systems specifically designed to maximise return on investment, and the latter refers to employees’ knowledge, skills, experiences, capabilities, and know-how (Al-Jinini et al. 2019).

A firm allocating resources to investment in R&D activities pursues incremental or radical innovation (O’Cass and Sok 2014), which enhance the discovery and exploitation of opportunities, and become pioneers ahead of their competitors. First, R&D activities positively affect knowledge spillovers and the number of entrepreneurial opportunities. Second, R&D activities generating new knowledge could lead to a technological breakthrough that represents an opportunity generating commercial value. Thirdly, R&D activities enable firms to successfully improve existing products and services, develop new products and services, and recognise new markets (Krzeminska and Eckert 2016), which in turn creates new profit opportunities that would not otherwise be available for exploitation. Finally, R&D activities increasing firms’ stock of technological capital are able to respond quickly when competitors make advancements (Cohen and Levinthal 1990). All these opportunities ultimately could generate the economic impact and enable firms to achieve innovation performance superior to their rivals.

A firm expends considerable resources and effort to build strong brands with the result that accumulating brand equity will assist them in achieving a competitive

advantage in the marketplace, thereby positively affecting performance (Wang and Sengupta 2016). First, brand equity can be summarised as consumers' knowledge, perceptions and awareness of the products and services produced by a firm. With branding effort, firms establish a dialogue and relationships with consumers. Through the dialogue, firms could increase customers' brand awareness and loyalty, and deliver value and benefits of product/service innovation for customers. Meanwhile, consumers' feedback enables detection of market changes and trends more adeptly, which makes them more capable of identifying new venturing opportunities in rapidly changing environments and achieving innovative performance (Hsieh et al. 2007). Second, branding efforts are represented by the inherent innovative nature. Entrepreneurs are creative in leveraging and stretching limited resources to implement brand strategies to differentiate a product or service from competitors. Third, branding efforts cannot be successful without efficient organisational management and product innovation. In other words, branding efforts facilitate product-related and administrative improvements, which in turn aid the process of strategic renewal. Taken together, investing in brand equity generates comparative advantages and a sustained price premium, and thus enhances firm performance (Steenkamp 2014).

A firm investing in organisational capital intends to create business processes, management structures and organisational systems to better suit its new strategic vision. As stated by Teece (2016), a firm's production possibilities may depend endogenously on management determined variables such as governance modes and organisational structures, as well as on the quality of the firm's supply of managerial knowledge. Before inventing new products or services and exchanging them in the market, much organising should be undertaken. An appropriate organisational system or routine can facilitate the manipulation of resources into value-creating strategies related to new products, markets/customer groups, or technologies (Wiklund and Shepherd 2003). In addition, organisational renewal enables better align firms' strategies with external environments and diversifies their ability to react to threats and opportunities, and thus obtains competitive advantages (Bierwerth et al. 2015; Al-Jinini et al. 2019). Idiosyncratic organisational capital developed over time makes them hard for rivals to imitate, which plays a pivotal role in explaining firm performance.

Human capital refers to knowledge, skills, experiences, capabilities, and know-how embodied in employees, which have been widely acknowledged to have a positive effect on firm performance (Ployhart and Moliterno 2011). Along this line of research, entrepreneurship literature also provides a number of arguments on how human capital contributes to entrepreneurial success (Unger et al. 2011). First, investing in human capital would assist in the accumulation of new knowledge and skills which enables firms discover specific opportunities that are not visible to other people (Shane 2000). Second, human capital is positively related to planning and venture strategy, which, in turn, positively impacts success (Baum et al. 2001). Third, both general and firm-specific human capital could be leveraged to achieve firms' strategic objectives. A higher level of human capital means a higher capability to realise the strategic goals, and thus enhance a firm's performance.

Drawing on the above arguments, we propose the hypotheses that:

- H1: CE strategy as a whole positively affects firm performance;
- H1a: Investing in R&D positively affects firm performance;

- H1b: Investing in brand equity positively affects firm performance;
- H1c: Investing in organisational capital positively affects firm performance;
- H1d: Investing in human capital positively affects firm performance.

The contingent role of firms' ownership: state-owned (SOEs) vs. privately-owned firms (POEs)

A firm's ownership has been identified as a key institutional factor in transition economies which affect firms' strategic management (Luo et al. 2005; Tang et al. 2007; Liu et al. 2017; Wang et al. 2019b). In the process of China's ownership reform, SOEs play a vital role in boosting the Chinese economy, and their strategic intent and organisational identity differ substantially from POEs (Lee and Zhou 2012). The effect of ownership structure on the CE strategy–firm performance relationship cannot be overlooked. However, the results on this topic are inconsistent. Some scholars support that there is a higher impact of CE strategy on firm performance among SOEs than among POEs for several rationales.

First, the entrepreneurial strategies are resource-consuming strategies (Covin and Slevin 1991). SOEs owned by government access resources more easily than POEs, such as financial resources and political privilege (Wang et al. 2019b). Although public support for private enterprises exists, preferential policies have traditionally leaned towards state-owned (He et al. 2019). SOEs can easily access low-cost resources with policy support which encourages SOEs to implement more risk-taking activities. Such advantages in resource acquisition provide substantial and risky resource commitments for SOEs to carry out risk taking strategies, therefore SOEs have more space to experiment with entrepreneurial strategies than POEs (Shu et al. 2019).

Second, the new generation of SOEs' executives have been given autonomy over pricing, investments, accounting, human resources, material supply and acquisition, and other key decisions coupled with China's reform of SOEs (Tang et al. 2007). Therefore, the executives are strongly motivated to capitalise on the newly-acquired autonomy and flexibility to compete with POEs. Meanwhile, these executives are no longer political appointees but are elected by employees or appointed by the board, and thus, are more responsive to market demands and opportunities.

Third, SOEs owning a more stable and well-defined hierarchical structure than POEs, which decrease coordination costs, increase decision-making speed, and enable response to entrepreneurial opportunities rapidly and efficiently (Tang et al. 2007; De Clercq et al. 2014).

Fourth, SOEs characterised by high-level control by central government are used to lacking entrepreneurial spirit; it should be noted that SOEs also tend to fulfil political and social objectives rather than purely economic ones (Lee and Zhou 2012). Along with 'mass entrepreneurship and innovation' (2015) 'National Strategy of Innovation-driven Development' (2016) emerged as national economic development strategies. SOEs, the main force in the strategy implementation, tend to allocate more resource on entrepreneurship activities, and thus enhance firms' performance.

Others hold different options supported by several reasons (Luo et al. 2005; Wang et al. 2019a; Chang et al. 2019). First, SOEs rarely utilise incentive structures that align with financial performance, which discourage SOEs from pursuing high-level

entrepreneurial activities (Luo et al. 2005). Second, SOEs can access scarce resources earlier due to high-level control by central government, strong bargaining power with government officials, easy access to political privileges, and soft budgets (Peng and Luo 2000), which makes them inefficient in utilising government support to achieve greater innovation capability. Instead, POEs are more efficient with their limited slack resources (Wang et al. 2019a). Third, a hierarchy may evade knowledge diffusion and the learning process (Meng et al. 2002). Therefore, knowledge can be transferred more efficiently in POEs with a simple and flexible structure, which leads to more entrepreneurial opportunities.

According to the above arguments, there is a divergence on the effect of firms' ownership. However, the government still has dominant power over the allocation of resource and the policies tend to support SOEs. Hence, we suggest the following hypothesis:

H2: CE strategy and its four sub-categories are more positively related to firm performance within SOEs than within POEs.

The contingent role of industry context: manufacturing vs. service firms

The industry context is another factor that moderates the relationship between CE strategy and firm performance. In particular, this paper discusses the different effects between the manufacturing and service industries. The distinct managerial challenges within these two industries have been well recognised across management and economic literature. Scholars in the field of entrepreneurship call for more efforts to be made to investigate how industry influences the relationship between entrepreneurship and performance (Choi and Williams 2016; McKenny et al. 2018). A commonly cited distinction between services and manufacturing is that services are more intangible than goods in manufacturing industry (Vomberg et al. 2015). It is difficult to standardise services exerted a higher heterogeneity. Due to this distinction, service industry firms are thought more likely to engage in branding strategy to construct a dialogue between firm and consumer, which helps overcome issues of intangibility in services. Conversely, R&D activities play a more important role in manufacturing industries, as the products are tangible with less heterogeneity. As suggested by Van Ark et al. (2003), innovation in services is more likely to be oriented towards organisational change, rather than to product or process innovation with technological progress. Another cited distinction is the inseparability of production and consumption in services. It means service know-how is tacit – embodied in individuals rather than embedded in technological equipment (Ekeledo and Sivakumar 2004). Therefore, a firm in a service industry tends to invest more in human capital. In addition, the national industrial strategy could significantly affect a firm's entrepreneurial behaviours. Although previous literature has confirmed that manufacturing firms are generally more entrepreneurial (Dickson and Weaver 1997) and more innovative (Thornhill 2006), the national strategy 'transforming China's manufacturing' further stimulates manufacturing firms engaging in entrepreneurial activities, thus enhancing firm performance.

Drawing on the above arguments, we suggest the following hypotheses:

H3: CE strategy are more positively related to firm performance for manufacturing firms than for service firms on average;

H3a: Investing in R&D is more positively related to firm performance for manufacturing firms than for service firms;

H3b: Investing in brand equity, organisational capital and human capital are more positively related to firm performance for service firms than for manufacturing firms.

Variables and empirical methodology

Variables

Dependent variable Profitability, sales growth and total factor productivity are widely used indicators to measure firm performance (Cucculelli and Bettinelli 2015). This paper uses sales growth rate as the indicator of firm performance because entrepreneurial activities are always growth-oriented and both owners and shareholders are very focused on this indicator. The sales growth rate ($salesg_{it}$) for firm i in period t is calculated as $(sales\ revenue_{it} - sales\ revenue_{it-1})/sales\ revenue_{it-1}$.

Independent variables This paper defines expenditure on R&D, branding, organisational capital and human capital as entrepreneurial strategies which allow a firm to be involved simultaneously in opportunity-seeking and advantage-seeking behaviours (Ireland et al. 2003; Cucculelli and Bettinelli 2015). As there are monetary tradeoffs between current investments in maintenance and the desired future return within an integrated strategy, we use the intensity form rather the level from to measure the firm-level entrepreneurial strategy. To be specific, the overall level of entrepreneurial strategy intensity and the four sub-categories are measured as follows:

- R&D intensity (rd_{it}) is the ratio of R&D expenditure on sales revenue. The indicator for firm i in period t is calculated as $R\ \&\ D_{it}/sale\ revenue_{it}$.
- Brand equity intensity ($brand_{it}$) is the ratio of advertising expenditure on sales revenue. Following Corrado et al. (2005), we regard 60% of total advertising expenditures as investing in brand equity. The indicator for firm i in period t is calculated as $ad_{it} \times 60\ \% /sale\ revenue_{it}$.
- Organisational capital intensity (org_{it}) is the ratio of 10% administration expense on sales revenue. The sales, general and administrative expenses or only administrative expenses (De and Dutta 2007) are used to capture the investment in organisational capital. As organisational changes are time consuming and rivals are difficult to replicate, only a small portion of administrative expenses are capitalised as investment in organisational capital. 10 and 20% are two arbitrary proportions (De and Dutta 2007). This paper is careful with these proportions and uses 10% to avoid overestimates of investments in organisational capital. The indicator for firm i in period t is calculated as $administrative\ expenses_{it} \times 10\ \% /sale\ revenue_{it}$.
- Human capital intensity (hc_{it}) is the ratio of salary on sales revenue. There are two proxies to measure human capital: the educational level of employees and the salary paid to employees. Due to data limitation, this paper uses salary to measure the

intensity of a firm's human capital. The indicator for firm i in period t is calculated as *cash paid to employee_{it}/sale revenue_{it}*.

- The overall level of CE strategy intensity (ces_{it}) is the sum of the above four sub-categories. That is, $ces_{it} = rd_{it} + brand_{it} + org_{it} + hc_{it}$.

Control variables The current study includes three firm-level variables which may influence firm performance. Existing literature has indicated that firm size affects firm performance (Covin and Miles 2007). It is frequently controlled in the studies of the relationship between entrepreneurship and firm performance. Firm size is measured by the total asset with natural logarithmic method, that is $size_{it} = \log(\text{total asset}_{it})$. Firm age (age_{it}) is another common control in entrepreneurship studies (Anderson and Eshima 2013), which was measured as the number of years since the firm's founding. The third control is debt to asset ratio (doa_{it}), which considers the firm risk, profitability and refinancing capability. Beyond internal factors, this paper also includes Year Dummy, Industry Dummy and Region Dummy to control the influence of external environment on firm performance.

We use a sample of Chinese listed companies on the Shanghai and Shenzhen Stock Exchange. We pretreat the sample and remove firms: (1) with missing data; (2) in the financial industry; (3) ST/*ST stock, and finally get a sample with 13,542 (11,087 with one-period lags) firm-year observations. All the data comes from firms' financial statements gathered in WIND and China Stock Market Accounting Research (CSMAR) database.

Empirical methodology

In order to test the hypotheses proposed in section 2, we construct the following two models:

$$\text{salesg}_{it} = \gamma_0 + \gamma_1 ces_{it-1} + \alpha' \text{control}_{it-1} + \mu_i + \varepsilon_{it} \quad (1)$$

$$\begin{aligned} \text{salesg}_{it} = & \beta_0 + \beta_1 rd_{it-1} + \beta_2 brand_{it-1} \\ & + \beta_3 org_{it-1} + \beta_4 hc_{it-1} + \alpha' \text{control}_{it-1} + \mu_i + \varepsilon_{it} \end{aligned} \quad (2)$$

where *control* represents the control variables, firm size, firm age and *doa*; μ_i represents the unobserved individual effects, which include time, region and industry effect in the present study. ε_{it} is a mean zero random error term. As one of the main characteristics of entrepreneurial strategy is proactiveness (Covin and Slevin 1991), the effect of entrepreneurial strategy on firm performance may occur with a lag. Hence, all the independent variables are one-period lagged. Meanwhile, one-period lagged independent variables are used to avoid reverse causality. However, due to the short time-series of the present panel, we prefer to use the 'default' lag of one period, rather than specifying a longer lag arbitrarily.

Empirical results

Descriptive statistics analysis

Table 1 summarises the descriptive statistics for main variables. As shown in Tables 1, 26.1% of the sample are SOEs, and 79.5% of the sample come from the manufacturing sector. Despite the global financial crisis, Chinese listed firms have good performance during the period between 2010 and 2018, as average sales growth rate is 9.6%. Meanwhile, the performance varies considerably with a minimum of -3385.0% and a maximum of 99.0% . When it comes to the intensity of CE strategy, the results show that firms are likely to attach importance to CE strategy, as the average intensity of CE strategy expressed as a percentage of total revenue is 21.6% and the maximum is 407.6%. The average levels of the four categories of CE strategy successively are investing in human capital (14.1%), R&D (4.9%), brand equity (1.6%) and organisational capability (1.1%). Figure 1 also displays the changing trends of the intensity of CE strategy and the four categories. There is a considerably increase in carrying out entrepreneurial strategies, as the intensity of CE strategy moves from 15.9% in 2010 to 23.8% in 2018. Among the four categories, average intensity of brand equity increases year by year during the entire examined period, average intensity of R&D and human capital experiences a small decrease in 2017, while average intensity of organisational capital experiences a decrease since 2016. Table 2 gives the Pearson correlations among the independent variables and control variables. Although the largest correlation is 0.891 appearing between human capital investment intensity and CE strategy intensity, the multicollinearity is unlikely to be a problem according to models (1) and (2).

Regression analysis

Table 3 displays the effects of CE strategy on firm performance. The results are estimated through pool model with robust standard errors which are applied to

Table 1 Descriptive statistics

VAR.	N	Mean	S.D.	Min	Max
<i>salesg</i>	11,087	0.096	0.448	-33.850	0.990
<i>rd</i>	13,542	0.049	0.052	0.000	0.984
<i>brand</i>	13,542	0.016	0.045	0.000	0.730
<i>org</i>	13,542	0.011	0.011	0.000	0.719
<i>hc</i>	13,542	0.141	0.096	0.003	2.708
<i>ces</i>	13,542	0.216	0.150	0.003	4.076
<i>size</i>	13,542	21.590	1.260	17.310	27.380
<i>age</i>	13,542	17.130	5.848	1	61
<i>doa</i>	13,542	38.090	19.330	0.752	186.600
<i>Ownership</i>	13,542	0.261	0.439	0	1
<i>Industry</i>	13,542	0.795	0.404	0	1

Data source: calculated by authors with WIND and CSMAR databases

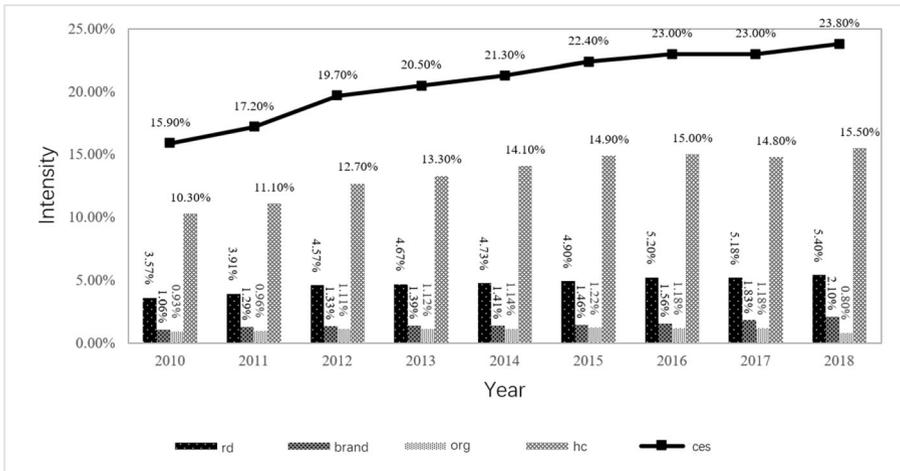


Fig. 1 Trends of CE strategy intensity and the four sub-categories from 2010 to 2018. Data source: WIND and CSMAR databases

eliminate heteroscedasticity. All the estimations are done with STATA 15.0. As shown in Table 3, as expected, the CE strategy positively effects firm sales growth. On average, an increase in CE strategy intensity by 10% translates to a 1.76% higher sales growth. The result verifies H1. When it comes to the different firm ownership and industry context, we find CE strategy positively affects firm performance with different marginal effects. For SOEs and POEs, CE strategy affects firm performance to a larger extent in case of SOEs (0.224) than in POEs (0.177). It indicates that the reform of SOEs stimulates their entrepreneurial spirit gradually on one aspect, and national economic development strategies drives SOEs allocate more resource on entrepreneurship activities on another aspect. For manufacturing and service firms, CE strategy affects firm performance to a larger extent in the manufacturing industry (0.199) than in the service industry (0.109). This is consistent with the results of previous studies,

Table 2 Pearson correlation analysis

	<i>salesg</i>	<i>rd</i>	<i>brand</i>	<i>org</i>	<i>hc</i>	<i>ces</i>	<i>size</i>	<i>age</i>	<i>doa</i>
<i>salesg</i>	1.000								
<i>rd</i>	0.065	1.000							
<i>brand</i>	0.012	0.096	1.000						
<i>org</i>	0.042	0.620	0.110	1.000					
<i>hc</i>	0.050	0.528	0.070	0.653	1.000				
<i>ces</i>	0.062	0.767	0.371	0.741	0.891	1.000			
<i>size</i>	0.020	-0.213	-0.011	-0.193	-0.243	-0.247	1.000		
<i>age</i>	-0.040	-0.140	0.016	-0.037	-0.021	-0.062	0.319	1.000	
<i>doa</i>	-0.020	-0.257	-0.113	-0.186	-0.212	-0.272	0.400	0.133	1.000

As we used one-year lagged independent and control variables in regression model, the independent and control variables in correlation matrix are also one-year lags

Data source: calculated by authors with WIND and CSMAR databases

showing that manufacturing firms are more entrepreneurial and more innovative (Dickson and Weaver 1997; Thornhill 2006). The results verify H2 partly and H3 fully.

Table 4 displays the effect of the four sub-categories of CE strategy on firm performance. As shown in Table 4, R&D and human capital intensity have a significant positive effect on firm performance at 1% and 5% confidence level respectively, while brand equity and organisational capital intensity have no significant effects on firm performance. On average, an increase in R&D intensity by 10% translates to a 3.37% higher sales growth, while an increase in human capital intensity by 10% translates to 1.84% higher sales growth. With regard to the former, the results verify H1a and H1d and reject H1b and H1c.

There are several possible explanations for the unexpected null H1b and H1c. First, such investments bear the risk that firms fail to realise a positive return on their brand equity and organisational capital investment (Baumann and Kritikos 2016). In fact, we find at present that Chinese firms make less effort in brand equity and organisational capital, and allocate more resources to R&D and human capital. Second, we use flows to measure CE strategy rather than stocks. A context with more knowledge will generate more entrepreneurial opportunities, while flows fail to measure the knowledge stock. Third, the effects of brand equity and organisational capital may be mediated by other intangibles, notably R&D and human capital (Simsek and Heavey 2011).

Table 3 CE strategy intensity and firm performance

VAR.	(1) <i>salesg</i> Full	(2) <i>salesg</i> SOEs	(3) <i>salesg</i> POEs	(4) <i>salesg</i> Manuf.	(5) <i>salesg</i> Service
<i>ces</i> (-1)	0.176*** (0.034)	0.224*** (0.073)	0.177*** (0.039)	0.199*** (0.048)	0.109*** (0.039)
<i>size</i> (-1)	-0.001 (0.006)	0.003 (0.005)	0.001 (0.008)	-0.000 (0.007)	0.007 (0.008)
<i>age</i> (-1)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)
<i>doa</i> (-1)	-0.000* (0.000)	-0.001* (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001* (0.001)
<i>Constant</i>	0.239** (0.099)	0.193 (0.137)	0.189 (0.129)	0.154 (0.169)	0.165 (0.160)
<i>Year</i>	✓	✓	✓	✓	✓
<i>Industry</i>	✓	✓	✓		
<i>Province</i>	✓	✓	✓	✓	✓
<i>Obs.</i>	11,087	2877	8210	8910	2177
<i>R-squared</i>	0.025	0.077	0.023	0.020	0.155

(-1) means lag one period. Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; year effect, industry effect and province effect are controlled in full sample and within groups with different ownerships. Year effect and province effect are controlled with groups in different industries

Data source: calculated by authors with WIND and CSMAR databases

Table 4 Four sub-categories of CE strategy intensity and firm performance

VAR.	(1) <i>salesg</i> Full	(2) <i>salesg</i> SOEs	(3) <i>salesg</i> POEs	(4) <i>salesg</i> Manuf.	(5) <i>salesg</i> Service
<i>rd</i> (-1)	0.337*** (0.107)	0.483*** (0.161)	0.302** (0.123)	0.553*** (0.146)	0.068 (0.128)
<i>brand</i> (-1)	0.003 (0.077)	0.100 (0.267)	-0.008 (0.082)	0.131* (0.068)	-0.450 (0.335)
<i>org</i> (-1)	-0.264 (0.806)	0.423 (1.235)	-0.348 (0.939)	-0.437 (1.026)	-0.434 (1.397)
<i>hc</i> (-1)	0.184** (0.073)	0.144 (0.112)	0.215** (0.087)	0.100 (0.090)	0.155** (0.061)
<i>size</i> (-1)	-0.001 (0.006)	0.002 (0.005)	0.001 (0.008)	-0.002 (0.007)	0.007 (0.008)
<i>age</i> (-1)	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.002*** (0.000)	-0.003*** (0.001)
<i>doa</i> (-1)	-0.000 (0.000)	-0.001 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.001** (0.001)
<i>Constant</i>	0.237** (0.101)	0.214 (0.139)	0.175 (0.135)	0.223 (0.143)	0.157 (0.152)
<i>Year</i>	✓	✓	✓	✓	✓
<i>Industry</i>	✓	✓	✓		
<i>Province</i>	✓	✓	✓	✓	✓
<i>Obs.</i>	11,087	2877	8210	8910	2177
<i>R - squared</i>	0.025	0.078	0.023	0.017	0.137

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Data source: calculated by authors with WIND and CSMAR databases

The effects of four sub-categories of CE strategy on firm performance also appear heterogeneity when considering firm ownership and industry context. For SOEs and POEs, only R&D intensity positively affects SOEs' performance at 1% confidence level, while R&D and human capital intensity positively affect private firms' performance at 5% confidence level. The effects of brand equity and organisational capital intensity on firm performance are statistically insignificant within both SOEs and POEs. R&D intensity affects firm performance to a larger extent in case of SOEs (0.483) than in POEs (0.302). The Chinese government has emphasised on reinforcing the capability of technical innovation since 'Twelfth Five-Year Plan', which encourages firms to steadily increase their R&D spending. Although a high level of R&D intensity does not guarantee the generation of successful innovations, firms that invest heavily in R&D are more likely trying to compete on the basis of innovativeness and technology breakthrough. Therefore, both SOEs and POEs benefit from investing in R&D. Similarly, due to the advantages in access, scarce resources and essential role in implementing national strategies, SOEs tend to invest more in R&D, and thus gain a higher revenue on firm performance. There is an unexpected result that the positive

effect of human capital is significant within POEs while insignificant within SOEs. The possible explanation for this is that it fails to leverage human capital efficiently due to the lack of rational incentive mechanism in SOEs. Both managers and workers receive very precise descriptions of what is expected of them in SOEs characterised by a well-defined hierarchical structure, which decreases the cost of coordination and increases efficiency (Tang et al. 2007). However, employees tend to lack motivation in pursuing entrepreneurial activities because they have job security and better benefits support provided by the government (Chang et al. 2019), which are less related to their work performance unless there is a serious mistake in their job. As a result, employees are less willing to leverage their knowledge and skills in risky entrepreneurial activities in SOEs.

For manufacturing and service firms, R&D and brand equity intensity positively affect manufacturing firms' performance at 1% and 10% confidence level respectively, while only human capital intensity positively affects service firms' performance at 5% confidence level. As stated before, the manufacturing firms take more R&D activity (Choi and Williams 2016), while service firms realise a positive return relying more on human capital due to the inseparability of production and consumption (Ekeledo and Sivakumar 2004). There is an unexpected result that the positive effect of brand equity is significant within manufacturing firms while insignificant within service firms. A possible explanation is that a higher level of R&D investment in manufacturing industry (1.19e+08 Yuan in manufacturing vs. 8.20e+07 Yuan in service on average) facilitates its branding efforts. Although developing influential brands has received increasing attention among the Chinese government and firms, it still seriously falls behind economic development. The successful branding efforts cannot be realised without support of innovation. Therefore, positive revenue is gained by investing brand equity in manufacturing industry. The results confirm H3a fully, and H2 and H3b partly.

Robustness check

As shown in Table 1, firms' sales growth varies from -3385.0% to 99.0% and the intensity of human capital varies from 0.3% to 270.8%. Hence, we speculate that outliers could be embedded in observations, which probably influences the parameter estimation in regression analysis. To reduce the effect of outliers, we winsorise the continuous variables at the 1st and 99th percentiles to check the robustness of our results. Table 5 reports the result of robustness check. It shows that although the marginal effects are smaller, the positive impact of CE strategy and its four sub-categories are consistent in different groups when compared to the original sample. This evidence suggests that our results are not sensitive to outliers, which confirms the robustness of our results.

Conclusion

This paper investigates the effects of CE strategy on firm performance at both overall and individual category levels with Chinese listed companies over the period 2010 to 2018. The empirical results show that firms gain a positive revenue by adopting CE

Table 5 Robustness check

VAR.	(1) <i>salesg</i> Full	(2) <i>salesg</i> SOEs	(3) <i>salesg</i> POEs	(4) <i>salesg</i> Manuf.	(5) <i>salesg</i> Service
<i>ces(-1)</i>	0.126*** (0.022)	0.164*** (0.059)	0.123*** (0.024)	0.136*** (0.025)	0.087*** (0.029)
<i>Controls</i>	✓	✓	✓	✓	✓
<i>R-squared</i>	0.073	0.093	0.073	0.064	0.073
<i>rd(-1)</i>	0.277*** (0.088)	0.461*** (0.170)	0.222** (0.102)	0.399*** (0.105)	0.093 (0.128)
<i>brand(-1)</i>	-0.015 (0.075)	-0.045 (0.225)	-0.028 (0.079)	0.126* (0.065)	-0.116 (0.228)
<i>org(-1)</i>	0.415 (0.646)	0.964 (1.377)	0.100 (0.745)	0.960 (0.760)	-0.093 (1.121)
<i>hc(-1)</i>	0.084** (0.038)	0.056 (0.095)	0.128*** (0.042)	-0.019 (0.046)	0.118** (0.054)
<i>Controls</i>	✓	✓	✓	✓	✓
<i>R-squared</i>	0.074	0.095	0.074	0.067	0.074

Robust standard errors in parentheses *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Data source: calculated by authors with WIND and CSMAR databases

strategies, while the size varies across different groups. Specifically, SOEs gain a higher revenue than POEs; manufacturing firms gain a higher revenue than service firms. When investigating the specific category of the CE strategy, we find the positive revenue is mainly driven by investing in R&D and human capital, while investing in brand equity and organisational capital have insignificant effects on firm performance. Similarly, the effects of specific category of CE strategy on firm performance also vary across different groups. Specifically, SOEs' performance is driven by R&D investment, while POEs' performance is driven by R&D and human capital investment; manufacturing firms' performance is driven by R&D and brand equity investment, while service firms' performance is driven by human capital investment. The results are further confirmed by robustness check.

There are some policy implications. First, although CE strategy has positive effects on firm performance, only R&D and human capital are functioned. Focusing on specific strategy excluding others increases a firm's ineffectiveness or risk of failure. Both government and firms have to be very alert to the imbalance effect of specific CE strategy. Relevant policies need to be formulated to encourage firms to leverage resources and strategy efficiently. Second, although public support for POEs exists, the preferential policies have traditionally leaned towards SOEs. The government should further ensure the implementation of support policy across different groups of firms. Third, it suggests managers should develop a profile of entrepreneurial categories according to the contextual factors (ownership and industry in this paper) due to the heterogeneous effect of CE strategies.

There are also some limitations in this paper. In this paper, we do not discuss the potential interaction effects of different sub-components of CE strategies on firm performance. In addition, the sub-components of CE strategies may not work until accumulated to a certain level. Therefore, future researchers should also explore the potential nonlinear relationships of CE strategies and firm performance.

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Compliance with ethical standards

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