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Core-Staff-Based ESOPs : a new concept of employee share ownership in China

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UNIVERSITY OF LORRAINE
Doctoral School of Legal Science, Political Science, Economics
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European Centre for Research
in Financial Economics and Business Management

Core-Staff-Based ESOPs:
A new concept of employee share ownership in China

« Core-staff-based ESOPs » :

un nouveau concept de l'actionnariat salarié en Chine

Ph.D. Thesis in Management Sciences

by Huifen PAN

Defended on February 3rd, 2021

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We are sailors on an ocean of change and the organization we are part of are the ships we sail. We cannot sail against the prevailing winds, but we can learn to work with the winds and the waves and harness their energy to arrive at the destination we aspire to reach.

M. Hugos, 2009

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ABSTRACT

Our underlying thesis focuses on the development of employee share ownership plans in China (called ESOPs as below). We attempt to fill knowledge gaps, search for a truth behind stereotypes, revise performance analyses, and study the organizational ecology of ESOP development in the specific contexts of China. For this, we construct our theoretical framework with the theories of organizations and decision-making, and apply specific big data skills for empirical studies. Our findings reveal that isomorphic structuration has not occurred between Chinese firms and western firms due to China's specific environments. However, two ESOP mechanisms having emerged in different periods can be merged into one new model called Core-staff-based ESOPs, because of the similarity in structures, objectives and procedures. Distinct from broad-based or executive-based ESOPs, this particular ESOP mechanism requires participants' qualification, involving the participation of senior executives, directors at the middle level and any other employees that make particular contributions to firms. In a society where traditional values conflict with new ESOPs' inherent properties, we explore ESOP firms' motives with institutions, firm characteristics, and performance analyses. Our findings reject coercive impacts and risk-taking desires in worrisome situations but support the effects of firm specificities and particular institutional policies, which would have encouraged a specific group of Chinese firms to challenge. We also contextualize the agency cost model with the resource-based analyses in prospects. Based on the regressions conducted with 119994 firm-quarter panel data during 2006-2018, our results confirm the positive effects of Core-staff-based ESOPs in improving firms' performance, reducing business risks, and increasing firms' market values in the normal business situations. Finally, we capitalize employees' contributions in the multi-capital potential and unveil the roles of "Core-staff-based ESOPs" in innovation, which enable Hi-Tech firms to increase their survival chances and enhance the innovation ecosystem's efficiency as a whole.

Keywords:

Core-staff-based ESOPs, Isomorphic development of ESOPs in China, ESOP firms' motives, Performance analyses, Roles of ESOPs in innovation

RÉSUMÉ

Notre recherche vise au développement des mécanismes de l'actionnariat salarié en Chine (dénommé ci-après AS). Nous tentons de combler des lacunes en connaissances, de chercher une vérité derrière des stéréotypes, de réviser les analyses de performance et d'étudier l'écologie organisationnelle du développement de l'AS dans les contextes spécifiques en Chine. À cet effet, nous construisons le cadre théorique avec les théories de l'organisation et de prise de décisions, et utilisons les techniques de grandes données pour réaliser les études empiriques. Nous relevons que la structuration isomorphique ne survient pas entre les entreprises chinoises et occidentales à cause de l'environnement spécifique en Chine. En revanche, deux mécanismes d'AS, ayant émergé pendant les différentes périodes historiques, peuvent fusionner sous un nouveau modèle dénommé « Core-staff-based ESOPs », grâce aux similitudes de structures, d'objectifs et de procédures. Étant distinct de « broad-based ESOPs » et de « executive-based ESOPs », ce mécanisme de l'AS demande la qualification des participants, impliquant la participation des administratifs supérieurs, des directeurs au niveau moyen et d'autres employés qui contribuent particulièrement à l'entreprise. Dans une société où les valeurs de culture traditionnelle vont à l'encontre des caractéristiques inhérentes à ces nouveaux plans, nous explorons les motivations des entreprises de l'AS à travers des analyses institutionnelles, des caractéristiques d'entreprises et de performance. Nos constats rejettent les impacts coercitifs et les désirs risquophiles dans les situations peu performantes ; toutefois, ils soutiennent les effets apportés par les spécificités d'entreprises et les politiques institutionnelles, lesquelles auraient encouragé un groupe spécifique d'entreprises chinoises à se lancer des défis. Nous contextualisons d'ailleurs le modèle des coûts d'agence sur la base des analyses en prospects dans les perspectives « resource-based ». Sur la base des régressions effectuées avec 119 994 données trimestrielles du panel pendant la période 2006-2018, nos résultats confirment les effets positifs engendrés par les « Core-staff-based ESOPs » en termes d'amélioration de la performance d'entreprises, de réduction de « business risks », et d'accroissement de valeurs du marché. Enfin, nous capitalisons les contributions des employés sous le potentiel « multi-capital », et découvrons les rôles de l'AS dans l'innovation, lequel permet aux entreprises Hi-Tech d'augmenter leurs chances de survie et de renforcer l'efficacité de l'écosystème de l'innovation dans son ensemble.

Mots-clés :

l'Actionnariat salarié « Core-staff-based ESOPs », le développement isomorphique de l'AS en Chine, les motivations des entreprises d'AS, les analyses de performance, les rôles de l'AS en innovation

CONTENTS

Acknowledgement.....	i
Abstract.....	iii
Résumé.....	iv
Contents.....	v
Introduction.....	1
Chapter I. Core-staff-based ESOPs: a new concept of ESOPs.....	21
Chapter II. Potential factors influencing ESOP firms' choices.....	48
Chapter III. Performance analyses of Core-staff-based ESOPs.....	72
Chapter IV. Roles of ESOPs in innovation.....	103
Conclusion and discussion.....	135
Research summary.....	149
Synthèse de recherche.....	155
Bibliography.....	161
List of illustrations.....	171
Table of contents.....	174
Appendices.....	179

INTRODUCTION

1. Brief presentation of ESOPs

The argument concerning the relationship between capital and labor has been around for more than 150 years. Given the different solutions that have been proposed and provided, the world has been split by different ideologies. As a result, capitalist and socialist countries coexist and develop alongside the trends of globalization. One of the most important topics in debates between two ideological hemispheres is firms' ownership and the related claims on a bundle of property rights, including profit-sharing.

Employee share ownership plans, known as "ESOPs," were created to align divergent interests between capital and labor. It is a corporate finance approach that a company gives its shares fully or partly to employees working in their company (Shields & Brown, 2007). More than financial benefits through the implementation of ESOPs, the traditional boundary between workers and owners is blurring, as workers increasingly participate as owners in the firms (Rousseau & Shperling, 2003).

Directors are the agents entrusted by firm owners to manage firms and supervise workers. Since the early capitalist era, firm owners had focused on directors and offered share-based schemes to them for a potential partnership. This is the origin of executive-based ESOPs. According to the GEO Global Equity Survey (2014), the share-based schemes for management staff, especially for upper management levels, have been offered by 93% of the companies surveyed in the US, 87% in Europe, and 75% in the rest of the world (Wolff & Zschoche 2015).

Workers transform materials into products and provide services. The growth of the firm relies on the improvement of productivity and quality. To motivate workers, firm owners provide ESOPs to the normal working staff, which gives birth to the mechanism of

broad-based ESOPs. Furthermore, with “The Capital Manifesto” published by Louis Kelso in 1958, the broad-based ESOPs have been endowed with the ideals of “Economic Freedom” and “Economy democracy” (Kelso & Adler, 1958), and strongly promoted by specific laws and policies in the leading developed countries during the past 60 years. In 2018, the US National Center for Employee Ownership estimated that approximately 32 million Americans had owned employer stocks through various ESOP schemes.

Theoretically, several kinds of literature support ESOPs, like labor economics, industrial relations, and corporate governance. The mainstream resides in the Agency theory, and the human capital theory has also been introduced to analyze the ESOP contributions to firms.

In practice, the theme of ESOP is a multi-discipline firm management strategy being linked to human resources, the firm organization, corporate finance, market finance, etc. Most previous studies are limited to single views in particular fields. We have attempted to analyze ESOPs at multiple dimensions and search for solutions to achieve real “fair play” for all the actors involved in the ESOP design.

2. Research territory defined: A reappraisal of ESOPs in China

In 1980, Deng Xiaoping led the Chinese people into economic reforms. In 1992, he affirmed his determination to introduce a market economy within a socialist framework. Since then, the modernization of state-owned companies has made a remarkable start, and private firms have actively emerged into the Chinese economic arena. In this scenario, ESOPs have played a substantial role in Chinese firms’ growth.

The ESOP development in China evolves with a trial-error-trial model. During 1992-1993, the government issued laws to supervise the companies listed on Chinese stock markets, including ESOP schemes that had been implemented with the purpose of

transferring one part of state-owned companies' property rights to employees. However, in 1998, the implementation of ESOPs by publicly incorporated companies was entirely suspended, and the ESOPs implemented by privately incorporated companies were forced to clean-up by the end of 2002.

After seven years' suspension, ESOPs were authorized to be recovered in 2005 in the form of "Share Incentive Plans" or "Equity Incentive Plans" (briefly called SIPs as below). Furthermore the <Guiding Opinions on the Pilot Implementation of Employee Share Ownership Plans by Listed Companies> were issued in 2014, confirming the formal return of ESOPs in China (briefly called ESOPs-2014).

Nevertheless, previous empirical studies have provided a better understanding on the ESOPs in China; most research focuses were limited in single historical periods and the field of performance tests, having ignored the inherent properties of ESOP mechanisms, ESOP firms' characteristics and motives, the impacts of environments reacted on the ESOP development, multiple bottom lines in performance analyses, the strengths and weaknesses of ESOP design exposed in specific contexts, etc. Thus, we attempt to fill gaps of knowledge and draw a fuller picture of interactions between the ESOP development and specific environments in China, whose institutions and cultures are entirely different from the western world. Specifically, we define our research territory as a reappraisal of employee share ownership plans in China.

3. Research challenge: the discovery of a new ESOP concept in China

3.1 To clarify the truth behind stereotypes: Are the new ESOPs implemented in China broad-based or executive-based ESOPs?

In the monitoring chain of modern management models, a hierarchical order has been established: workers, workgroup chiefs at the low level, directors at the middle level, working staff and directors at the senior level, and executives at the top management. In

practice, different ESOP mechanisms represent different firm incentive strategies in the choices of ESOP targets. For example, implementing executive-based ESOPs enables firms to motivate executives at the top management, better evaluate upper management decisions, and monitor executives' agency problems (Shavell, 1979; Fama & Jensen, 1983; Jensen & Murphy, 1990; Bebchuk & Fried, 2003). Beyond the agent control perspectives, executive share ownership solutions are also attractive for family-owned firms, searching for an ideal partnership with high-level managers to sustain the family business with their particular contributions. While the firms that implement the broad-based ESOPs expect to enhance productivity and firm performance with all employees' contributions, especially those at low and middle levels. Thus, the target of ESOP schemes and the relevant accessibility are vital themes in the design of ESOPs, determining the natures and roles of ESOP mechanisms.

In China, we have observed a subsequent evolution in time of different ESOP mechanisms. Most researchers have grouped the first trials of ESOPs in the 1990s under the total-based ESOPs, the SIPs under the executive-based ESOPs, and the ESOPs-2014 under the broad-based ESOPs. While Ren and her partners (2019) perceived all the Chinese ESOPs from 1992 to 2017 as the broad-based ESOPs, and merged these ESOPs having emerged in different historical periods into one regression model. However, our research denies these assumptions through case studies. Are the ESOPs implemented in China broad-based or executive-based ESOPs? To clarify the truth behind stereotypes, we study the details of the mechanism of Chinese ESOPs.

3.2 Discovering a new ESOP concept in China: Core-staff-based ESOPs

According to our statistics, 98% of SIPs are confirmed not to be executive-based ESOPs for senior executives at the top management, and 99.94% of SIPs are not broad-based ESOPs either. In reality, the executive participants represent less than 10% out of total SIP participants in 83.58% of SIPs.

The same applies to ESOPs-2014: they are neither broad-based nor executive-based ESOPs. The broad-based ESOPs in which all working staff is accessible or more than 80% of working staff participate, count for less than 2% of total ESOPs-2014 in execution. In more than 71% of schemes, there are less than 20% of working staff participating in ESOPs-2014; and in 84% of ESOPs-2014, the executive participants represent less than 20% of total ESOP participants.

Furthermore, the financial capital contributed by employees' funding represents only a small part of firms' capital structure. In 99% of SIPs and 89% of ESOPs-2014 in which the firms have disclosed the capital proportion, employee shareowners have a power of less than 5% out of total shares of the firms.

We also examine the procedures and the targets explained in ESOP announcements. Our findings support that both SIPs and ESOPs-2014 require participants' qualification, involving the participation of executives in top management, other senior working staff in direction, managers at the middle level, and any other excellent employees that make particular contributions to firms. Each firm can define specific qualification criteria and level proportions for ESOP participants. All the ESOP firms announce that the improvement of firm performance is the primary objective of ESOP implementation, among which some firms use the term "core staff" for the qualified participants in the titles of ESOP schemes. Thus, we use it to name this new ESOP mechanism: Core-staff-based ESOPs.

In practice, Chinese listed firms implement these Core-staff-based ESOPs with strict procedures. Only those candidates who are approved by the General Meetings of Shareholders and validated by independent supervisors and lawyers can participate in these new ESOPs. After initial qualifications, most ESOP participants should also pass annual performance assessments to obtain the ESOP benefits or enjoy particular risk compensations. Based on the principle of transparency, all the ESOP firms should disclose

the whole ESOP procedure to the public with announcements.

We take on our challenge to conduct a series of research completing this surprising discovery. We observe ESOP firms' characteristics, explore their motives, analyze the ESOP performance, and study the environmental impacts with a bundle of approaches, including qualitative and quantitative methods.

4. Research framework: an organizational ecology of interactions between environments, organizations, and individuals

4.1 Applying organization theories for the ESOP research

Applying the organizational theories for the ESOP research, we observe the ESOP development in China within a background where environments, organizations and individuals uninterruptedly interact.

For example, few people realize the process of isomorphism when we introduce similar structures in an organization. Moreover, fewer people pay attention to the conditions to activate the isomorphic structuration: the same set of environmental conditions (Hawley, 1968) and specific organizational links like the dependence (DiMaggio & Powell, 1983). Due to different institutions and cultures, ESOP vehicles in China naturally run on distinct orbits from western firms. For this reason, the assumed isomorphic process has not occurred between Chinese firms and western firms in the ESOP development, and previous studies that had merged Chinese ESOPs within western standard systems were biased on the base of comparison.

On the other hand, although SIPs and ESOPs-2014 were relaunched in different historical periods, authorized by different laws, registered under different names, and possess certain different features in their forms, they aim at similar targets, possess similar proportions in capital structure, utilize similar procedures based on the principle of

qualification, represent similar incentive strategies, and account for similar team forces to achieve their goals of performance. Besides the stability of firm organization structures, prominent features in the labor market and the openness in legal institutions, we observe a dependence having stimulated this historical isomorphism. That is not the dependence related to organizations or resources, but a path dependence being linked to specific learning based on experience: the failure experience in the 1990s. Moreover, the successful experience of the first SIP trials from 2005 to 2010 would also have led to followers' mimetic impulse. Finally, a historical isomorphism has surged in the time-space, so that we can merge SIPs and ESOPs-2014 into one single model and generate the new ESOP concept "Core-staff-based ESOPs."

Although Chinese firms have substituted western firms' standard models with their own experience and exploration in adapting themselves to specific environments of China, people still rely on the normative credentials established by the common framework of ESOPs, and avoid taking risks to be the first ones. For this reason, most people believe that Chinese companies are implementing the broad-based or executive-based ESOPs, unaware that they have done something different from standard routines. Based on this cultural impact, we observe that organizational innovation has developed under the stereotypical illusions.

4.2 A multi-layer organization structure

Being inspired by the cellular structure in science and various levels of organization identity, we attempt to propose a multi-layer organization structure to analyze the coexistence and interactions of diversification and homogenization. Taking advantage of ESOP research materials in China, we demonstrate an authentic example. Firstly, the discovery of Core-staff-based ESOPs confirms Chinese firms' contribution of diversity to the worldwide standard framework of ESOPs. Secondly, we reveal a historical isomorphic process in the evolving path of Chinese ESOPs. Thirdly, under Core-staff-based ESOPs,

each sub-model, like SIPs or ESOPs-2014, maintains its specificities to be distinguished from others and possesses various subcategorized variants at a lower level.

Furthermore, competition and cooperation between these sub-models have generated new designs of ESOPs such as the mixed ESOPs. Even in a homogenic structure, the isomorphic process can be driven by the coercive, mimetic and normative mechanisms and impacted by different environments. Modeling organizations in the multi-layer structure, we present a full picture of Chinese ESOP schemes, their sub-models and the sub-categorized variants under the sub-models, clearly demonstrating the compromise between homogenization and diversification processes.

4.3 Organizations, institutions, and decision-making theories

As defined in the behavioral and social science as “groups of individuals bound by some common purpose to achieve objectives” (North, 1990), organizations are constructed and managed by human beings. Hannan and Freeman described an organization cycle containing birth, growth, change, and death, and prescribed a natural selection process among organizations in the competing environments (Hannan and Freeman 1989).

Distinct from organizations:

Institutions are the humanly devised constraints that structure political, economic, and social interaction. They consist of both informal constraints (sanctions, taboos, customs, traditions, and codes of conduct) and formal rules (constitutions, laws, property rights). Throughout history, institutions have been devised by human beings to create order and reduce uncertainty in exchange. (North, 1991)

To clarify the distinction between the definitions of organizations and institutions, Douglass North (1990) also uses a sports metaphor: organizations are the “players of the game,” and institutions are the “rules of the game.”

Both formal and informal, institutions can influence people's cognitions by creating or enforcing credentials in normative isomorphic processes and professionalization. For example, through education and social network, the code of conduct and social customs can be transferred from one or one group of individuals to others. Finally, firm decision-makers in specific regions or industrial sectors possess the same thinking system or similar views in their models of the world.

Institutions create and enforce the coercive forces to sustain a social order of community and shape individuals' and organizations' behavior. However, based on behavioral theories, we believe that the issue of legitimacy is a choice-based behavior rather than a rule-based behavior. Applying for the Prospect Theory (Kahneman and Tversky, 1979; 1991), we translate the obligations defined by institutions into a classic choice question: to do or not to do. In this way, we understand the specificity of a legitimate choice, which is strictly associated with the outcomes: if we do not fulfill our obligations, we will suffer from the punishments which are so severe that few individuals or organizations can afford it.

In practice, people seldom possess enough information to precisely estimate the gain or loss of actions and evaluate the relative probabilities of occurrence. The choice to change will lead to high risks of loss. While the choice not to change will keep their advantage of familiar routines, and will be estimated as a positive value in uncertainty. For this reason, people usually delay their decision-making or choose not to change to protect interests obtained under the certainty effect. Only when they believe that they will have a significant probability of gaining, they will try to change. In this process, the successful models with similar characteristics play significant roles and may lead to a mimetic behavior. Essentially, the mimetic isomorphism is a type of path dependency, aiming to borrow the experience of successful models in perception and reduce the decision risks in uncertainty.

Bridging institutions and decision-making theories on the platform of organization

behavioral theories, we track the traditional rule-based decisions devised by institutions on the choice-based decision-making orbits and explain three isomorphic mechanisms from a resource-based view with prospects. By this means, we can observe social phenomena from different points of view both of institutionalism and decision-making processes, in the same way that we explain the reason why the lid of a boiling kettle rises is due to being forced by streams or forced by the thermal motion of water atoms.

4.4 Exploring firms' motives with institutions, firm characteristics, and performance analyses

Like the gravity effects behind the phenomenon that apples fall, we connect single phenomena with their direct and indirect links and analyze organizational behaviors in the organizational ecology of society (Committee on Basic Research in the Behavioral and Social Sciences of National Research Council, 1986). We attempt to explore the motives of ESOP firm actions and the impacts of environments: which factors would have influenced firms' choices and stimulated the ESOP development? We try to imitate the reference points in the subjective evaluation framework of firm decision-makers and investigate the logic of firm behaviors and the rules based on which they are working.

Firstly, we research Chinese environments at the moment of ESOPs being relaunched in 2005. Although institutional changes were creating a more open environment for ESOP development, failures would discourage people from making new trials. Secondly, we study possible cultural impacts on the formation of beliefs of Chinese managers. In a society where people do not like to take individual initiatives and the performance-oriented qualifications are considered as dangers that would destroy the traditional values, the likeliest choice of Chinese firms in such environments is: not to implement these new ESOPs and keep on working in familiar routines without changes. In reality, Non-ESOP firms represent an attitude of the majority.

However, about 42% of firms have broken out of this organizational homogeneity. Why have these Chinese firms decided to challenge and implement Core-Staff-Based ESOPs? Who are they? To understand their risk-seeking behavior, we conduct institutions, firm characteristics, and performance analyses. Our findings reject the potential influences caused by coercive forces or worrisome performance situations but support the effects of firm specific properties and institutional benefits. Based on other statistics, we sketch portraits of ESOP firms and identify the boundaries of organizational heterogeneity between ESOP firms and Non-ESOP firms.

4.5 Modeling institution and decision-making factors in regressions

Continuously, we attempt to introduce institutional and decision-making factors in quantitative models.

We begin with the statistics to analyze ESOP schemes' characteristics and observe organizational changes alongside the ESOP development. In the binary regression examining ESOP firms' characteristics, we select the particular variables which may influence individual cognitions and organization decision-making processes like the "experience in the 1990s." We also choose those variables which can reflect specific institutional and cultural environments in China, such as Hi-Tech license holding, family-controlled firm structure, and shareholders' power dispersion.

In performance analyses, we design the contexts with modeling languages, effectively sketching specific primary environmental characteristics around Chinese firms, especially the informal institutional constraints in the economic field, like geographic heterogeneity and industrial heterogeneity. When we analyze the roles of ESOPs in innovation, we design some formal institution elements in regressions, like the Chinese government's supportive policies.

We also use specific data to imitate the probable reference points in individuals' mentality during the firm decision-making processes, like the debt ratios being less than or more than 85%, which reflect decision-makers' risk perceptions of firms and financial institutions.

5. New research insights: capitalizing employees' potential and recalling agency controls in the ESOP design

5.1 Revising the agency cost model in specific contexts

Repetitively, we highlight the advantages of ESOPs in reducing controlling costs. These controlling costs are not specific costs stated in accounting subjects, but one type of agency cost. The whole discussion was launched by Ronald Coase in 1937. Inheriting the work of Coase and Williamson, Jensen and Meckling (1976) created the agency cost model and applied it to the firms' ownership structure. In the meanwhile, being inspired by Alchian (1965) and Ross (1973), Mitnick devoted himself to the development of "a vertical theory of control as well as a horizontal one of exchange" that leads to the birth of Agency Theory's institutional approach (Mitnick, 1973; 1974a; 1974b; 1975a; 1975b; 1976a; 1976b; 2013).

The implementation of ESOPs, especially the broad-based model, enables the majority of employees to change their identity and become firm owners. Thus, the divergence of interests between employees and owners is assumed to be aligned in the ESOP design, which changes the nature of agency relationship and reduces the agency costs in the firm organization. Combined with the vertical theory of control in Mitnick's institutional approach, these agency costs have been interpreted as "controlling costs."

We revise the above agency cost model with Kahneman and Tversky's Prospect Theory, exploring the agents' and principals' decision-making processes from a resource-based view.

On the part of agents, they will not breach their contractual duty under the certainty effect of protecting their obtained interest. However, they will take more risks to breach duties in adverse situations. The controls organized by firms, including monitoring activities and bonding resources, can change the agents' evaluation of breaching duties' probabilities and values. Moreover, the institutional and cultural infrastructure outside firms also plays significant roles in controlling firms' agency risks. Thus, the agency problems will be aggravated or diminished, depending on specific contexts.

On the other hand, Jensen and Meckling assumed that the value under the sole-manager-owner management should be maximum with zero agency costs due to the absence of interest divergence. However, sole-manager-owners can rarely reach the maximal point because of the bounded rationality. They are limited in information, alternatives, abilities, experience, time, and energy. Thus, as symmetric outcomes of a balance, owners pay agency costs and earn agency gains. When they earn more gains than the paid costs, the invested capital will gain returns as shown in profits. With positive profits, capital providers are encouraged to invest more capital and hire more employees, and the firms grow. On the contrary, the firms suffer from losses, and initial capital will be burned. Thus, the firm organization's mission is not only controlling agency costs but also motivating employees to increase value-creation.

5.2 Capitalizing employees' contributions in the multi-capital potential

Beyond the traditional definition as the labor force, we capitalize employees' contributions in the multi-capital potential: physical capital, human capital, organization capital, and social capital. Employees also provide financial capital; for example,

employee-owners purchase their firms' stocks.

Capital can be defined as the amount of wealth used in making profits (Sombart, 1953), while labor is defined as the work of working people enforced by transaction contracts with employers (Marx, 1867; Simon & Frank, 2005). In Solow's model (1957), labor is considered as a factor of physical capital. While, as defined as the skills the labor force possesses, human capital is an asset more than the traditional definition of labor. Named as "organization capital" (Prescott & Visscher, 1980), information is also an asset to the firm in modern management. Finally, social networks are considered as useful assets, especially to those innovative firms with smaller sizes and fewer financial resources. Employees' contributions in multi-capital provide significant power to enhance firms' innovation, performance, and reputation.

5.3 Defining employees' participation as one type of investment

For us, employees' participation is not only employees' voices for demanding interests for themselves, but also one type of investment in developing employees' multi-capital potential and creating more values for firms.

Being challenged by high risks and rapid speed of technological evolution, a choice "good enough" made by a small number of decision-makers will seldom be enough in the long term either for big incumbents or small entrants. With the active participation of employees at all levels, decision-makers' can understand their errors in stereotypical routines, find out more alternative solutions for problems, estimate more precisely values and probabilities of alternatives, diversify strategy focuses, anticipate negative results, and balance different interests in firms.

Moreover, in participation, employees learn how to analyze firms' problems, express their opinions, and develop other social networks in the firms' interest. In this way, they

change their mentality beyond the usual working positions, generate new social capital, and increase human capital by developing new competencies.

Thanks to employees' participation, firms improve the quality of decisions, reduce failures of innovation, enhance organisation structure' efficiency, and facilitate firms' adaption to the challenging environments of rapid technology changes.

5.4 Balancing diverse capital providers' interests in the ESOP design

The implementation of ESOPs enables firms to recognize employees' contributions, motivate their multi-capital potential, construct channels for employee-owners' participation, align conflicts of interest between employees and firm owners, and reduce agency costs.

However, new agency risks can be generated due to the divergence of interests between employee-owners working in firms and share-owners outside firms. In reality, the divergence of interests between different capital providers does not change, even though employees change their identities through ESOPs.

Objectively, employees have limited financial wealth. If firms are defeated in market competitions, employee-owners will suffer from double losses: jobs and their savings. Thus, employees should not bear the primary responsibility of raising financial capital for firm operations. We need both financial capital providers bearing capital risks and employees developing multi-capital potential for value-creating.

Few people pay attention to the details of the incentive effects of ESOPs. In reality, employees working in listed firms can freely trade stocks in the market with their own savings. The advantage through ESOPs is based upon the inherent discounts or gifts proposed by ESOP schemes. Essentially, these are the benefits alienated by market shareholders to employee-owners, with which investors expect to motivate employee-

owners' potential and improve firm performance. With firms' growth, investors will compensate for their damages and gain returns in the market with the new values created by employees. If the implementation of ESOPs cannot improve firms' performance, few new values are created to compensate market investors. In the long term, stock prices decrease, employee-owners also gain less and less price difference in the market, and the motivation effects become less and less significant. At last, both market investors and employee-owners lose in the ESOP games.

In the environments of insufficient legal supervision and firms' controls, severe agency problems will break out in the ESOP framework because imperfect infrastructure and short-term earning desires will stimulate employee-owners to maximize their own interests by sacrificing those of market investors or creditors.

Directly or indirectly, most financial contributors supporting incorporated companies are small and medium investors with their individual or family savings. Due to the asymmetry of information and limited power in corporate governance, even the controlling shareholders of a bigger capital size cannot protect their interests in the organization where the ownership and the management power separate.

To achieve a healthy and continuous growth of firms, we need to design a suitable mechanism based on the "fair play" spirit, balance different capital providers' interests and protect all the actors involved in the ESOP design, like employees, employee-owners, market investors and creditors.

5.5 Recalling agency controls based upon experience

Due to agency problems, the first ESOP trials in China in the 1990s resulted in an entire failure. After seven years' reflection, ESOPs were legally authorized to be relaunched in China with strict agency controls and full transparency for the public. Having learned from the experience of previous failures, both SIPs launched since 2005 and

ESOPs-2014 launched since 2014, are constrained by similar regulations and internal controls. This is the essential similarity in their structures that has led to the birth of the Core-staff-based ESOPs.

We realize that ownership is a scarce resource. Unlimited distribution of employee shares will harm market shareholders' interests and destroy the financial capital market. In the new design of ESOPs, the distribution of employee-owner shares has been controlled to keep a right balance between shares' supply and demand, and the participants' accessibility is selective. Moreover, most participants should devote themselves to achieve performance goals; otherwise, the relevant ESOP benefits or risk compensations will be withdrawn.

Specific regulations are established to protect market investors and control employee owners' abuse of power, and severe discipline controls ESOP participants' conduct. All the ESOP firms' loan requirements should be strictly controlled by financial institutions.

We examine these new ESOP schemes' performance at three dimensions, corresponding to three types of agency risks. Firstly, we use the profits as basic performance measures to verify whether the implementation of ESOPs can reduce traditional agency risks in firms and motivate employees' potential for value-creation. Secondly, we use the debt ratios to verify firms' business risks and the agency risks towards creditors. Thirdly, we use market values to observe whether market investors are satisfied with protections and gain positive returns through these new ESOPs.

Our test results strongly support that Core-staff-based ESOPs enable firms to improve firm performance, reduce business risks, and increase market values in the normal business situations of gains. Furthermore, these new ESOP schemes propose efficient solutions to innovators' dilemma. They enhance the cycle effects between R&D investments and firm

profits, reduce the inherent performance gap in the Hi-Tech industry, and increase innovative firms' survival chances together with the government's supportive policies.

6. Research trials: applying for big data skills and structured equations

Distinct from common approaches in big data, we apply for specific mining skills. Our mission is collecting information from 61522 firm announcements of more than one million pages. We begin with case studies of more than 400 companies and summarize the main characteristics of ESOP schemes in variables. We then, cooperate with data providing companies to elaborate computer programs and search for data in the announcements. We check the computer-collecting data with law studies and case studies and correct computer errors. We codify these data with numeric codes and segment them in different data groups. In this way, we accelerate our research's speed and transform literature materials in quantitative data, based on which we construct our database for modeling and statistics.

Furthermore, we choose total-sample-sized data for our regressions. For example, we use a cross-section database covering all the 3523 Chinese listed firms in binary regressions to verify the specificities of ESOP firms. We compare performance quartiles between ESOP firms and Non-ESOP firms, between Prior-ESOPs and Post-ESOPs, with a database of 139018 firm-quarter data.

Besides these big data applications, we improve the models' efficiency with structured equations and segmentation in data groups and achieve significant results and modeling robustness. The values of R^2 are averagely more than 45% in our models; some of them obtain 99.82%. Moreover, we succeed in modeling cycle effects with lagged data and unlagged data, for example, the cycle between R&D expenses and firm profits of years "t-1", "t" and "t+1."

Finally, we verify our test results with different models and data. For instance, we conduct panel regressions based upon 119994 firm-quarter data to test various agency risks. Analyzing the roles of ESOPs in innovation, we use two databases consisting of 15031 and 30963 annual logarithm data to reexamine the previous results on quarterly data. We also use statistics to complement and interpret regression test results, in order to understand not only whether our tests have significant effects and which factors are significant, but also how and why they are significant. By this means, we reduce the bias like samples' particularity, human perceptions, institutional constraints, and culture specificities.

7. Research dossier: research papers fit-into a structured thesis

Distinct from a classical dissertation, the current research dossier is a structured thesis in which four independent research papers are embedded. Each of these papers has its own theoretical framework, methodology, data, findings, and further discussions. To satisfy readers of different journals or reviews, we are obliged to reintroduce some basic knowledge about ESOPs and the discovery of Core-staff-based ESOPs in each article. To be fit-into the thesis structure, we delete these papers' abstracts, introductions, and conclusions, rewrite the dossier's general abstract, introduction, conclusion, and add the connections between chapters. However, some explanations are inevitably repeated to maintain the original papers' structures. Thus, we apologize for the eventual inconvenience brought to readers.

To facilitate French-speaking people's comprehension, we insert a bilingual abstract (résumé) and research summary (synthèse de recherche) written in French and English. We attach the paper submission records and conference proceedings to this dossier (see the appendices).

To adapt to the thesis style, we change the articles' titles as below:

- Chapter I. Core-staff-based ESOPs: a new concept of ESOPs
- Chapter II. Potential factors influencing ESOP firms' choices
- Chapter III. Performance analyses of Core-staff-based ESOPs
- Chapter IV. Roles of ESOPs in innovation

CHAPTER I.

CORE-STAFF-BASED ESOPS: A NEW CONCEPT OF ESOPS

1. Basic knowledge of employee share ownership plans (ESOPs)

1.1 ESOPs defined

The ESOP, Employee Share Ownership Plan, also known as the Employee Equity Ownership Plan, is a corporate finance approach that a company gives its shares fully or partly to employees working in their company. For the listed companies on the stock market, the ESOP is referred to as: the Employee Stock Ownership Plan (Shields & Brown, 2007). Distinct from profit-sharing schemes, ESOPs are share-based financial participation schemes, focusing on long-term rewards in share value and a less direct link to profitability (Pendleton, 1997). Tax benefits could be one of the critical determinants which identify this difference in the USA and the UK. However, they are not significant in other countries.

Far more than a pay incentive, ESOPs are blurring the traditional boundary between workers and owners. Since implementing these schemes, a new structure of firm ownership has come into being: both workers and directors invest in their employer. This ownership grants employee investors specific claims and privileges that previously only belonged to firm owners, including the access to profits or information and participation in decision-making processes, etc. (Rousseau & Shperling, 2003). While cash-based profit-sharing schemes do not attempt to elicit worker participation (Gomez-Merjia, Balkin & Cardy, 2011).

The participation in ESOPs varies in different institutional contexts, that can be interpreted in individual participation, collective voting, entrusted delegating, or nominal rights. Each employee shareowner has pro-rata rights based on their shares. While, cooperative firms, as total-employee-owned enterprises, practice full participation of

working staff, in which each employee equally owns one vote. Furthermore, the co-determination mechanism, set up by worker councils, trade unions, or other worker organizations, can be used by all forms of enterprises without necessarily being linked to employee ownership.

1.2 Main rationales supporting ESOPs

Many rationales support employee share ownership. The relevant research can be summarized in the literature of labor economics, industrial relations, and human management (Landau et al., 2007). Moreover, ESOP practices may significantly influence corporate governance with various bundling involvements (Guery, 2015). The theoretical framework well accepted by the mainstream resides in the Agency Theory (Pendleton, 1997; Rousseau & Shperling, 2003; Pendleton, 2006; Gormez-Merjia et al., 2011; Guery 2015; Poutsma & Ligthart 2017). We analyze the roles involved in the theme of ownership with different mechanisms that have been generally implemented.

Traditionally two roles were organized in firms: owners that owned a legal title to the firm and managed the firm's operations and workers who produced products or provided services. Owners represented the capital and principals; workers represented the labor and agents. With the development of corporate governance, ownership, and management have been separated. Managers stand as an independent role on the stage: essentially, they contribute their intellectual labor to organization, conciliation, motivation, and control the whole process of value creation until achieving goals; however, managers themselves are agents too. The monitoring system in this mechanism is constructed by a unidirectional chain: workers are controlled by managers, and managers are controlled by firm owners; the middle point of this chain is the role of managers.

In accounting, material assets that have been utilized in production are recorded in fixed costs, and payments for the employment of workers and managers are allocated in

variable costs. Lastly the residual value that remains after taxes will be distributed among firm owners, that is the famous “surplus value” (Marx, 1867), also called “profit.”

With the implementation of ESOPs, one part of ownership, together with its specific rights, can be transferred to employees. Thus, the identities of managers or workers have been changed: they play multiple roles as agents + principals (Rousseau & Shperling, 2003). Like chain reactions, changes in physical ownership induce changes in social roles and their relationship, and then induce changes in employees’ perceptions of themselves and the firm environment. Finally, the human motives’ satisfaction enhances the employees’ commitments to firms and encourages their contribution to the firms’ growth perspectives. These ESOP psychological effects have been explained in Klein’s three models (Klein 1987) and later defined as “psychological ownership” (Pierce, Kostova & Dirks, 2001; 2003), the original theory of which can be explained by the motivation theories, such as the Porter-Lawler Model or Vroom’s expectancy theory.

1.3 Standard ESOP mechanisms practiced by western firms

Different ESOP mechanisms can be selected based upon the targets of motivation. Since managers play particular roles in the monitoring chain of modern management models, they become the first target aimed by firm owners with ESOP schemes. According to the GEO Global Equity Survey (2014), the share-based schemes for management staff, especially for upper management levels, have been offered by 93% of the companies surveyed in the US, 87% in Europe, and 75% in the rest of the world (Wolff & Zschoche 2015). From investor behavior, upper management decisions can be better evaluated, and executives in top management can be better monitored by firm owners with the implementation of share-based schemes (Shavell 1979; Fama & Jensen, 1983; Jensen & Murphy 1990; Bebchuk & Fried 2003). Beyond the agent control perspectives, share ownership solutions are attractive for family-owned firms, searching for an ideal partnership with high-level managers to sustain the family business with their particular

contributions. One example is where the Browns relied on Joseph Shipley to save Liverpool House of BBH Bank from bankruptcy, at the time when their family business was in crisis due to the worse turn of the British economy in 1837.

Although senior managers play key roles in strategies and organization, even save firms in crisis with their talents, the essential transformation from materials to products or direct supply of services is carried out by workers. Visibly, workers are producers of value. As a result, trade unions have been set up to claim workers' rights on firms' surplus-value that only belonged to capital providers in traditional models. Conflicts have blown up together with economic inequality throughout the life of capitalism since it was born, and different solutions to respond to this question have evolved in arguments on societal ideologies. In 1956, Louis Kelso developed ESOPs with the participation of the working staff and published his work <*The Capital Manifesto*> two years later. His idea suggests disagreement both on traditional capitalism and communism and proposes the third way: to make employees become owners with ESOP schemes. This new way has been concretized in the "Broad-based ESOPs" and has become an example of "Economy democracy" (Kelso & Adler, 1958). In the past sixty years, it has been popularly promoted in the US, the UK, Australia, and the European Union. The National Center for Employee Ownership of the US estimated in 2018 that approximately 32 million Americans had owned employer stocks through various ESOP schemes.

2. Truth or stereotypes:

Are ESOPs in China broad-based or executive-based ESOPs?

In China, the mainstream of academic research believes that we would have followed in western firms' footsteps and implemented ESOPs the same as the standard practice. However, we found non-conformity through case studies. Are the ESOPs implemented in

China broad-based or executive-based ESOPs? We launch our research to clarify the truth behind stereotypes.

2.1 Sequential evolving path of ESOPs in China

Since the 1980s, Chinese state-owned firms in Mainland China had tried to modernize their management systems. During 1992-1993, the <Opinions on the Standardization of Limited Liability Companies>, the <Opinions on the Standardization of Joint Stock Limited Companies> and <Company Law of the People's Republic of China> were issued to supervise the companies listed on Chinese stock markets, including ESOP schemes that had been implemented with the purpose to transfer one part of a company's property rights to employees. However, after only one year, the relevant regulations were formulated to correct the inappropriate application of ESOPs. Moreover, the implementation of ESOPs by publicly incorporated companies was suspended in 1998 by the regulations of the China Securities and Regulatory Commission, and the ESOPs implemented by privately incorporated companies were forced to clean-up by 2002. These first trials of ESOPs during the 1990s were grouped under the total-based ESOPs, and their failure was essentially due to Agency problems, interpreted by Chinese scholars as "Asymmetry of interests between players" (Wang, 2005).

After seven years of suspension, the implementation of ESOPs was authorized to be relaunched in 2005 with the promulgation of the <Measures for the Administration of Share Incentive Plans of Listed Companies (For Trial Implementation)> (briefly called SIP laws below). These "Share Incentive Plans" or "Equity Incentive Plans" (briefly called SIPs), were legally designed by SIP laws as incentive plans for senior executives. Further confirmation of the return of ESOPs was announced by the <Guiding Opinions on the Pilot Implementation of Employee Share Ownership Plans by Listed Companies> that were issued in 2014 (briefly called ESOP-2014 laws below). These "Employee Share Ownership

Plans” (briefly called ESOPs-2014) were legally defined by ESOP-2014 laws as the broad-based ESOPs.

2.2 Contrasts between popular beliefs and our preliminary research

Most law issuers, firm managers and academic researchers believe the below evolving path of Chinese ESOPs in three different historical periods: the total-based ESOPs in the 1990s, the executive-based ESOPs since 2005, and the broad-based ESOPs since 2014. Being perfectly conform to our normative knowledge and standard practice of western firms, almost all previous studies on Chinese ESOPs have recognized this framework (Lin, Trenberth and Kelly, 2010; Meng et al., 2011; Faigen, 2016; Lian, Su & Gu, 2011; Fang, Nofsinger & Quan, 2015; Zhang, Sun & Wan, 2016). Only Ren and her partners (2019) merged these three historical ESOP models into the broad-based ESOPs for panel regressions.

Furthermore, Chinese people traditionally do not like to take individual initiatives (Khairullah and Khairullah, 2013). Their risk aversion should naturally lead to a mimetic attitude under uncertainty and ambiguity, especially when ESOPs were relaunched after the suspension. Being driven by the coercive, mimetic, and normative forces, an isomorphic structuration process should be significant in the development pathway of Chinese ESOPs. In other words, the ESOP mechanisms implemented in China should demonstrate the same or similar characteristics to the ESOP schemes practiced in western countries.

However, our preliminary findings through case studies reject the above assumption: the ESOPs implemented in China since 2005 and since 2014 are neither broad-based nor executive-based ESOPs. Thus, we conduct analyses to examine the characteristics of the mechanism of ESOPs in execution and utilize institutional theories to analyze the impacts of environments on the ESOP development in China.

3. Theoretical framework and hypotheses

3.1 Diversification and homogenization

Organizational diversification and homogenization are two main mechanisms in the research of organization development. The debate around them started from the famous question: “Why are there so many kinds of organizations?” (Hannan and Freeman 1977). Departing from the logic of interactions between environments and organizations, Hannan and Freeman constructed their organizational ecology with three levels: community, population, and organization. They described the organization cycle containing birth, growth, change, and death, and prescribed a natural selection process among organizations in competing environments (Hannan and Freeman 1989).

However, DiMaggio and Powell captured a development process of organizational homogenization after the diversity demonstrated in the initial stages of the organization’s life cycle. They used the notion “isomorphism” to name this structuration process (DiMaggio and Powell, 1983). As defined by Hawley (1968), “isomorphism” is a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions. Furthermore, inherited from the bounded rationality (March and Simon 1958; Simon, 1962), DiMaggio and Powell developed the concept of collective rationality in the organizational field with three mechanisms of isomorphic institutional change: coercive, mimetic, and normative forces. Their work extends the power of organizational change from economic fitness to social adaptation, “not just for resources and customers, but for political power and institutional legitimacy” (Carroll and Delacroix, 1982; DiMaggio and Powell, 1983).

Most people ignore the conditions of homogenization. DiMaggio and Powell (1983) specified the predictors of isomorphic change both at the organizational level and at the field level. For example, the higher the dependence of organization A on organization B, the more probable A will become similar to organization B (Thompson, 1967; Pfeffer and

Salancik, 1978). The more uncertain the relationship between means and ends, the more probable organizations will structure themselves to be similar to the successful models that they have perceived (March and Cohen, 1974). The higher the reliance on academic credentials in choosing managerial and staff personnel, like university education programs or international norms, the more likely organizations will be operated like other organizations (DiMaggio and Powell, 1983). Furthermore, an isomorphic change in organizations needs relatively homogenous surroundings (Hawley, 1968).

3.2 Hypotheses

Based on the above analyses, we take advantage of examining Chinese ESOP mechanisms to observe the interactions between Chinese firms and their environments. If these ESOPs have similar characteristics to western firms' standard practice, an isomorphic process will be confirmed in ESOPs between Chinese firms and western firms. On the contrary, if these ESOPs demonstrate distinct characteristics from western firms' practice, specific impacts of environments will be confirmed during the organizational development.

In details, we set up our hypotheses, assuming that the ESOP practice of Chinese firms follows the issued laws or western firms' standard models as below:

Hypothesis 1: the SIPs implemented since 2005 are executive-based ESOPs.

Hypothesis 2: the SIPs implemented since 2005 are broad-based ESOPs.

Hypothesis 3: the ESOPs-2014 implemented since 2014 are broad-based ESOPs

Hypothesis 4: the ESOPs-2014 implemented since 2014 are executive-based ESOPs.

As introduced above, the designs of broad-based and executive-based ESOPs are based on the targets of firms' motivation. According to strict standards (Pendleton, 2006), the schemes in which more than 80% of working staff are allowed to participate can be defined as broad-based ESOPs. Thus, we utilize the proportion and identity of participants

as intermediate variables to examine the accessibility of participants, and translate the initial hypotheses as following:

Hypothesis 1a: the executive participants at the top management represent more than 80% of the total SIP participants.

Hypothesis 2a: the normal staff participants in SIPs represent the whole working staff or more than 80% of total staff.

Hypothesis 3a: the normal staff participants in ESOPs-2014 represent the whole working staff or more than 80% of total staff.

Hypothesis 4a: the executive participants at the top management represent more than 80% of total ESOPs-2014 participants.

Suppose these hypotheses are verified to be true. In that case, we will research the common elements that would have stimulated the homogenization development under the surface of the difference between two systems, analyzing the potential mechanisms in the isomorphic structuration process, like coercive, mimetic, and normative forces.

If all these hypotheses are rejected, we will research the specificities of ESOP schemes together with the impacts of environments, exploring the potential factors that would have influenced Chinese ESOP firms to disregard the normative credentials established by western firms and the mechanism designs defined by Chinese laws.

4. Methodology and data

4.1 Data

We select all the 3523 Chinese firms listed in the Stock exchanges of Shanghai and Shenzhen on June 30th, 2018, as our samples for tests, among which 2027 are non-ESOP companies and 1496 are ESOP companies, including SIP firms and ESOP-2014 firms. To respect transparency requirements, Chinese incorporated companies are obliged to inform

investors of each step of ESOP implementation with official announcements. As the primary data sources, we collect all the announcements published by these listed firms related to their ESOP activities during the period 1992-2018, including 51244 ESOP announcements and 10308 IPO announcements. A total of 3065 ESOP schemes have been announced since 2005, including SIPs and ESOPs-2014. Among these ESOPs, 2587 schemes have been put into execution since 2005, 27 ESOP proposals have been proposed since 2017 but still waiting for approvals, and 451 schemes have been suspended or canceled.

4.2 Methodology

The main approach that we utilize is the literature synthesis and statistics. However, the information collection in 61522 announcements of more than one million pages is challenging. To fulfill this research task in the limited time and resources, we use specific big data mining skills.

Different from the fashionable deep reading based on the analyses of keywords' frequencies or distances, we make the case studies of more than 400 companies firstly and summarize the main characteristics of ESOP schemes in variables. We cooperate with data providing companies to set up computer programs and search for data in announcements with keywords under the selected variables. And then we check the computer-collected data with law studies and case studies, and correct computer errors. Codifying the data with numeric codes and segmenting them in different data groups under the variables, we transform literature materials into quantitative data and construct our database for modeling and statistics. Finally, based on the statistics results and case study controls, we can capture the main characteristics of Chinese ESOP schemes and conduct comparative analyses with western firms' standard practices.

By combining computerized data mining skills with human controls, we overcame computer programs' weakness and accelerated our data work faced with the large sample size.

5. Results on the isomorphic structuration

5.1 SIPs are neither executive-based nor broad-based ESOPs

Legally, the executives working at the top management of public incorporated companies in China should be registered in the company statutes. Their activities should comply with specific regulations under strict controls. 96% of Chinese listed companies, both SIP firms and ESOP-2014 firms, have no more than 25 people representing top executives.

**Table 1. Frequency analysis of SIPs
(Executive participants out of total SIP participants)**

Percentage of Executive Participants out of Total SIP Participants	(1) SIPs in execution	(2) SIPs expired	(3) SIP proposals	(4) SIPs suspended/ canceled	Subtotal SIPs (1+2+3)	Total SIPs (1+2+3+4)
<10%	83.58%	69.57%	66.67%	65.97%	78.62%	76.61%
10%-20%	8.34%	14.72%	20.83%	9.55%	10.66%	10.48%
20%-30%	3.04%	3.51%	0.00%	4.48%	3.16%	3.37%
30%-40%	1.56%	2.01%	4.17%	2.09%	1.75%	1.80%
40-50%	0.43%	0.67%	0.00%	0.90%	0.51%	0.57%
50-60%	0.43%	1.00%	0.00%	1.19%	0.62%	0.71%
60-70%	0.87%	0.84%	0.00%	0.00%	0.85%	0.71%
70-80%	0.17%	0.50%	0.00%	0.30%	0.28%	0.28%
80-90%	0.09%	0.33%	0.00%	0.00%	0.17%	0.14%
90-100%	1.39%	3.51%	0.00%	4.78%	2.09%	2.51%
No data	0.09%	3.34%	8.33%	10.75%	1.30%	2.80%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

According to our statistics, 387,481 employees have participated in SIPs since 2005, among which only 10,699 are executive participants. The median number of SIP participants is 108, while the median number of executives participating in SIPs is only 5. As shown in Table 1, less than 2% of SIP schemes in execution have 80-100% executive participants. On the contrary, 98% of SIPs are confirmed not to be executive-based ESOPs for the senior executives at the top management. In reality, the executive participants represent less than 10% out of total SIP participants in 83.58% of SIPs.

**Table 2. Frequency analysis of SIPs
(SIP participants out of total staff)**

Percentage of SIP Participants out of Total Staff	(1) SIPs in execution	(2) SIPs expired	(3) SIP proposals	(4) SIPs suspended/ canceled	Subtotal SIPs (1+2+3)	Subtotal SIPs (1+2+3+4)
No data	0.09%	3.34%	8.33%	10.75%	1.30%	2.80%
<10%	65.07%	84.78%	62.50%	65.07%	71.69%	70.64%
10-20%	21.29%	9.20%	20.83%	16.72%	17.20%	17.13%
20-30%	9.21%	1.51%	4.17%	3.58%	6.54%	6.07%
30-40%	2.69%	0.67%	0.00%	1.49%	1.97%	1.90%
40-50%	0.96%	0.17%	0.00%	0.60%	0.68%	0.66%
50-60%	0.43%	0.17%	4.17%	1.19%	0.39%	0.52%
60-70%	0.09%	0.17%	0.00%	0.00%	0.11%	0.09%
70-80%	0.09%	0.00%	0.00%	0.00%	0.06%	0.05%
80-90%	0.00%	0.00%	0.00%	0.30%	0.00%	0.05%
90-100%	0.09%	0.00%	0.00%	0.30%	0.06%	0.09%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Moreover, as demonstrated in Table 2, among a total of 2108 SIPs, including the schemes that have been implemented, proposed, suspended or canceled and that have expired, 99.94% of SIPs by Chinese public listed companies are not broad-based ESOPs. In detail, in 65.07% of SIPs in execution, less than 10% of working staff have participated

in SIPs; and in 87.77% of SIPs, no more than 20% of working staff have participated in SIPs.

In sum, almost all SIPs implemented by Chinese listed firms during 2005-2018 are neither executive-based nor broad-based ESOPs. Hypotheses 1 and 3 are rejected.

5.2 ESOPs-2014 are neither broad-based nor executive-based ESOPs

The implementation of ESOPs-2014 was legally authorized in October 2014. These ESOP schemes have 435,987 participants from October 2014 to June 2018, including 6,757 executive participants. The median number of ESOP-2014 participants is 190. While the median number of total staff working in these listed companies is 2634.

**Table 3. Frequency analysis of ESOPs-2014
(ESOP participants out of total staff)**

Percentage of ESOP Participants /Total Staff	(1) New-ESOPs in execution	(2) New-ESOPs expired	(3) New-ESOPs proposals	(4) New-ESOPs suspended/ canceled	Subtotal New-ESOPs (1+2+3)	Subtotal New-ESOPs (1+2+3+4)
No data	6%	7%	0%	10%	6%	7%
<10%	55%	50%	100%	41%	53%	51%
10-20%	18%	24%	0%	20%	20%	20%
20-30%	11%	7%	0%	9%	9%	9%
30-40%	3%	5%	0%	8%	4%	4%
40-50%	2%	4%	0%	4%	3%	3%
50-60%	1%	1%	0%	1%	1%	1%
60-70%	1%	0%	0%	2%	1%	1%
70-80%	1%	1%	0%	3%	1%	1%
80-90%	1%	1%	0%	0%	1%	1%
90-100%	1%	1%	0%	2%	1%	1%
Total	100%	100%	100%	100%	100%	100%

With the frequency statistics demonstrated in Table 3, in more than 71% of schemes, there are less than 20% of working staff participating in ESOPs-2014. The broad-based ESOPs in which all working staff is accessible, count for less than 2% out of total ESOPs-2014 in execution. More precisely, in 55% of ESOPs-2014, less than 10% of working staff have participated in ESOP schemes. While in 18% of ESOPs-2014, more than 10% but less than 20% of working staff have participated in ESOP schemes. Therefore, Hypothesis 2 is rejected because the majority of ESOPs-2014 implemented in China are not broad-based ESOPs. The stereotypical impression that these ESOP schemes are broad-based ESOPs is far from reality.

**Table 4. Frequency analysis of ESOPs-2014
(executive participants out of total ESOP participants)**

Percentage of Executive Participants out of Total New-ESOP Participants	(1) New-ESOPs in execution	(2) New-ESOPs expired	(3) New-ESOPs proposals	(4) New-ESOPs suspended / canceled	Subtotal New-ESOPs (1+2+3)	Subtotal New-ESOPs (1+2+3+4)
<10%	75.31%	75.00%	33.33%	67.24%	75.03%	74.09%
10%-20%	9.21%	10.00%	66.67%	11.21%	9.75%	9.93%
20%-30%	3.35%	2.50%	0.00%	5.17%	2.97%	3.24%
30%-40%	1.26%	1.39%	0.00%	2.59%	1.31%	1.46%
40-50%	1.05%	0.83%	0.00%	0.86%	0.95%	0.94%
50-60%	1.26%	0.56%	0.00%	0.86%	0.95%	0.94%
60-70%	0.21%	0.28%	0.00%	0.00%	0.24%	0.21%
70-80%	0.21%	0.28%	0.00%	0.00%	0.24%	0.21%
80-90%	0.42%	0.00%	0.00%	0.00%	0.24%	0.21%
90-100%	1.67%	2.22%	0.00%	1.72%	1.90%	1.88%
No data	6.07%	6.94%	0.00%	10.34%	6.42%	6.90%
Total	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Like SIPs, ESOPs-2014 cannot be grouped under the executive-based ESOPs either. As shown in Table 4, even though a bias due to a small sampling number has been observed in ESOPs-2014, the final results remain the same: only 2% of ESOPs-2014 have more than 80% executive participants. In 84% of ESOPs-2014, the executive participants represent less than 20% of total participants. The median number of ESOP-2014 participants is 190, while the median number of executive participants in all these ESOPs-2014 is only 8.

In sum, all the hypotheses are rejected: neither SIPs implemented since 2005 nor ESOPs-2014 implemented since 2014 are broad-based ESOPs or executive-based ESOPs. The assumed isomorphic structuration in Chinese ESOP development has not occurred between Chinese firms and western firms. What is the mechanism of ESOP implemented in China? We should research these schemes' specificities and the environments of development in China.

5.3 The birth of Core-staff-based ESOPs: a historical isomorphic process between SIPs and ESOPs-2014

We observe a subsequent evolution in time between SIPs and ESOPs-2014, and each of them has its specificity in operation. However, they resemble each other at the structural level in the main mechanism designs.

Firstly, both SIPs and ESOPs-2014 have a similar number and similar structure of participants. As demonstrated above, in 87% of SIPs and 71% of ESOPs-2014, the participants represent no more than 20% of the total working staff, and in 87% of SIPs and 84% of ESOPs-2014, the executive participants represent no more than 20% of total number of participants.

Secondly, both SIPs and ESOPs-2014 have a similar structure of capital. Few executive employee-owners have predominant power of capital in SIPs or ESOPs-2014. In

99% of SIPs and 89% of ESOPs-2014 in which the firms have disclosed the capital proportion, employee shareowners have a power of less than 5% out of total shares of the firms.

To defend our findings as mentioned above, we have also examined the procedures and targets explained in announcements. As clarified in the objectives in their announcements, most SIPs have aimed to motivate the “core staff,” including executives in top management, other senior working staff in direction, managers at the middle level, and any other excellent employees that make particular contributions to firms. The procedures confirm that SIPs are not accessible for the entire working staff but accessible for senior executives and the qualified staff out of the top management. In practice, the lists of participants should be proposed by SIP commissions or administration boards, specifying names and positions of participants, and supervised by company supervisors and independent law firms. Different duties have been distinguished for the executive participants and non-executive participants in SIP schemes. Like SIPs, most ESOPs-2014 focus on the qualified “core staff” instead of total staff, in which the relevant lists of participants should be proposed by the administration boards or general directors, and supervised by company supervisors and independent law firms. Different duties have also been defined for the executive participants and non-executive participants in ESOP-2014 schemes.

Because of the similarity being observed on the main features of ESOP schemes, like the functions and incentive targets of ESOPs, the number and structure of participants, the capital power of employee-owners, and the relevant processes of participant selection, we reveal an isomorphic structuration process in the time between SIPs and ESOPs-2014. Thus, we merge these two ESOP mechanisms having surged in different historical periods into one single model. Since several ESOP schemes specify that the participation is accessible

by the qualification of “core staff,” we call this new ESOP design “Core-staff-based ESOPs.”

5.4 Specificities of environments, firm structures, and learning paths

A question will be naturally raised: why haven't Chinese firms implemented western firms' standard models, like broad-based or executive-based ESOPs? In other words, why has the mechanism of ESOP been changed in China?

As we know, the isomorphic structuration requires the same set of environments, and the institutional and cultural environments in China where firms have implemented ESOPs are entirely different from the western countries.

Firstly, the regulations issued since 2005 represent a neutral position of the Chinese government. Distinct from the developed countries, no direct institutional incentives have been provided to encourage Chinese listed firms to implement ESOPs. Furthermore, all ESOP firms and individual participants should pay taxes for ESOP benefits. On the other hand, even though two standard models are defined in the relevant laws, the government gives firms full rights to choose without sanctions. As a result, Chinese firms do not need to oblige themselves to be structured in the recommended models for legitimacy.

Secondly, as analyzed with the predictors (DiMaggio and Powell, 1983), no evident dependence or centralized relationship is demonstrated between Chinese listed firms and western firms. These Chinese listed firms also work in all sectors, few of which depend on one or several resources.

However, Chinese people have a strong risk aversion. Why haven't they imitated standard practice of western firms under uncertainty and ambiguity, and implemented the normative models that have been already proved to be successful in the developed countries?

In reality, they had tried. However, they have changed their initial routines for various reasons.

For example, why have they extended the target of SIPs from executives to the “core-staff” both in and out of the top management? In ESOP firms’ characteristics as analyzed in Chapter II, the property of family-controlled structure is significant in tests. More than 84% of ESOP firms are family-controlled firms, in which the majority of executives at the top management are usually family members, holding firm shares through a family relationship. Those firms which have changed the design of executive-based ESOPs, aim to construct a partner relationship with the excellent staff outside the families. Thus, specific firm structures in China is one reason for the change.

Why have they selected a limited number of working staff instead of implementing broad-based ESOPs? Firstly, the culture inside family-controlled firms is not an open culture. Too strong and too much participation of employee-owners will threaten the family power in decision-making processes. Secondly, the Chinese labor market is an entirely flexible market, in which few jobs have permanent employment contracts, and limited duration contracts (usually at a short term like one year) play predominant roles. Both companies and employees have full rights to discuss terminating the employment relationship in advance before these contracts expire. Thirdly, we observe specific immigration of the labor force from rural regions to cities. Most “immigrant” workers change jobs each year or after several months. Even though the implementation of ESOPs can lower the working staff’s turnover rates, firm owners also need security to ensure their capital structure. In these circumstances, distributing shares at discounts or gifting shares to most operational staff without selection is not convenient in Chinese business operations.

Furthermore, as called “the world’s factory,” the main Chinese manufacturing style is characterized by Fordism or Toyotism. The workers at basic positions work on automatic or semi-automatic production lines, rewarded by wages, salaries and performance bonuses.

Even though some workers quit factories, new workers can fulfill production tasks with a short time of training. Thus, firm owners use the share-based schemes like ESOPs to attract the employees with particular values, not only focusing on senior managers, but also the elites in innovation and marketing, loyal staff working at senior level, directors at the middle level, long-term skilled workers or workgroup chiefs in service, and some workers at basic positions hurt in a work injury, etc.

Few of non-family-controlled firms that are implementing ESOPs, like the state-owned firms, have chosen the broad-based ESOPs, even though most employees have long-term contracts. Based on our test results in Chapter II, we believe that the first trials' negative experience in the 1990s has significantly impacted these firms' choices. To avoid repeating agency problems, the government implements strict supervision that has hindered the state-owned companies' challenge. Moreover, new laws have specified that the discounts offered to SIP restricted shares and the costs of SIP options should be registered in accounting and paid by the funds provided by firms or contributed by the improved performance. In the leveraged ESOPs-2014, controlling shareholders or companies should provide guarantees for the ESOP funds in case of margin calls. Thus, the rigid accounting disciplines and the lack of funds are one of probable reasons for developing an ESOP mechanism focused on a limited number of participants instead of all the working staff.

On the other hand, the traditional reward system is inefficient to motivate the managers working in state-owned companies (Faigen, 2016). To resolve this problem, the ESOPs were authorized to be relaunched in 2005 with the reform called "stock right division," and the first trials were focused on the executives and senior managers. However, under the bureaucracy of big-sized public firms, the incentives towards a few senior managers were insignificant in improving firms' performance, especially during and after the crises of 2008-2009. Thus, the targets of incentives have extended out of the top

management, but limited to a small number of participants covering all the working staff levels with particular competencies or contributions. The criteria of performance are emphasized in the ESOP design. Strict regulations and disciplines control ESOP participants.

Finally, as explained in Chapter III, a new mechanism of ESOPs is created, encouraging Chinese firms to adapt themselves to specific environments in China after failure trials. Essentially, this learning path based on a trial-error-trial model has generated a new normative force in the process of isomorphic structuration that merges SIPs and ESOPs-2014.

Even though China has rapidly evolved during the last three decades, specific organizational attributes remain stable, resisting changes, for example: the family-controlled firm structure, the flexibility of the labor market, the firms' freedom supported by governmental policies, the impacts of experience, etc. This stability has created continuity in the Chinese firms' development, but independent of the environments in western countries. Thus, an isomorphic structuration has not happened as forecasted between Chinese firms and western firms in ESOP development. It has occurred between two types of Chinese ESOP practice surging in different periods and created a new ESOP model, "Core-staff-based ESOPs," that corresponds to the specific environments in China and adds diversity to the common framework of ESOPs. However, people still rely on the normative credentials established by developed countries. They believe that Chinese firms would be implementing the executive-based ESOPs or the broad-based ESOPs. This path dependency sustains the diffusion of stereotypes, like a specific psychological isomorphism in human perceptions. Thus, we observe a binary contradiction that the mechanism of Core-staff-based ESOPs, as organizational innovation, has developed under the illusions of doing the same things as others.

6. Multi-layer organization structure under Core-staff-based ESOPs

6.1 A compromise between homogenization and diversification in the multi-layer organization structure

Homogenization or diversification: which theory explains the reality of organizational changes? As explained by Brewer (2003), an optimal distinctiveness exists in the self of individuals and organizations, caused by “the tension between humans’ equally compelling needs for assimilation and uniqueness” (Whetten 2006). Being inspired by the cellular structures in science and different levels of CED (central, enduring, and distinctive) attributes of organizational identity (Albert and Whetten, 1985; Whetten, 2006), we postulate a multi-layer organizational structure, under which homogenization and diversification coexist at the different levels of organizations. As a result, organizations may display similar forms and practices based on different motivations and structures; or they may display diversified forms based on the same focus and similar internal processes. If we explain the variations of diversification and homogenization in a two-layer matrix, we can develop four types of organizations in the population: the organizations of different forms and different structures; the organizations of different forms and similar structures; the organizations of similar forms and similar structures; and the organizations of similar forms and different structures. In reality, numerous levels or organizational layers count in defining categories and subcategories, and the coexistence even cross-level interactions of homogenous and heterogenous structuration processes construct a real and complex organizational ecology.

6.2 Specificity of SIPs and ESOPs-2014

Based on the above analyses, we analyze different structuration processes that have influenced the ESOP development of China. Firstly, the diversity has surged in Chinese ESOPs, distinct from the standard practice of western firms. Secondly, a historical

isomorphic process in the time-space has merged SIPs and ESOPs-2014 into one single model: Core-staff-based ESOPs. We advance our research, focusing on the specificities of SIPs and ESOPs-2014, which are the sub-models under Core-staff-based ESOPs, and the particular ESOP designs developed under these sub-models.

SIPs have three different mechanisms: SIP restricted shares, SIP stock options, and SIP stock appreciation rights. More than 62% of SIPs rely on restricted stocks, 37% on stock options, and 1% on stock appreciation rights.

In SIP restricted shares, companies usually offer restricted stocks to SIP participants with discounts or provide funds drawn from profits. Regularly, these stocks should be locked for at least 24 months. Later, one part of distributed stocks can be unlocked and individually owned by SIP participants, only if they pass annual performance assessments.

SIP stock options are effectively stock call options of the American model. These call options give employees the right to purchase their firm stocks at the strike prices and exercise their rights any day during the whole exercising period until the expiration dates, except for specific periods legally prohibited for employee-owners to trade ESOP stocks. A significant difference between SIP calls and other regular calls is regarding the restriction of SIP call buyers' rights: only if the qualified employees pass annual performance assessments, can they decide whether to exercise or not exercise options; otherwise, SIP call options will be canceled by firms.

SIP stock appreciation rights were initially designed for SIP foreign participants who worked in China. Before Sep.15th 2018, no foreigner was authorized to own Chinese stocks listed as "A" type. Thus, virtual stocks and stock options had been invented in SIPs, through which the participants have the right to own financial gains derived from increasing share values if they pass the qualification and annual performance assessments. However, they do not have physical rights like other shareholders or formal participation

rights like other SIP employee-owners. Since Sep.15th, 2018, foreigners have been allowed to participate equally in ESOPs in China. As a result, the utilization of virtual stocks in ESOPs are likely to change.

Since 2014, ESOPs-2014 have grown in parallel with SIPs. Except for the initial qualification procedure similar to SIPS, only 10% of these ESOPs emphasize annual performance assessments to unlock or authorize exercising rights on the participants' ESOP parts. Furthermore, only a few of ESOP-2014 companies have funded ESOP schemes through profits derived from overperformance or have born extra costs to grant employees shares with discounts. The majority of ESOPs-2014 use employee self-funds and different types of financial leverages. Like specific ESOP investment fund subscribers, the employee-owners participating in ESOPs-2014 can enjoy the leveraged gains when the investment funds have positive performance, but they do not need to bear the capital loss when these ESOP funds have adverse outcomes. In the case of excessive losses of more than the total amount of employees' capital, the controlling shareholders or companies should bear responsibility for margin calls and capital losses. As exchanged, employee-owners should fulfill obligations and achieve performance goals to obtain their firms' support at the worst moments. Otherwise, they will lose their rights on the firms' guarantees of margin calls, the compensation of their capital, or the fixed income rates promised by specific firms during the bear markets.

Better participation channels have been proposed to employee shareowners in ESOPs-2014. However, the property rights owned by these ESOP participants are characterized by collective holding. Thus, employee-owners participation in corporate governance relies on their collective expression through internal ESOP organizational devices like the ESOP commissions.

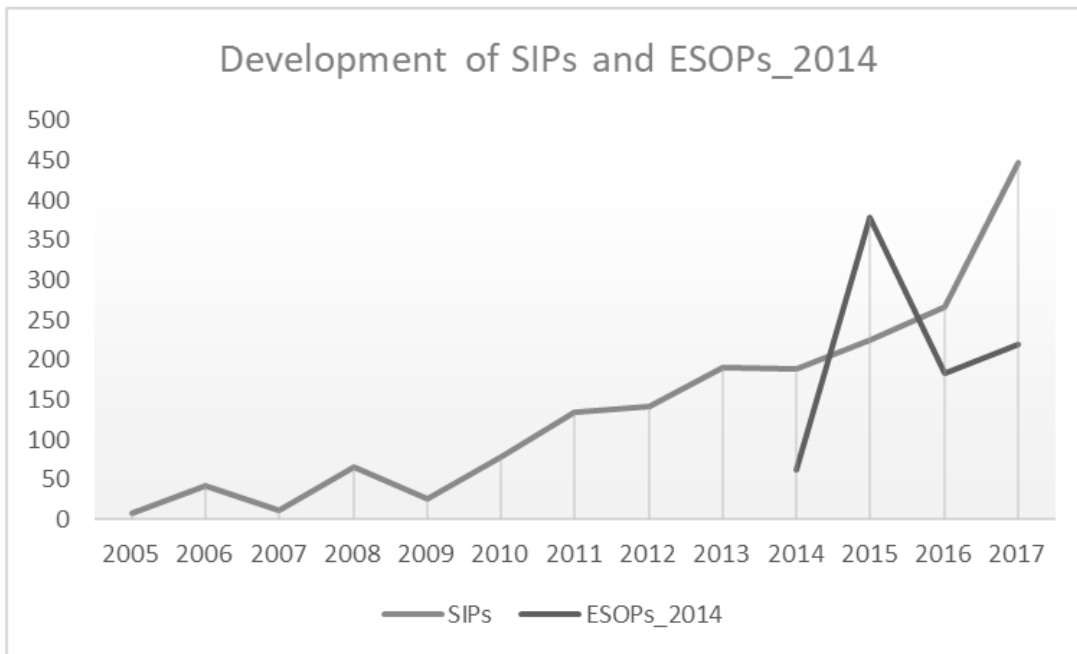
6.3 Interactions between SIPs and ESOPs-2014: competition and cooperation

In parallel with specific organizational stability observed in the ESOP development as mentioned above, we also observe dynamic changes due to Chinese firms' choices in specific circumstances. Like streams, new entrants join in the group of SIP firms or ESOP-2014 firms, and some firms change their ESOP mechanisms or entirely quit the ESOP groups. The outcomes of these firms' decision-making processes lead to competition or cooperation between SIPs and ESOPs-2014.

According to our statistics, 31.39 billion shares have been granted to employee-owners by gifting or at compromised prices as defined in SIPs. The total share value of SIPs is 331.99 billion RMB (about 39.52 billion euros), and the average amount of capital contributed by each SIP participant counts 109.28 thousand euros during the period 2005-2018. While the total amount of ESOP-2014 parts is 150.16 billion RMB (about 19.15 billion euros), and the average amount of capital contributed by each participant amounts to 43.9 thousand euros during 2015-2018. Even though SIPs have been developed for more than thirteen years and ESOPs-2014 only four years, the total number of participants in ESOPs-2014 is 12% more than that of SIPs, probably due to the mechanism's attractiveness.

However, as shown in Chart 1, the growth of ESOPs-2014 reached its climax in 2015 but dived immediately in 2016; while the development of SIPs has demonstrated a continuous and robust growth since 2005. The risks of leveraged structure, the lack of diversification in the portfolio, and the limitation of ESOP participants' individual rights in ESOPs-2014, may probably be the reason for the fluctuation. Moreover, big crises, unfortunately, occurred on Chinese stock markets in 2015. ESOP-2014 portfolios suffered more from these drops on the stock market than SIPs. Perhaps, for this reason, many firms and employees gave up ESOP-2014 mechanisms and turned back to SIPs during 2016-2017. As a result, when ESOPs-2014 dropped dramatically, the number of SIP schemes increased remarkably.

Chart 1



Another interesting tendency has drawn our attention. There are a small number of ESOP companies that have implemented both SIPs and ESOPs-2014. One qualified employee cannot join in two employee share ownership plans at the same time. This cooperation between SIPs and ESOPs-2014 laid the birth of a new model: the mixed ESOPs (SIP and ESOP-2014). Theoretically, it possesses the advantages both of SIPs and ESOPs-2014: enabling firms to establish a strict system of assessments that will continuously improve performance; enabling ESOPs to collect ample funds contributed by excessive profits; enabling employees to participate actively in corporate governance with more available channels; and enabling employee-owners to protect their investment with independent asset management systems, etc.

However, this mixed mechanism may have conflicts of interest and diverse participation directions between different types of employee-owners. For example, the introduction of financial leverage will increase the risk exposure and aggregate ESOP firms' losses at the worst moment, but increase the gains of ESOP-2014 employee-owners at the

best moment. On the other side, SIP participants have to suffer from the disturbances caused by the leveraged losses charged on the firms, but cannot enjoy the leveraged benefits of ESOP investment funds during the bull market. Furthermore, SIP participants should achieve performance goals to obtain the ESOP shares and benefits. In comparison, ESOP-2014 employee-owners should achieve performance goals to obtain firms' guarantees or compensations in the case of stocks' diving. Reasonably, ESOP-2014 participants will take more care of their performance when they need risk compensation, but it will be more difficult for them to fulfill tasks in challenging circumstances. These ESOP-2014 participants will also be criticized by SIP employee-owners and other employees for having taken so many loans for investments. Thus, the mixed ESOPs possesses particular advantages and disadvantages compared to the other mechanisms.

7. Summary and open questions

Like the categories of biodiversity, the interacting processes of homogenization and diversification generate the similarity and diversity in the organizational nature and categorize organizations with a multi-layer structure. The cooperation and competition between different mechanisms lead to organizational changes, even the birth of new organizations and the death of the old ones. Based on these analyses, we observe the Chinese ESOP development in an organizational ecology in which individuals, organizations, and society interact.

We reveal a subsequent evolution in different ESOP mechanisms in China: the first trials of ESOPs in the 1990s, the SIPs authorized since 2005, and the ESOPs-2014 launched since 2014. Being verified by our tests, neither SIPs nor ESOPs-2014 are broad-based ESOPs or executive-based ESOPs. Isomorphic structuration has not occurred between Chinese firms and western firms due to the independence of organizations, specificities of environments, and a particular learning process of Chinese firms through trial-error-trial

models. However, with the stability of organizational attributes resisting changes, an isomorphic process has succeeded in merging SIPs and ESOPs-2014 into one single model: Core-staff-based ESOPs. These new ESOPs address the scarcity of ownership and introduce competition in workplaces. The qualification is accessible for all the working staff, including senior executives, directors at the middle level, and employees at basic positions, but only those with particular contributions can be qualified to participate in “Core-Staff-Based ESOPs.” With our findings, the whole history of ESOP evolution in China can be summarized in two periods instead of three periods: Total-Staff-Based ESOPs during the 1990s and Core-Staff-Based ESOPs from 2005 until today.

Except for the isomorphism at the structural level, we demonstrate the sub-categorical diversity under Core-staff-based ESOPs: the sub-models (SIPs and ESOPs-2014) and different variants under these sub-models. Firms’ choices lead to the structuration, competition, and cooperation between SIPs and ESOPs-2014, and create a new ESOP sub-model: the mixed ESOPs. Further analyses should explore the potential factors having influenced firms’ choices and stimulated the ESOP development in China facing the challenges of traditional values and risk aversion attitudes.

CHAPTER II.

POTENTIAL FACTORS INFLUENCING ESOP FIRMS' CHOICES

1. Challenge and change: Which factors have influenced firms' choices and stimulated the ESOP development in China?

With times of trials and failures, a new ESOP model called “Core-Staff-Based ESOPs,” has been created in China, requiring employee qualifications for their participation. During the period 2005-2018, 1496 Chinese listed firms out of 3523 have implemented Core-staff-based ESOPs. Compared to the presence of ESOPs in western firms, the proportion of ESOP firms in China is still underdeveloped, which leads us to ask the following question: Why has the ESOP development been limited?

In reality, the tendency that we observe in organization populations is composed of numerous organizations' actions. The heterogeneity of Chinese firms' actions regarding the ESOP implementation reflects their different choices: implementing ESOPs or not implementing them. Thus, the above question at the institutional level can be translated into another question from the view of firms' decision-making processes: Why do some Chinese firms decide to implement the new ESOPs and others not?

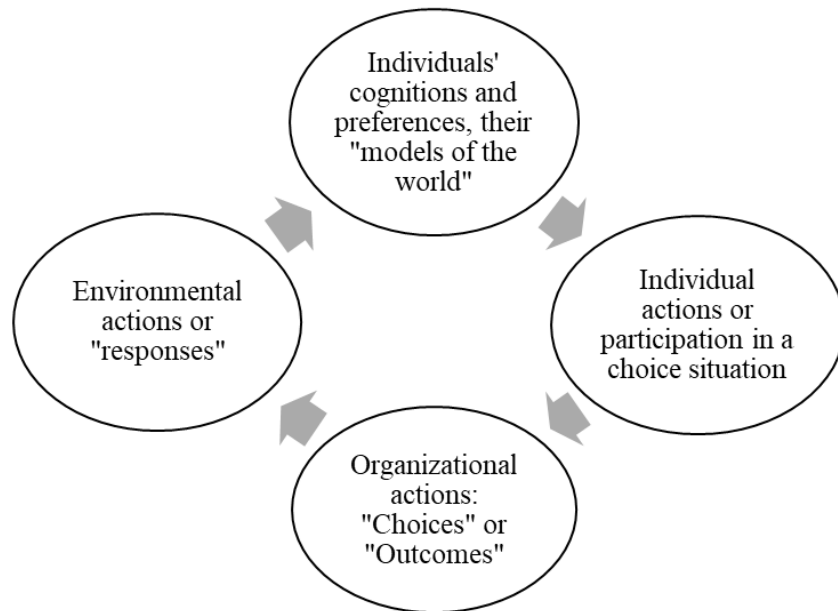
Since the beginning, the implementation of ESOPs is not obligatory in China, and Chinese people generally do not like to take individual initiatives. Under these specific institutional and cultural backgrounds, Chinese firms' likeliest choice will be to keep working in familiar routines without changes. As we have observed, 58% of Chinese firms have not implemented Core-Staff-Based ESOPs. On the contrary, those who have decided to implement these new ESOPs, especially the first ones, have made a relatively risky choice. Thus, our research aims to identify which factors have motivated these Chinese firms to take risks for change and who they are.

2. Theoretical framework and hypotheses

2.1 *Decision-making processes and Prospect Theory*

From the perspective of modern behavioral theories, organizations are managed by human beings. Distinct from Max Weber's rule-based concepts, behavioral economists introduced a choice-based framework for the decision-making process that can be abstracted in a closed cycle of connections, as shown in Chart 2.

Chart 2. Organizational Choice Cycle



This cycle's departure point is "individuals' cognitions and preferences, their models of the world," and the second step is "individuals' action and participation in a situation of choice." Being enforced by the power structure, different decision-makers' ideas will be united towards one prevailing direction based on the organization's affordability, and generate the outcome as organization decisions. Finally, feedbacks on firm actions will be collected from environments, confirming or opposing decision-makers' compromises at the base points of departure (March and Olsen, 1975). New streams of problems, solutions,

information, and participants will enter the new decision-making process, even challenging the power structure. Multi-interactions between individuals, organizations, and society illustrate the whole picture of organizations' decision-making processes.

As explained with the theory of expectations, the normative human decision-making mental models strongly rely on comparing the expected values of different alternatives. Mathematically, the expected value, also called expectations, is the probability-weighted average of all possible values of a random variable. However, we are not able to obtain complete information that can exhaust all the alternatives and estimate precisely the value of the future outcome of each alternative and their probabilities of occurring (March, 1982). Thus, we are obliged to make most of our choices in a context of uncertainty. Instead of choosing the alternative of the highest expected value, people make choices of the highest expected utility with their subjective evaluation. As a result, different risk attitudes can be observed in our life: risk aversion, risk-seeking, and risk-neutral attitude (Neumann & Morgenstern, 1953). However, these risk preferences are not constant because different evaluations can be made by people for the same gambling offer, having compared the amounts they will probably gain or lose with their current asset positions or expectations. Moreover, the same people can make choices to avoid risks or to seek risks depending on different situations (Kahneman and Tversky, 1979; 1991).

According to Prospect Theory, information of alternatives is edited and evaluated in two different phases. In the information editing phase, the outcomes will be perceived and coded as gains and losses based on specific reference points, rather than final states of wealth or welfare. While in the evaluation phase, people compare each option's edited value and select the one with the highest value. The formula on the prospect is simplified as below:

$$V(x, p; y, q) = \pi(p)v(x) + \pi(q)v(y)$$

V is the prospect of overall values after the editing phase. The x and y are the objective values of two alternatives, and p and q are the probabilities of occurring ($p+q \leq 1$). The v that assigns to each x reflects the subjective value of the outcome and measures the value of deviation from the reference point, i.e., gains and losses. The π is the decision weight of each probability (Kahneman and Tversky 1979).

All constraints coming from decision-makers themselves or environments such as institutions or cultures will shape the presence of alternatives, the definition of reference points, the estimation of values, and probabilities of occurring. The desires reflecting actors' identities, intentions, and interests will also influence the formation and the evaluation of values in a subjective framework, and emphasize the selected alternative with a specific decision weight. For this reason, individuals in organizations and society will seldom make the same choices as individuals who decide independently with complete autonomy and information.

2.2 Resource-based view on organizational change processes

In the research field of organizational change, three mechanisms have been identified through which isomorphic structuration can occur: coercive, mimetic, and normative isomorphisms. Being impacted by the organization's characteristics and their environments, these isomorphic changes need conditions. (DiMaggio and Powell, 1983).

We can also explain three isomorphisms of New Institutionalism from the resource-based view of choice-making processes. For example, the issue of legitimacy or obligations under international norms can be considered as a classic question with two choices: to do "v(x)" and not to do "v(y)." Under political or legal pressure, organizations that do not fulfill their obligations will be severely punished and even closed. In this case, "v(y)" is approximate to the negative infinitive value. For this reason, the probability "q" will be multiplied by its decision weight " π " being approximate to zero, even though the value of

gain “ $v(x)$ ” may be moderate. Thus, the legitimacy can also be put into the self-interested orbit, representing organizations’ vital interests: to survive or to die.

In normative isomorphism, organizations demonstrate reliance on an academic credential or social networks of their decision-makers. Constructing the poles of professionalization, similar educational background, and social networks enable decision-makers to evaluate information with similar views and demonstrate risk preferences with similar decision weights.

However, in uncertainty, people do not possess complete information, cannot precisely estimate the gain or loss of actions, and evaluate the relative probabilities of occurrence. The choice not to change will keep their advantage of familiar routines; thus, “ $v(y)$ ” will be estimated as a positive value under certainty. On the contrary, the choice to change “ $v(x)$ ” will lead to high risks of loss. Unless the decision-makers believe that their organizations would have a significant probability to gain like the successful models with similar characteristics, they will delay their decision-making or choose not to change under the certainty effect (Kahneman and Tversky 1979). Thus, the internal mechanism of mimetic isomorphism is a type of path dependency, aiming to borrow the experience of successful models in perception and reduce the risks of the decision in uncertainty.

Finally, a homogenous environment and specific organization characteristics enable decision-makers to estimate approximate values of gain or loss and the relative probabilities with similar reference points. For this reason, the expansion of isomorphic change strictly relies on the conditions of environments and organizations.

2.3 Choices of Chinese firms and hypotheses

As explained in Chapter 1, an isomorphic structuration has occurred in China between two ESOP models, which have emerged in different historical periods. However, this isomorphism has not expanded to the whole population of Chinese listed firms for thirteen

years. An evident heterogeneity of firm actions has generated two populations: ESOP firms that have chosen to implement ESOPs, and Non-ESOP firms that have chosen not to do it immediately. From the point of view with prospects $V(x, p; y, q)$, ESOP firms should have an estimated higher value of " $v(x)*p$ " than that of " $v(y)*q$," while Non-ESOP firms should have evaluated an adverse outcome.

Our preliminary research finds that ESOPs were suspended in Chinese listed companies for seven years due to the failure of trials in the 1990s. They were authorized to relaunch in 2005. Simultaneously, the third trial of reform called "stock right division" came into being after two failed trials in the 1990s and 2000, aiming to liberate the trading of shareholders' non-circulated stocks (G shares) on public stock markets. These institutional changes created a more open environment for Chinese listed firms; however, the experience of failures would discourage people from making new trials.

Besides institutional contexts, we study possible cultural impacts on the formation of beliefs of Chinese managers. Like American managers (March and Shapira, 1987), Chinese managers generally make decisions "relatively safer and less risky" with an attitude of risk-aversion (Khairullah and Khairullah, 2013). Moreover, a low score on individualism has been measured by Hofstede's model on Chinese traditional culture; thus, Chinese people generally do not like to take individual initiatives, and the performance-oriented qualifications are considered as dangers that would backfire and destroy the traditional values such as harmony, humility, and cooperation. A higher power distance coefficient has also been recorded in China than in the USA, suggesting the difficulty of promoting employees' participation that may challenge firm owners' formal authority in highly hierarchical orders. As a result, adverse outcomes will be possibly estimated by Chinese firm managers for Core-Staff-Based ESOPs because the inherent properties of these new ESOPs generate conflicts with Chinese traditional values. For example, the implementation of Core-Staff-Based ESOPs strongly relies on participants' qualifications and performance

assessments (Chapter 1). Furthermore, it will blur the traditional corporate governance's boundary, requiring firm owners to share ownership and decision power with employees.

Therefore, Chinese firms' likeliest choice in such environments is: not to implement these new ESOPs and keep working in familiar routines without changes. In reality, Non-ESOP firms represent an attitude of the majority under normative beliefs and instincts. However, about 42% of firms have challenged and broken out of the homogeneity, like overcoming gravity to climb mountains. Why have these Chinese firms decided to implement Core-Staff-Based ESOPs for change? Who are they? To understand their risk-seeking behavior, we research the specificity of firms and their surroundings.

As we know, firms would have obliged themselves to implement new ESOPs for the issue of legitimacy or the pressure of following credentials. Caused by the desire to protect organizations from visible losses or invisible constraints, firms' decision-makers will close the choice $\pi(q)v(y)$ in 0 by emphasizing the decision weight π , and take action for the ESOP implementation. Based on this analysis, we set up our first hypothesis as below:

Hypothesis 1: specific institutional forces like regulations, social networks, or organizational dependence are assumed to oblige Chinese firms to implement new ESOPs.

Another probability is when firms have difficulty in business, "*the desire to reach the target focuses attention in a way that generally leads to risk-taking*" (March and Shapira, 1987). In the case that "y" or "v(y)" in prospects $V(x, p; y, q)$ is negative, people become risk-seekers to avoid certain losses under the reflection effect (Kahneman and Tversky, 1979). Even though the change is risky with a small probability of gaining, the desire to change their worrisome situation would have encouraged decision-makers to change and innovate. Based on this analysis, we set up our second hypothesis:

Hypothesis 2: the firms that decided to implement new ESOPs should have losses in performance or underperformed more than other firms.

Except for the possible negative cases under the coercive force or firms' crises, potential benefits will also drive some firms to take risks for gains. These benefits will probably be provided by external institutions like favorable tax policies or social networks. Following the formula of prospect, we set "d" as the external benefits. The standard value of change estimated by Firm A is "v(x)." However, the value possessed by Firm B with external supportive policies provided by new ESOPs will be "v(x+d)" (d>0). Moreover, these benefits "d" should be attractive enough to motivate Firm B to take risks. Based on this analysis, we construct the third hypothesis as below:

Hypothesis 3: Institutional advantages are assumed to encourage specific Chinese firms to take risks and implement new ESOPs, e.g., tax benefits, association membership networks, or fewer constraints on administrations in specific sectors and regions.

Alternatively, the benefits can be generated by firms' characteristics. Analyzing with prospects $V(x, p; y, q)$, in case of a given value of "x" obtained through new ESOPs, specific properties of firms can influence the estimation of probability "p" and decision weight " π " in choice-making of ESOP implementation " $\pi(p) * v(x)$." Especially when specific problems hinder the execution of a new mechanism, decision-makers will estimate whether they can overcome difficulties based on their particular characteristics and resources. If decision-makers believe that they have a more significant probability of gaining or a smaller probability of losing, they will decide to take risks for change.

Moreover, the value "v(x)" is a resource-based estimation. If the implementation of Core-Staff-Based ESOPs can satisfy specific firms' objectives or needs, they will estimate the value valence created by these new ESOPs more than other firms, and take risks for change. Although we are limited in understanding directly firm decision-makers' thinking, the specificities of firms and firms' surroundings provide us traces to understand their logic of resource-based behavior (Kahneman & Tversky, 1991). Thus, we use an intermediate method to examine whether ESOP firms have different properties from Non-ESOP firms

with the hypothesis below:

Hypothesis 4: ESOP firms demonstrate distinct properties from Non-ESOP firms.

3. Methodology and data

We utilize a combination of qualitative and quantitative methods to analyze the potential factors that would have encouraged Chinese firms to activate changes for the ESOP implementation.

3.1 Approach for institutional analyses out of firms

To clarify possible institutions that would have impacted firms' decision-making in the external environments, we verify legal regulations, company statutes, association rules, and ESOP announcements for Hypothesis 1 and Hypothesis 3. Furthermore, taking advantage of the test results of firm characteristics, we examine specific regulations for individual firms.

3.2 Approach for prior-ESOP performance analyses of firms

We utilize a statistics approach for Hypothesis 2, examining if Chinese ESOP firms had negative performance or underperformance during prior-ESOP. Firstly, we use frequency statistics of net profits to analyze the number and the percentage of firms suffering from losses, comparing Prior-ESOP firms to Non-ESOP firms. Secondly, comparing the prior-ESOP performance quartiles of ESOP firms to Non-ESOP firms, we verify whether ESOP firms overperform or underperform more than Non-ESOP firms. Since some firms possess favorable fiscal advantages, we use performance indicators both before and after taxes.

3.3 Approach for firms' characteristics analyses

The approach that we mainly use for Hypothesis 4 is binary logistic regressions. We accurately verify if Chinese ESOP firms have significantly distinct features from Non-ESOP firms, and complement these analyses of firm characteristics with frequency data in excel pilot charts.

To select variables for logistic regressions, we first take advantage of the literature review as summarized in Appendix 1. Secondly, we use a bundle of tests to choose the most suitable variables, eliminating those that may influence models' reliability. For example, we use Pearson correlation tests to select the variables that are not mediumly or highly correlated with others ($\rho < 0.35$, or $\rho > -0.35$). Moreover, as shown in Table 5, we use VIF tests to verify the multicollinearity of regressions, and eliminate the variables with the value of VIF more than 5. Finally, only 12 variables out of a total of 48 have been selected for our regression tests.

Table 5. VIF Test Results

Model	Collinearity Statistics	
	Tolerance	VIF
Company size (market value in billion RMB)	0.946	1.057
Fre Stock code	0.758	1.319
GICS sector codes 1	0.862	1.160
Hi-Tech	0.772	1.295
Region code	0.963	1.038
CR_5	0.970	1.031
Family controls	0.861	1.161
Function 2 - Technical-RD-QC	0.845	1.184
Function 3 – Management	0.898	1.113
Function 4 – Sales	0.920	1.087
Asset per staff (million RMB per staff)	0.886	1.129
EXPERIENCE IN THE 1990s	0.787	1.270

3.4 Selection of data

The total number of selected samples is 3523 Chinese listed firms, including all the companies listed on Shanghai or Shenzhen Stock exchanges on June 30th, 2018. During 13 years, a total of 1496 firms have implemented these new ESOPs, including 1168 firms whose ESOP schemes are in execution and 328 firms whose ESOP schemes expired before Dec. 31st, 2018. On the other hand, 15 firms had proposed ESOP schemes since Jan. 1st 2017 but are still waiting for approvals of their general meetings of shareholders; 529 firms had experienced ESOPs in the 1990s but have not implemented new ESOP schemes since 2005; 1483 firms have no ESOP experience in the 1990s nor ESOP implementation since 2005. All these 2027 firms are categorized as Non-ESOP firms in China, including 148 firms that announced ESOPs but canceled the execution.

For the statistics of performance analyses, we use a firm-quarterly database of 139262 data including all 3523 listed firms and 68 quarters from 2002 to 2018.

4. Results and interpretations

4.1 No evident coercive force for the ESOP implementation in China

All Chinese listed firms are supervised by the CSRC, Chinese Securities Regulatory Commission. Two guidelines issued by the CSRC play dominant roles for the ESOP supervision in China: <Measures for the Administration of Share Incentive Plans of Listed Companies (For Trial Implementation)> which were issued in 2005 and called SIP laws in Chapter 1, and the <Guiding Opinions on the Pilot Implementation of Employee Share Ownership Plans by Listed Companies> that were issued in 2014 and called ESOP-2014 laws. After verification, neither of them obliges firms to implement various types of ESOPs.

We have examined other relevant laws and rules applied by the ESOP statutes of firms, including those formally issued or informally proposed by Chinese national or local

governments during the period 2005-2018. No obligations are found in these legal documents to force firms to implement ESOPs. However, several laws explicitly limit the ESOP execution, e.g., prohibiting high leverages in Chinese ESOPs.

All state-owned companies are dependent on the Supervision Bureau of State-owned Assets, including listed firms and non-listed firms. Without the authorizations of this Supervision Bureau, all listed state-owned companies cannot implement ESOPs. We can observe a noticeable delay in the implementation of ESOPs-2014 in state-owned firms compared to private firms.

In China, no ESOP associations have been established yet. Since this mechanism was imported from developed western economies, it has no common impacts on Chinese traditional culture. Thus, no visible informal institutions provide coercive forces for the ESOP implementation.

In sum, our findings show that no formal or informal coercive mechanisms force Chinese listed firms to implement ESOPs. However, some institutions exist to limit the ESOP execution. Thus, Hypothesis 1 is rejected.

4.2 Overperformance of ESOP firms during Prior-ESOP period

In the first performance test, the results show that no more than 11% of ESOP firms had a negative performance during the periods prior-ESOP, while about 16% of Non-ESOP firms suffer from the losses. Furthermore, comparing all performance indicators, both pre-tax and post-tax, we find that ESOP firms have quartile values higher than those of Non-ESOP firms before the ESOP implementation (see Appendix 2).

In sum, 89% of ESOP firms did not have any losses before they decided to implement ESOPs, and they had overperformed more than Non-ESOP firms on the performance. Being expressed by prospects $V(x, p; y, q)$, the estimated values “y” or “v(y)” by ESOP

firms during Prior-ESOP are confirmed not to be negative. Therefore, it was not a problematic situation that induced firms to take risks and implement ESOPs. Hypothesis 2 is rejected.

4.3 A significant difference between ESOP firms and Non-ESOP firms

We utilize binary logistic regressions and pilot charts to examine Hypothesis 4. As seen in Table 6, eight variables show significant effects on characteristics between ESOP firms (group 1) and Non-ESOP firms (group 0).

Table 6. Test results of binary logistic regressions
Variables in the Equation (significant effects)

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 8 ^a	Fre Stock code	0.174	0.033	28.151	1	0.000	1.190
	Hi-Tech	0.249	0.079	9.993	1	0.002	1.283
	Region code	-0.080	0.021	14.553	1	0.000	0.923
	CR_5	-0.018	0.002	132.158	1	0.000	0.982
	Family controls	0.512	0.046	125.402	1	0.000	1.669
	Function 2 - Technical-RD-QC	0.010	0.002	25.280	1	0.000	1.010
	Function 3 – Management	-0.019	0.004	28.152	1	0.000	0.981
	EXPERIENCE IN THE 1990s	-0.682	0.105	42.039	1	0.000	0.506

a. Variable(s) entered on step 8: Hi-Tech.

Variables not in the Equation (insignificant effects)

	Variables	Score	Df	Sig.
Step 8	Company size (market value in billion RMB)	1.967	1	0.1608
	GICS sector codes 1	3.382	1	0.0659
	Function 4 – Sales	3.288	1	0.0698
	Asset per staff (million RMB per staff)	2.177	1	0.1401
	Overall Statistics	13.499	4	0.0091

With additional statistics (see Appendix 3), we present the detailed characteristics analyses of Chinese ESOP firms as below:

a) *Hi-Tech*

The significant variable Hi-Tech in our logit model indicates the firms working in the Hi-Tech sector. Being qualified by the government with Hi-Tech licenses, they are the most active actors in China's innovation. About 69% of ESOP firms hold Hi-Tech licenses, whereas only 46% of Non-ESOP firms are qualified as Hi-Tech firms. Thus, the first label to identify ESOP firms from Non-ESOP firms is "Hi-Tech."

b) *SME and Start-ups but middle-sized firms*

The variable "Fre Stock Code" indicates firms' positions listed on the boards of stock exchanges. In statistics, 64% of ESOP firms are coded as "002" or "300," listed on the boards of SMEs and Start-ups of Shenzhen Stock Exchanges. On the other hand, the percentage of the listed SMEs or Start-ups among Non-ESOP firms remains only 34%, and the majority of Non-ESOP firms are listed on the main boards of stock markets.

However, most ESOP firms are not small firms. They have higher median values regarding the company size for both their capital value and staff number. Precisely, the median of ESOP firms' capital value is 5.65 billion RMB, while that of Non-ESOP firms is 4.46 billion RMB. Also, the median of staff numbers in ESOP firms is about 1972, while that of Non-ESOP firms is about 1783. Nevertheless, few of them have a presence in the quartile of the biggest firms. Thus, their sizes are in the middle range of all the Chinese listed firms.

c) *Young firms with less failed experience in the 1990s*

Most ESOP firms are younger than Non-ESOP firms. The average age of ESOP firms is about nine years, while that of Non-ESOP firms is about twelve years.

The significant variable "Experience in the 1990s" in regression tests explains that the ESOP experience in the 1990s demonstrates adverse effects like constraints in firms' decision-making process. Among 699 existing firms with ESOP experience in the 1990s, 77% have chosen not to implement ESOPs even when authorized by new laws. On the other hand, 89% of ESOP firms who have implemented ESOPs under new laws have not experienced failures in the 1990s.

d) Private and family-controlled firm

According to our regression and statistics results, 86% of ESOP firms are private firms, and only 11% of ESOP firms are state-owned. In contrast, 44% of Non-ESOP firms are state-owned companies. The weak ESOP presence of state-owned companies is probably due to the institutional constraints of the coercive force and the negative experience in the 1990s, as analyzed above.

The family-controlled structure characterizes corporate governance in most of the Chinese private firms. Our findings show that 83% of ESOP firms are incorporated by family-controlled firms, while only 50% of Non-ESOP firms are family-controlled firms.

Among different types of family-controlled governance, the first choice of ESOP firms is the pyramid structure, representing 54%; the second choice is the direct control of families, representing 45%; and the cross-holding model represents only 0.24%.

e) The moderately concentrated power of shareowners

The variable "CR_5", significant in regressions, is calculated by the sum of shares of the firms' five largest shareholders and represents the power of controlling shareholders, especially in a family-controlled structure. According to our statistics, in 64% of ESOP firms, 40-70% of shares are controlled by the five largest shareholders. Only in 55% of Non-ESOP firms have we observed a similar power structure as in the former. Moreover,

we observe a higher concentrated power of the five largest shareholders (>70%) in Non-ESOP firms than ESOP firms. Although a relatively lower concentration of shareowners' controlling power is observed in ESOP firms, most firms, either ESOP firms or Non-ESOP firms, are controlled by a small group of shareholders. Thus, we assume that ESOP firms can accept employee-owners' participation, but the power of decision will be firmly controlled by a small group of decision-makers, those who are probably families in practice.

f) Technical and commercial functions relatively enhanced in the firm organization

We segment the working staff of each firm into five functions: Function 1 - the production function, Function 2 - the technical function as well as R&D and quality control, Function 3 - the management function, Function 4 - the commercial function, and Function 5 - other functions. Functions 2 and 3 have significant effects between ESOP firms and Non-ESOP firms in our logistic regression tests. If we extend our test criteria to 0.1, the commercial function will also have significant effects. With more detailed studies, different structures are demonstrated in ESOP firms' global organization: a relatively higher proportion of staff working in commercial and technical functions, and a lower proportion in production, management, and other functions.

g) Geographic and industrial concentration

If we extend our criteria to 0.1, the variable "GICS sector code 1" representing industries will also be significant. The main sectors in which ESOP firms concentrate more than Non-ESOPs are IT and health cares, coded by GICS standards as 45 and 35. Geographically, ESOP firms are concentrated in three areas: the regions of Eastern China, Southern China, and Northern China.

With the above characteristics analyses, we can sketch a portrait of Chinese ESOP firms. Most of them work in the Hi-Tech industry with technical and commercial functions relatively enhanced in their organizations. They are concentrated in the developed regions

in China, like the Eastern, Southern, and Northern China. They have a significant presence in the sectors of IT and health care more than Non-ESOP firms. The majority of ESOP firms are private firms, middle-sized, young with less failed experience in ESOPs, being governed directly or indirectly by families with moderately concentrated power.

Based on their specific properties, we assume that ESOP firms' decision-makers will have expected a bigger probability of gaining and a smaller probability of losing for the ESOP implementation, or they will have estimated higher values of ESOPs to satisfy their particular interests. Therefore, Hypothesis 4 is well supported.

4.4 Hidden institutional benefits for the ESOP implementation

Having verified laws and rules, we do not find direct benefits authorized by national or local governments to promote the ESOP implementation. No favorable tax policies are conceded to ESOP firms or ESOP participants in China. Both firms and individuals who participate in ESOPs should pay taxes, the usual taxes in addition to the extra taxes on benefits received through ESOPs. Furthermore, no direct facilities in sectoral associations or social networks can be enjoyed by ESOP firms.

However, we find some hidden institutional advantages to stimulate the ESOP implementation, based on our firm characteristics analyses. Following the OECD's calls, the Chinese government supports innovation-active firms working in the Hi-Tech sector with tax-reduction and R&D expenses deduction. Strict criteria have been established for the qualification of these Hi-Tech firms, in which the implementation of employee participation schemes is one assessment criterion enabling candidates to obtain positive points in their Hi-Tech qualification. Although this institutional advantage cannot contribute a direct benefit "d," as assumed in our hypothesis expressed by prospects, it would have increased the estimation of the instrumental probability of other gains, like Hi-

Tech qualification, and indirectly encouraged firms to implement ESOPs. Thus, Hypothesis 3 is supported.

5. Further analyses

The development of organizational innovation is costly and risky, full of surprises after the initial decisions. The majority of Chinese firms fully implemented ESOPs met a series of crises in their business environments, such as the global financial crisis in 2008, European difficulty on governments' bonds since 2009, the slowing down of China's growth since 2011, Chinese stock market crashes in 2015 and 2016, RMB depreciation during 2017, and Sino-American international trade war since 2018. Suffering from unexpected difficulties, some firms have changed their minds and canceled the ESOP trials. Also, most people delayed their plans, continuing to observe others' tests. Thus, the boundary to identify the ESOP population and the Non-ESOP population has evolved since the beginning of ESOP trials. With further research, we attempt to explore potential factors that would have motivated ESOP firms to continue their ESOP trials and convinced other firms to follow their models and implement ESOPs in challenging economic environments.

5.1 Trends analysis: concavely increasing ESOPs and volatility in first trials

Chart 3 shows that the growth of the cumulated number of ESOPs in execution is a concave upward slope during the period 2005-2017. Each critical point in the slope approximately corresponds to the years of issuing new laws. As we can see, the beginning of the curve is the year 2005, in which the SIP laws were issued to authorize the implementation of ESOPs after the suspension; the first evident growth started in 2010, in which the SIP options were authorized with new regulations; the second growth started in 2014, in which the relevant laws were issued in 2014, authorizing the use of leverages in ESOPs and the collective rights of ESOP commissions. These new institutions have released the coercive force that hindered ESOP trials from 1998 to 2005, providing a more

open environment for firms' choices.

Chart 3. The ESOP development in China (2005-2017)

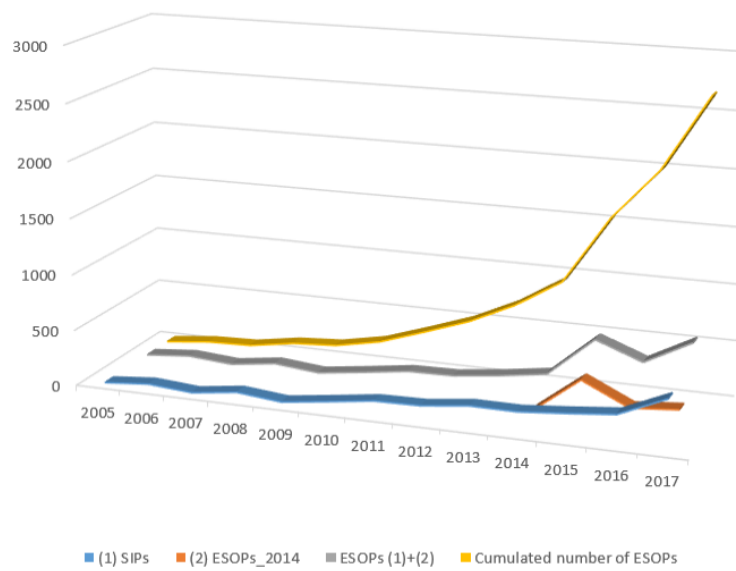
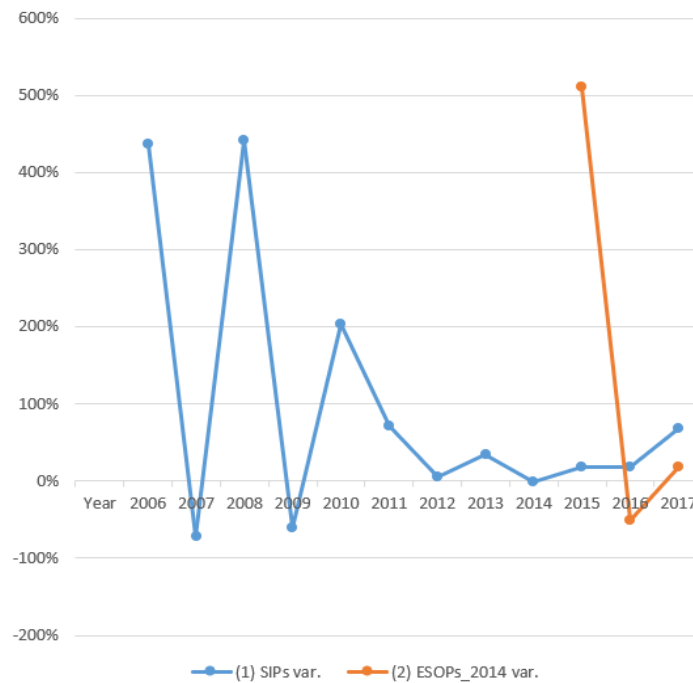


Chart 4. Annual variations of new ESOP schemes put into execution



However, as shown in Chart 4, during the first trials of SIPs (2005-2010) and ESOPs-2014 (2015-2017), tremendous volatility is observed in the annual numbers of new ESOP schemes announced to the public. Moreover, each significant drop was approximate to the time point of economic crisis with reasonable delays. Thus, we affirm that most firms gave up or delayed their ESOP implementation due to challenging environments.

Surprisingly, the volatility of SIPs started to be stabilized since 2012, and they did not fall during the Chinese stock crash in 2015-2016, maintaining an optimistic growth since 2014. Why Chinese firms were not frightened and continued to promote new SIP schemes even during crises? We assume that certain inherent benefits of SIPs would have been discovered by ESOP firms themselves and by their followers during ten years' trials. Following this trend analysis, we explore SIP firms' potential motives.

5.2 Discovering the ESOP mechanisms' inherent benefits with time

As profitable organizations, firms rely on continuous positive performance to survive in the market. Neither mimetic mechanisms, coercive force, nor normative credentials can provide vital resources to maintain firms' lives in the long term. In reality, with a trial-error-trial model, we learn to correct our inappropriate beliefs, find ourselves after imitations, and release pressures under unsuitable coercive power. The real motives to sustain our choices of change should be the inherent advantages of ESOPs contributed to firms' growth. With enough time, we can evaluate gains and losses objectively after numerous trials. From prospects, the cumulated subjective estimations like $\Sigma v(x)$ and $\Sigma v(y)$, tends to be approximate to the objective values of $\Sigma(x)$ and $\Sigma(y)$, and $\Sigma(x)$ is the sum of performance enhanced by the organizational innovation.

Thus, we assume that the vital cause supporting the persistence of ESOP firms' trials and attracting other firms for the ESOP implementation is improving performance, the

main goal as announced in all statutes of ESOP schemes. Taking advantage of SIP firms' development path, we set up the hypothesis below:

Hypothesis 5: The implementation of SIPs enables firms to enhance performance.

Using the same method, as mentioned in Session 4, we compare the quartiles of performance indicators between SIP firms and Non-SIP firms in two different periods: prior-SIP and post-SIP. Responding to the evolution chart, we select 83962 firm-quarter data from the spring of 2002 to the summer of 2014 (before the promulgation of ESOP-2014 laws), and segment these data into three groups: Non-SIP firms, Prior-SIP of SIP firms, Post-SIP of SIP firms.

**Table 7. Performance analyses
between SIP firms and Non-SIP firms, Prior-SIP and Post-SIP**

	Obs.	ROA	ROE	ROS	Pre-tax _Assets	Pre-tax _Equity	Pre-tax _Sales
Non-SIP firms	55033						
Q25%		0.0030	0.0078	0.0116	0.0042	0.0108	0.0169
Q50%		0.0130	0.0300	0.0469	0.0171	0.0388	0.0616
Q75%		0.0325	0.0690	0.1119	0.0415	0.0882	0.1414
SIP firms (Prior-SIP)	25233						
Q25%		0.0061	0.0126	0.0236	0.0082	0.0165	0.0315
Q50%		0.0195	0.0371	0.0657	0.0248	0.0468	0.0828
Q75%		0.0427	0.0757	0.1347	0.0523	0.0942	0.1650
SIP firms (Post-SIP)	3695						
Q25%		0.0119	0.0208	0.0457	0.0146	0.0255	0.0569
Q50%		0.0295	0.0519	0.0909	0.0357	0.0629	0.1097
Q75%		0.0552	0.0949	0.1523	0.0662	0.1135	0.1833
Total obs.	83961						
<i>Firms</i>	2507						
<i>Quarters</i>	46	<i>(2002.3-2014.6)</i>					

As shown in Table 7, SIP firms improved their performance and overperformed more than Non-ESOP firms after implementing SIPs. Therefore, Hypothesis 5 is well supported. The implementation of SIPs enables firms to construct specific advantages to support themselves under challenging crises more than Non-SIP firms. These inherent benefits of SIPs encourage SIP firms to continue their trials and attract followers to innovate their organizations like their models. On the other hand, ESOPs-2014 have exposed more risks than SIPs, probably being linked to the usage of leverages and employees' self-funding.

People need time to understand new mechanisms, refine institutions to lower risks, learn from painful failures, and construct their particular competitive advantages in favorable or unfavorable economic environments. Also, people need time to observe their models, imitate their successful experiences, and extract their own experience after trials. Thus, the initial volatility reflects people's exploration, and the performance achievement confirms the risk-taking choices of the first ones and their followers.

6. Summary and open questions

The ESOP, a practice that originates from corporate finance and human resource management, blurs the traditional boundary in and out of organizations and brings us new challenges to research the organizational ecology interacting between environments, organizations, and individuals.

From the perspective of resource-based prospects, we have utilized a combination of multiple approaches to identify the potential factors that would have stimulated Chinese listed firms to change their organization and launch the ESOP trials. Our test results discover the influence of ESOP firms' specific properties and the indirect benefits provided by external environments. The specificities of firms and their environments enable decision-makers to evaluate a higher value of gains, estimate a bigger probability of gaining or a smaller probability of losing, and lead to their risk-taking actions to implement

ESOPs. These trials broke out of the market's homogeneity and generated two populations: ESOP firms that challenge and change, and Non-ESOP firms that do not want to change or delay their decisions. With statistics, we draw profiles for ESOP firms and specify the boundaries of organizational heterogeneity.

Furthermore, different trends observed in SIPs and ESOPs-2014 encourage us to continue our research. Our findings support that the overperformance achieved through SIPs would have encouraged SIP firms to continue their trials and attracted followers to imitate the first ones' successful experience. Beyond the path dependency in mimetic processes, these inherent advantages with the ESOP implementation sustain an exponential growth of ESOPs in China since 2005.

We have attempted to select the firms' characteristics that maintain the constant nature in time, like family-controlled structure, Hi-Tech license holding, Stock ISIN codes, the listing years, regions and industrial sectors, etc. However, certain ambiguity exists in the specificities on various functions comparing ESOP firms to Non-ESOP firms, because it is not easy to clarify whether these specificities are constant or would have impacted by the implementation of ESOPs. The most precise method should codify the time (year) of each ESOP firm's decision-making process as "N," and investigate the proportions of various functions at the year "N." Due to the limits of data disclosure, we cannot find all the working staff numbers in each department of Chinese listed firms during the period 2005-2018. In reality, the main contribution of ESOPs is associated with turnover rates, productivity, participation, and firms' performance. The proportions among various functions inside firms are primarily related to their business objectives and development strategies. Thus, although these proportions may vary in time, they maintain an approximate constancy before or after the implementation of ESOPs.

For us, the cumulated subjective estimations $\Sigma v(x)$ will correspond to the objective values $\Sigma(x)$ in sufficient time. We will develop further theoretical discussions and empirical

studies to support this assumption.

With time, isomorphic structuration will probably surpass specific populations' boundaries, and a new tendency will substitute the existing heterogeneity of ESOP distribution. In several years, we should update this analysis and observe whether the ESOP development would expand to the majority of Chinese firms.

Although we have indirectly explored decision-makers' cognition and organizational decision-making processes with various quantitative and qualitative approaches, direct approaches like interviews, questionnaires, or attending firms' meetings will help us examine and complete the above analyses.

With quartile statistics (see Appendix 2), we have compared the Prior-ESOP performance between ESOP firms and Non-ESOP firms, and SIP firms' performance before and after the ESOP implementation. With these performance analyses, we have attempted to reproduce the environments in which the firm decision-makers set up their reference points for choice-making. However, to examine whether the Core-staff-based ESOP mechanism contributes an efficient organization to firms and to clarify why and under which conditions this organization is efficient is our vital mission of future research.

CHAPTER III.

PERFORMANCE ANALYSES OF CORE-STAFF-BASED ESOPs

1. Have Core-staff-based ESOPs improved firms' performance?

Distinct from non-profitable organizations, firms' survival relies on their performance. The performance improvement enables firms to enhance their survival chances and becomes one of the most significant indicators to measure the organization efficiency.

Following previous footsteps, we revise the performance analysis of employee share ownership plans in China. Our primary focus is fixed on economic performance. In a society where the system thinking of three bottom lines has overwhelmed, the economic performance analysis of specific firm organizations like ESOPs appears to be regressive. However, firms struggle in challenging environments, suffering from the global crisis in 2008, the European debt crisis in 2009, the growth slowing-down in emerging economies since 2010, and the worldwide recession after the pandemic COVID-19 in 2020. Thus, beyond a traditional approach staring at shareholders' interests, the revision of economic performance consolidates the social system's foundations, supporting employment, governments' taxation, and social benefits.

For a long time, we have believed in the constancy of “psychological ownership” (Pierce, Kostova & Dirks, 2001; 2003) and the employee-auto-controlled system realized by ESOPs. However, ESOP firms in developed countries difficultly resolve free-rider problems in practice. Furthermore, Chinese firms' failure experience in the 1990s led to the suspension of ESOPs in China from 1998 to 2005. After seven years' reflection, Core-Staff-Based ESOPs were born, and we recall agency controls back to the design of ESOPs.

Exploring specificities of agency problems under different firm organizations, we attempt to penetrate the decision-making processes of the agent and the principal with

Prospects Theory and reexamine at three dimensions whether Core-staff-based ESOPs have contributed positive effects to firms, corresponding to three types of agency risks among firms, employees, market investors, and creditors.

2. Theoretical framework and hypotheses

2.1 Agency problems

According to the Business law (2006), an agency relationship is a fiduciary relationship, where one person (called the “principal”) allows an agent to act on his or her behalf. The agent owes his principal the below duties: duty of loyalty, duty to act in accordance with the express and the implied terms of a contract, duty of care, competence and diligence, duty of good conduct and duty to comply with the principal’s lawful instructions. If the agent does not subordinate his interests to those of the principal, he will breach his duties, which leads to the well- known “agency problems.”

Academically, the relevant discussion can be traced back to the work of Ronald Coase, “The nature of the firm” (1937). In the classic economy, the market is theoretically believed to be “efficient.” However, Coase found that we should pay transaction costs if we rely entirely on market exchanges, and he explained why people establish firms: the firm’s organization can reduce or avoid transaction costs. Williamson introduced the notion of transaction costs in the employment relationship (1975), and linked to his discretionary managerial model (1964). Being inspired by Alchian (1965) and Ross (1973), Mitnick devoted himself to the development of “a vertical theory of control as well as a horizontal one of exchange” that leads to the birth of Agency Theory’s institutional approach (Mitnick, 1973; 1974a; 1974b; 1975a; 1975b; 1976a; 1976b; 2013). Meanwhile, inheriting Coase and Williamson’s work, Jensen and Meckling (1976) created the agency cost model, and applied it to firms’ ownership structure.

In detail, the agency costs consist of monitoring costs, bonding costs, and residual

loss. The monitoring activities refer to the "efforts on the part of the principal to control the agent's behavior through budget restrictions, compensation policies, operating rules." The bonding costs are defined as the resources that the agent should expend to guarantee that he will not take actions to harm the principal, or the principal will be compensated if the agent does not fulfill his commitments. The reduced amount caused by the divergence of opinions between the agent and the principal in decision-making is considered the "residual loss" in agency costs (Jensen & Meckling, 1976).

Essentially, the agency costs are the loss generated by the agent's activities compared to those activities that would maximize the principal's welfare. The vital cause of agency costs is the divergence of interests between the agent and the principal. The market structure does not impact the existence of agency costs either in competition or in monopole.

However, this model relies on certain predefined assumptions. For example, both the agent and the principal are utility maximizers; the utilities are bounded on economic resources; the firm's size should be fixed; all elements of the owner-manager's decision problem involving portfolio considerations induced by uncertainty and the existence of diversifiable risk are ignored, etc.

For us, firms are not only the outcomes of a complex equilibrium process; they are born and managed by human beings (Cyert & March, 1963). In the long term, firms' sizes are not fixed but in change: growth or decline. Rarely people make decisions in certainty and with complete information. Sole-owners also have their limits to maximize their own interests, and thanks to employees' specific skills and knowledge, some risks can be diversified and reduced. Men have diverse interests, not only those economic but also social or spiritual interests. Thus, we attempt to explore the specificities of agency problems under different business models, analyzing with Prospects Theory the probable decision-making processes of the agent and the principal in the environments of diverse

institutions and cultures.

2.2 The agent's choices in the traditional business model

The relationship between employees and employers constitutes the typical agency relationship in which workers and directors represent the agent, and firm owners represent the principal. The payments paid by firm owners for employees are the legal indemnities for agents allocated in variable costs and expenditures. The residual value that remains after taxes is the famous profit that will be distributed among firm owners.

As human beings, directors or workers naturally have personal interests. If these personal interests comply with the contractual duties, no divergent interests exist between the agent and the principal. However, when the agent's personal interests conflict with the principal's interests, the agent will have two choices: Choice A is to do activities for themselves but harm the principal's interests; Choice B is not to do these activities and give up their own interests. How do they make decisions?

To penetrate the agent's decision-making process, we use the Prospect Theory developed by Kahneman and Tversky (1979; 1991). As explained in Chapter II, this theory reveals the resource-based preference with a series of effects like the certainty effect and the reflection effect. The phenomenon that people overweight the positive outcomes that they consider certain more than those perceived probabilities is the certainty effect (Allais, 1953; Kahneman & Tversky, 1979). While in case of loss, people reverse their preferences and take risks to avoid a certain loss. This phenomenon is the reflection effect. Since each agent's choice contains multiple expectations, we change the formula of prospects as below:

$$V(x, p; y, q) = \sum \pi(p)v(x) + \sum \pi(q)v(y)$$

Under Choice A, doing what the agent wants " $\sum \pi(p)v(x)$," the best value expected by the agent is to gain both the legal indemnities paid by the principal and the personal

interests with their power. While the worst expectation is to lose both of them, and the medium ones are to gain either of them. The controls, like monitoring activities organized by the principal and the agent's bonding system, will influence the agent's perceptions, whether it is difficult to fulfill their personal interests, and whether these fraudulent activities will be discovered and severely punished later. Finally, under the certainty effects, most agents will be directed by the controlling system to choose not to breach their duties.

The institutions out of firms, both formal and informal, also play indispensable roles to reduce agency problems. In a society where severe institutions are legally or religiously imposed, whoever breaches their duty will suffer tremendous losses of their identity, religious faith, spiritual personality, and social life. In this case, even though firm owners pay little monitoring costs, and employees do not provide any bonding costs, the probability of the agent's breaching duties will be lower than others. On the contrary, if firm owners impose too many monitoring controls in these environments, employees will feel disappointed for being distrusted.

Furthermore, the agent's status will influence their risk preference. For example, when " $v(y)$ " is negative, that means the agent is in crisis or unsatisfied, the probability of breaching duties will increase under the reflection effects.

In the absence of external institutions and internal agency controls, in addition to the agent's dissatisfaction, e.g., the existing societal inequality, serious agency problems will explode, breaking out of enterprises' order, even society's order.

In sum, agency problems will be diminished or leveraged depending on different situations in and out of firms. The golden measure of agency controls should be adapted in specific contexts.

2.3 *The principal's choices in the traditional business model*

In Jensen's agency costs model, the departing reference as the ideal status is the management of sole-manager-owner, if possible, with no debts. In this case, zero agency costs exist in the employment of directors. Going further, if this sole-manager-owner works alone in his firm, zero agency costs will be spent on managing workers, and zero payments should be paid to others. This situation might be the perfect status in maximizing firm owners' profits. However, the paradox is born in reality: why innumerable firm owners employ workers for production and employ directors for management?

We reutilize the formula of prospects to analyze the principal's choices:

$$V(x, p; y, q) = \Sigma\pi(p)v(x) + \Sigma\pi(q)v(y)$$

Here, the principal's choice A " $\Sigma\pi(p)v(x)$ " refers to employ directors and workers, and the choice B " $\Sigma\pi(q)v(y)$ " is not to employ anyone. Given that zero agency costs are spent in the sole-manager-owner model, " $\Sigma\pi(q)v(y)$ " are significantly positive. Unless the gains " $\Sigma\pi(p)v(x)$ " are extraordinarily attractive, firm owners' risk aversion will make them work alone under the certainty effects.

However, as pointed out by Simon and his partners (March and Simon, 1958; Simon, 1962; Cyert & March, 1963; March, 1982), firm decisions are intentionally rational, bounded by human and institutional limitations. The sole-manager-owners' decisions are not always optimal, compared to those of directors, because they are limited in information, alternatives, abilities, experience, time, and energy. Managers contribute their intellectual force to direction, organization, conciliation, motivation, and control the whole process of value creation until achieving goals. Their work creates values for firms. The same applies for workers. Workers create values with their work in production.

When directors and workers create more values than their explicit and implicit costs,

firm owners earn profits and are encouraged to invest more capital. As a result, firms grow. When firms continuously grow, under the enhanced certainty effects and satisfactions of both employees and employers, agency problems' probabilities will decrease. Consequently, firm owners will confirm their choices, employ directors and workers, and even recruit more employees to earn more gains.

In economic histories, the models of individual production or family production were similar to the assumption of sole-manager-worker-owner. With industrial revolutions, the concentration of production, the division and specialization of work, and the transactions in the market laid birth to firms' modern organization (North, 1991), which has enormously enhanced the productivity and become mainstream. In comparison, individual or family production remains only in small-sized enterprises. Hence, specialized employees' work organization is proved to create much more value than the production of sole-manager-worker-owner for the firms' growth.

Nevertheless, the organization of concentration, division, and specialization has its limits. The typical management style responding to this organization is the scientific management of Taylorism, in which the controls have modularized the working people like machines. The unidirectional monitoring system generates a high-power-oriented hierarchical order in the firms. The motivation of employees' potential is underappreciated. With the intellectual economics' evolution, we reflect on this business model in the new era.

2.4 Explaining the behavioral logic of ESOPs with prospects

As explained in Chapter 1, the ESOP is an organization mechanism different from the traditional model. With the implementation of ESOPs, employees become firm owners (Rousseau & Shperling, 2003). It motivates employees' value-creating potential and reduces agency costs with self-controlled systems. The "controlling costs" that have

repetitively been mentioned in the ESOP research papers are one type of agency costs based upon the vertical theory of control in Mitnick's institutional approach. Focused on different motivation targets, the executive-based ESOPs and broad-based ESOPs have become the worldwide standard models.

Most ESOP firms distribute less than 3% of shares to employee-owners. People wonder why such a small number of shares could attract employees for work. Again, we utilize the Prospect Theory to study how the ESOP influences the agent's decision-making processes in ESOP firms.

As in the agent's choices in the traditional model, ESOP participants have two choices: Choice A " $\Sigma\pi(p)v(x)$ " represents the activities of breaching duties, and Choice B " $\Sigma\pi(q)v(y)$ " not breaching duties.

$$V(x, p; y, q) = \Sigma\pi(p)v(x) + \Sigma\pi(q)v(y)$$

Distinctly, employees gain more benefits in ESOP firms:

- a) They have the rights to share firm profits;
- b) They have the rights to share the firms' information where they are working;
- c) They have the rights to participate in corporate governance;
- d) They have other ownership rights, standing at an equal position as firm owners.

With the profit-sharing design, employees will earn more economic benefits and the values of "y" increase. With information sharing, employees can anticipate firms' crises without fear or surprise. With the participation rights in corporate governance, employees gain opportunities to express themselves and change their adverse situations. At an equal position with firm owners, employees raise their social mobility and change the traditional business model's hierarchical order: they are no longer located at the bottom of the monitoring chain. All these rights and protections enable firms to increase employees'

satisfaction and change employees' perceptions of their situation from negative to positive. As a result, the certainty effects of positive prospects $\Sigma\pi(q)v(y)$ will be strongly enhanced, while the reflection effects of negative prospects that may encourage employees' risk-taking to breach duties will be reduced.

Furthermore, the ESOP mechanism can align specific interest divergence between the agent and the principal and change the agent's behavior logic. The ESOP agent will have a lower decision weight " $\pi(p)$ " on the choice of breaching duties, because they understand that they have become firm owners.

Effectively, the mechanism of ESOPs recognizes employees' value-creating contributions as a specific type of capital that can share the firm ownership in the same way as the contributors of financial capital. This capital-recognition is the fundamental reason why the ESOP can enhance employees' commitments and activate chain reactions to improve organizational efficiency.

2.5 Recalling agency controls in Core-Staff-Based ESOPs

We did not believe that we should organize controls for employee-owners for a long time because we thought that they would be autonomous. However, performance improvement becomes less and less significant in the western firms, and shareholders become more and more dissatisfied. The presence of free-riders (Kim & Ouimet, 2014) teaches us that the ESOP mechanism, especially the broad-based ESOP, also has its limits. In fact, " $v(x)$ " and " $v(y)$ " in the prospect formula are human subjective estimations based on specific reference points. They are not constant, and marginal utilities decrease. Moreover, not all the efforts devoted to change can succeed. Employee owners' participation will be demotivated when they realize that they have limited power. Gradually, people become tired of the ownership they admired, and the effects of motivation will become inefficient.

Furthermore, few people pay attention to the details of the incentive effects of ESOPs. In reality, employees working in listed firms can freely trade stocks in the market with their own savings. Even without the implementation of ESOPs, they can become shareholders of the firms where they are working. The advantage through ESOPs is based upon the inherent discounts or gifts proposed by ESOP schemes. Essentially, these are the benefits alienated by market shareholders to employee-owners, with which investors expect to motivate employee-owners' potential and improve firm performance. With firms' growth, investors will compensate for their damages and gain returns in the market with employees' new values. In practice, when the difference between the prices proposed by ESOPs and stock prices is not significant or adverse to employees, no employees accept these schemes, or they won't exercise their rights of stock options.

In case that the implementation of ESOPs cannot improve firms' performance, no new values created will compensate for market investors' damages, while employee-owners can still gain price difference from market investors with lower purchasing prices settled at the beginning. Without positive returns, market investors sell ESOP firms' stocks. Progressively, these stock prices go down. Employee-owners gain less and less price difference in the market, and the motivation effects become less and less significant. At last, both market investors and employee-owners lose in the ESOP games.

Hence, although employee-owners become the principal, agency problems can also occur between different principals (Jensen & Meckling, 1976): between employee-owners working in firms and market shareholders out of firms, and between employee-owners and creditors.

As in the traditional model, in the environments of insufficient legal supervision and firms' controls, severe agency problems will also break out in the ESOP framework. Because an imperfect infrastructure and short-term earning desires will stimulate employee-owners to maximize their own interests by sacrificing those of the market

investors or creditors. The first ESOP trials in China in the 1990s are useful examples.

Due to the agent's abuse of power, these ESOP trials entirely failed (Wang, 2005). Scandals broke out: some employee-owners (directors and workers together) distributed unlimitedly shares to themselves with favorable discounts and sold them to market shareholders at the market price for gains; some managers decided to sell firms' assets with the purpose to fulfill performance tasks and gain ESOP benefits for employee-owners when operating profits were not enough; some managers collateralized firms' assets to borrow money, used loans for investment to improve the performance rapidly, and gained dividends for employee-owners. In 1997, when the Asian financial crisis shut down Asian economies' growth, the challenging environments worsened the above agency problems. High bankruptcy risks were exposed to Chinese firms, and most creditors (banks) and market investors suffered from terrible losses. Thus, the China Securities Regulatory Commission (briefly called the CSRC), the Chinese financial market supervisor, issued laws in 1998 to suspend the implementation of ESOPs in Chinese listed firms.

After seven years of reflection, a new ESOP model was legally authorized to be relaunched in China. Agency controls are recalled to revise the design of ESOPs:

- a) We realize that ownership is a scarce resource. Unlimited distribution of employee shares will harm market shareholders' interests. Thus, the distribution of employee ownership shares should be limited.
- b) Participation in ESOP schemes should be selective. Only those who make particular contributions can be qualified as "core staff" and participate in ESOPs. The qualification is open to the working staff at all levels, including senior executives, directors at the middle level, the excellent working staff for innovation, loyalty, etc.
- c) The participants should devote themselves to achieve collective or individual

performance goals; otherwise, the relevant ESOP benefits will be withdrawn.

- d) All employees should equally pass their assessment at the moment of renewing work contracts. The employee-owners have no priority for employment. When they leave the firms, some firms require them to return their shares.
- e) In case that employee-owners make errors or faults or cause severe damages to firms, the punishment cannot be exempted because of employee ownership. Furthermore, they will lose their ESOP qualification and be obliged to return their shares or ESOP parts to companies and even pay penalties for their misconduct. Serious faults or crimes of employee-owners will be recorded in the blacklist of the CSRC, and they cannot be qualified in other listed companies during the period predefined by regulations.
- f) Specific regulations are established for the protection of market investors. Examples being: locking periods of ESOP share-trading, prohibitions to exercise ESOP rights within sensitive reporting periods. All the stock trading activities related to executives' ESOP shares should be strictly recorded and publicly reported by companies and stock exchanges.
- g) Many firms explicitly state the performance goals net of exceptional profits to hinder employee managers from selling firms' assets to fulfill goals.
- h) All financial institutions should strictly control the loans of ESOP firms.

Inevitably, the competition will be enhanced in workplaces alongside the selection of “Core staff.” In addition to psychological ownership, ESOP participants will enjoy a specific “winner” effect for being qualified. Moreover, they have to take more care of their conduct and performance because they are afraid to lose their qualification.

The competition between qualified and unqualified staff will probably generate gaps

in communication and cooperation. Naturally, the qualified employee-owners will take advantage of their ESOP channels and improve social benefits for all the employees to mobilize them and achieve performance goals. Gradually, they become the representatives to facilitate the communication between firm owners and all employees and transfer the information for decision-making through ESOP channels. Nevertheless, these channels constructed by the core-staff are narrower than those of broad-based ESOPs; their participation voices in corporate governance may be clearer and more efficient to be heard by firm decision-makers.

2.6 Hypotheses

Based on the above analyses, we examine whether Core-Staff-Based ESOPs have overcome the weakness of previous trials, and analyze this new organization's performance at three dimensions, corresponding to three types of agency risks: the problems between employees and firms, between employee-owners and creditors, and between employee-owners and market investors.

Firstly, we verify whether this ESOP mechanism enables firms to motivate employees' value-creation, control agency problems inside firms, and achieve performance goals. Thus, we set up our hypothesis as below:

Hypothesis 1: The implementation of Core-Staff-Based ESOPs enables ESOP firms to improve firms' performance more than Non-ESOP firms.

ROE, ROA, and ROS are commonly used in previous researches (Meng et al., 2011; Zhang et al., 2016; Ren et al., 2019). Since the Chinese government provides fiscal benefits to Hi-Tech firms, we measure asset-based or equity-based performance with the indicator "pre-tax profits" (variable "ProfBefTax") to avoid the disturbance generated by specific policies. Accordingly, we translate the first hypothesis into two sub-hypotheses for different indicators:

Hypothesis 1a: The implementation of Core-Staff-Based ESOPs enables ESOP firms to increase the asset-based pre-tax profits more than Non-ESOP firms.

Hypothesis 1b: The implementation of Core-Staff-Based ESOPs enables ESOP firms to increase the equity-based pre-tax profits more than Non-ESOP firms.

Secondly, we need to control business risks to ensure healthy growth of performance. Taking affordable loans creates financial security in the workplace and protects creditors' interests. Thus, we verify whether the new mechanism of Chinese ESOPs enables firms to reduce business risks and maintain a suitable proportion between debts and equity. We select debt ratios for measurement and set up our second hypothesis as below:

Hypothesis 2: The implementation of Core-Staff-Based ESOPs enables ESOP firms to lower their debt ratios, reducing business risks more than Non-ESOP firms.

As we know, price plays a predominant role in market mechanisms. In reality, firms' market values on the stock market represent market investors' subjective estimations regarding the present values of firms' future gains. Stock price fluctuation is also influenced by various factors like national GDP growth, interest rates, tax rates, unemployment rates, international trade environments, and systemic crises in economies. However, we believe that the stock prices correspond to firms' real values over a sufficiently long time. Those firms who are diligent enough to contribute positive performance, intelligent enough to reduce business risks, respectful to employees who create values, and sincere in the protection of investors, especially the small market investors, will finally gain more values than other firms. Thus, we use stock prices as intermediate variables in our third hypothesis to verify whether Core-Staff-Based ESOPs enable firms to gain higher values in the long term.

Hypothesis 3: The implementation of Core-Staff-Based ESOPs enables ESOP firms to increase market values more than Non-ESOP firms.

To imitate market investors' decision-making processes, we measure the performance-based market values with the indicator of net profits instead of pre-tax profits.

3. Methodology and data

We utilize the random models of linear panel regressions and construct a database made up of 119994 data, covering 52 quarters from 2006 to 2018 and including all the 3523 Chinese firms listed on Shanghai or Shenzhen Stock Exchanges on June 30th, 2018. The classical model of regression in our tests is described as below:

$$Y_{i,t} = \alpha_t + \beta_1(X_{i,t}) + \beta_2(\text{AdjCoreSeason}) + \sum_n \gamma_n CV_{i,t} + \sum_k \lambda_k CV_i + \mu_{i,t}$$

α_t is an intercept term that varies across time. "AdjCoreSeason" is the dummy variable of Core-staff-based ESOPs with values in 0 or 1. $\sum_n \gamma_n CV_{i,t}$ represents time-variant control variables like firm ages or debt ratios; while $\sum_k \lambda_k CV_i$ stands for all time-invariant control variables such as Hi-Tech or family-controlled. $\mu_{i,t}$ is the error term, including individual disturbing terms μ_i and time disturbing terms v_t . Regarding the industries or regions, the regression results significantly vary depending on the choice of group 0 in comparison. For this reason, we will insert various designs of heterogeneous contexts and control the effects of Chinese new ESOPs in specific contexts.

The firm ages can be calculated since their foundation or their incorporation on the stock market. For Hypotheses 1 and 2, we choose the "Age1Foundation" as the control variable, to observe potential effects on the firms' experience or their properties. While for Hypothesis 3, we choose the "Age2Listing" because it will be closer to the listed firms' histories perceived by market investors.

For Hypothesis 3, we also search some control variables at the macro level to complement the market value tests. However, the indicators like GDP growth rates, interest rates, exchange rates, and inflation rates, have medium or strong correlations. Finally, we

select the “M2” as our control variable, which indicates the monetary supply volume.

4. Results and interpretations

4.1 Significant improvements in performance

We have different results on ESOP effects when measuring with different performance indicators. As shown in Table 8, ESOP firms have significantly overperformed more than Non-ESOP firms on asset-based profits. Non-family-controlled firms have more advantages in corporate governance than family-controlled firms; however, Hi-Tech firms have underperformed more than Non-Hi-Tech firms. Experience does not seem to contribute to value-creating cycles allocated in rapidly changing surroundings, while young firms’ dynamism explores more opportunities to enhance performance. In the field of asset-based performance, the effects of debt ratios are not significant.

As shown in Table 9, among the firms whose debts are less than 85% of their assets, the ESOP mechanism has significantly contributed positive effects to improve firms’ equity-based performance. However, ESOP firms have not overperformed more than Non-ESOP firms whose debt ratios are superior to 85%, because ESOP firms are constrained to take loans due to the agency controls inside and outside firms.

In sum, Hypothesis 1a is well supported, and Hypothesis 1b is conditionally supported.

Table 8. Asset-based pre-tax profit analysis

Random-effects GLS regression	Number of obs	=	119,994
Group variable: ISIN	Number of groups	=	3,523
R-sq:	Obs per group:		
within = 0.1158	min =		3
between = 0.8931	avg =		34.1
overall = 0.4938	max =		52
corr(u_i, X) = 0 (assumed)	Wald chi2(6)	=	56760.54
	Prob > chi2	=	0.0000

ProfBefTax	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Assets	.0093618	.0000396	236.32	0.000	.0092842	.0094394
AdjCoreSeason	.1637476	.0567418	2.89	0.004	.0525356	.2749596
NonFamControl	.3842993	.0613139	6.27	0.000	.2641262	.5044723
HiTech	-.2188914	.0597188	-3.67	0.000	-.3359381	-.1018446
Age1Foundation	-.0195816	.0055243	-3.54	0.000	-.0304091	-.0087542
DebtR2	-.0000392	.0001032	-0.38	0.704	-.0002414	.000163
_cons	.5600204	.1216821	4.60	0.000	.3215279	.7985129
sigma_u	1.1888562					
sigma_e	6.0520365					
rho	.03715456	(fraction of variance due to u_i)				

Table 9. Equity-based pre-tax profit analysis (Debt ratio <=85%)

Random-effects GLS regression	Number of obs	=	114,657
Group variable: ISIN	Number of groups	=	3,494
R-sq:	Obs per group:		
within = 0.0179	min =		1
between = 0.9293	avg =		32.8
overall = 0.6100	max =		52
corr(u_i, X) = 0 (assumed)	Wald chi2(6)	=	54027.70
	Prob > chi2	=	0.0000

ProfBefTax	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Equity	.0677965	.0002956	229.34	0.000	.0672172	.0683759
AdjCoreSeason	.0470545	.0167136	2.82	0.005	.0142964	.0798126
NonFamControl	.0896457	.0201508	4.45	0.000	.0501509	.1291406
HiTech	-.0727298	.0193431	-3.76	0.000	-.1106415	-.0348181
Age1Foundation	-.0036403	.0017872	-2.04	0.042	-.0071432	-.0001374
DebtR2	-.0005793	.0003684	-1.57	0.116	-.0013014	.0001428
_cons	.1319717	.0400676	3.29	0.001	.0534407	.2105027
sigma_u	.39387651					
sigma_e	1.6861386					
rho	.05174391	(fraction of variance due to u_i)				

4.2 Significant prudence in loan-taking

Corresponding to the above observation, ESOP firms significantly bear fewer debts than Non-ESOP firms, as demonstrated in Table 10. The strict controls applied in the new ESOP mechanism enable firms to decrease bankruptcy risks with more prudence. Thus, Hypothesis 2 is strongly supported.

Nevertheless, different firm attitudes have drawn our attention. For example, Non-family-controlled firms take less risk in the capital structure than family-controlled firms; however, Hi-Tech firms generally bear more debts than Non-Hi-Tech firms, probably due to their challenging technological competition. Insignificant effects are observed in firm ages.

Table 10. Debt ratios analysis

Random-effects GLS regression	Number of obs	=	119,994
Group variable: ISIN	Number of groups	=	3,523
R-sq:	Obs per group:		
within = 0.9988	min =		3
between = 0.9983	avg =		34.1
overall = 0.9982	max =		52
corr(u_i, X) = 0 (assumed)	Wald chi2(5)	=	1.00e+08
	Prob > chi2	=	0.0000

Liability	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Assets	.9129188	.0000913	1.0e+04	0.000	.9127399	.9130978
AdjCoreSeason	-1.934318	.0829144	-23.33	0.000	-2.096827	-1.771809
NonFamControl	-3.688399	.7915878	-4.66	0.000	-5.239883	-2.136916
HiTech	1.517694	.7538572	2.01	0.044	.0401606	2.995227
Age1Foundation	.084949	.0666644	1.27	0.203	-.0457108	.2156087
_cons	-3.577697	1.424686	-2.51	0.012	-6.37003	-.7853641
sigma_u	20.81241					
sigma_e	7.8001251					
rho	.87683774	(fraction of variance due to u_i)				

4.3 Significant contribution to increasing firms' market values

As shown in Table 11, the ESOP mechanism has significantly contributed positive effects to increase the firms' performance-based market values. Thus, Hypothesis 3 is well supported.

Table 11. Net-profit-based market value analysis

Random-effects GLS regression	Number of obs =	117,767
Group variable: ISIN	Number of groups =	3,523
R-sq:	Obs per group:	
within = 0.0455	min =	3
between = 0.3348	avg =	33.4
overall = 0.2833	max =	52
corr(u_i, X) = 0 (assumed)	Wald chi2(7) =	7102.37
	Prob > chi2 =	0.0000

marketvalue1	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
NetProf	1.285412	.0197621	65.04	0.000	1.246679	1.324145
AdjCoreSeason	2.642779	.241667	10.94	0.000	2.16912	3.116437
NonFamControl	13.94729	1.139109	12.24	0.000	11.71468	16.1799
HiTech	-8.502631	1.05287	-8.08	0.000	-10.56622	-6.439043
Age2Listing	-.2721002	.0711683	-3.82	0.000	-.4115875	-.1326128
DebtR2	-.0001401	.0003722	-0.38	0.707	-.0008696	.0005894
M2	.0607403	.0015714	38.65	0.000	.0576604	.0638202
_cons	6.053457	1.212059	4.99	0.000	3.677866	8.429048
sigma_u	27.450234					
sigma_e	20.801451					
rho	.63522624	(fraction of variance due to u_i)				

Moreover, the money supply volume “M2” that reflects the monetary policies of the Chinese central bank, also influences stock prices. Non-family-controlled firms have gained higher expectations of market investors than those family-controlled, while the stocks of Hi-Tech firms cost less than Non-Hi-Tech firms. Most Chinese investors appreciate young firms more than old firms, which means firms' long histories and relative business reputations have not provided advantages for investors' estimation. Also, debt ratios have insignificant effects on investors' short-term analyses.

Based on the above analyses, the implementation of Core-staff-based ESOPs enables firms to generate an accountable business model: ESOP firms have achieved higher returns with lower debt burdens, improving firms' performance and market values.

5. Further analyses

5.1 *Analyzing ESOP effects between prior and post-ESOP*

The above comparative approaches are focused on the difference between ESOP firms and Non-ESOP firms. As tested in Chapter II and Ren's paper (Ren et al., 2019), most ESOP firms overperformed more than Non-ESOP firms, even before implementing ESOPs. Naturally, a question like the chickens and the eggs will be raised. Did those firms who had overperformed decide to implement ESOPs or those who had implemented ESOPs improve their performance? Our findings support the positive effects of SIPs with quartile statistics after comparing post-SIP to pre-SIP in Chapter II, and we complement the previous research in the current paper with panel regressions. We select the asset-based pre-tax profits for tests and construct the second database of 53123 data containing all the 1496 ESOP firms and 68 quarters from the spring of 2002 to the winter of 2018.

Hypothesis 4: The implementation of Core-staff-based ESOPs enables ESOP firms to overperform more than pre-ESOP.

As shown in Table 12, the dummy variable "AdjCoreSeason" distinguishing the period during which 1496 firms were implementing ESOPs and the period without ESOPs, demonstrates a positive significance. Thus, Hypothesis 4 is strongly supported.

Similar to the above tests, Non-family-controlled firms possess more advantages than family-controlled firms, and Hi-Tech ESOP firms have relatively underperformed more than Non-Hi-Tech ESOP firms. In contrast, the firm ages and debt ratios have insignificant effects.

Table 12. Comparative analysis between Prior-ESOP and Post-ESOP

Random-effects GLS regression	Number of obs	=	53,123
Group variable: ISIN	Number of groups	=	1,496
R-sq:	Obs per group:		
within = 0.5452	min =		3
between = 0.8134	avg =		35.5
overall = 0.6846	max =		68
	Wald chi2(6)	=	68772.28
corr(u_i, X) = 0 (assumed)	Prob > chi2	=	0.0000

ProfBefTax	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Assets	.013343	.0000512	260.46	0.000	.0132426	.0134434
AdjCoreSeason	.1360707	.0131059	10.38	0.000	.1103837	.1617577
NonFamControl	.3075317	.0512347	6.00	0.000	.2071135	.40795
HiTech	-.1287505	.0398862	-3.23	0.001	-.206926	-.050575
Age1Foundation	-.0036156	.0035423	-1.02	0.307	-.0105583	.0033272
DebtR2	-.0000649	.0000771	-0.84	0.400	-.0002161	.0000863
_cons	.1967449	.0749271	2.63	0.009	.0498904	.3435994
sigma_u	.64959367					
sigma_e	1.279405					
rho	.20495525	(fraction of variance due to u_i)				

5.2 Analyzing ESOP effects in heterogenic contexts

As we know, development is heterogeneous in China. Thus, we attempt to verify whether the effects of Core-Staff-Based ESOPs will be changed in different regions, industries, firm organizations, and business situations. We use the first database of 119994 data and select the asset-based pre-tax profits for panel regressions.

Firstly, we segment the provinces of China Mainland into seven regions, distinguishing ESOP and Non-ESOP firms with the dummy variable “AdjCoreSeason,” and set up our hypothesis:

Hypothesis 5: The performance improvement contributed by Core-staff-based ESOPs demonstrates different effects in different regions of China.

Secondly, we segment Chinese firms into eleven industries according to the Global Industry Classification Standard, and set up the following hypothesis:

Hypothesis 6: The performance improvement contributed by Core-staff-based ESOPs demonstrates different effects in different industries of China.

Thirdly, we identify four types of firms according to their ISIN codes, representing different firm sizes and organizations, and set up the relevant hypothesis:

Hypothesis 7: The performance improvement contributed by Core-staff-based ESOPs demonstrates different effects under different firm organizations.

Finally, we segment the data into two groups, examining whether these ESOP schemes enable firms to improve their performance in different business situations either in gain or loss.

Hypothesis 8: The performance improvement contributed by Core-staff-based ESOPs demonstrates different effects in different business situations.

If the initial assumptions are proved to be accurate, the ESOP effects are significantly heterogeneous in specific contexts. On the contrary, the ESOP effects are proved to be homogenous regardless of the external environments' heterogeneity. We attach the descriptions and proportions of observations to Appendix 4 and analyze the test results as below.

As shown in Table 13, the positive effects of ESOPs are significant in the Eastern, Southern, Central, and North-West China, while insignificant effects are observed in Northern, North-East, and South-West China. Even among the regions of positive effects, ESOPs' contributions are not the same. Thus, geographic heterogeneity can lead to heterogenic effects of ESOPs.

As shown in Table 14, diverse effects of ESOPs are observed in different industries: in the industries of materials, manufacture, health care, and information technology, ESOP firms overperform more than Non-ESOP firms; in the industries of energy, financials, communication services, utilities, and real estate, no significant effects are exposed; while in the industries of consumer discretionary and consumer staples, adverse effects are observed in ESOPs. Few other variables remain significant in segmented industrial sectors, except for the assets and debt ratios. However, the coefficients of debt ratios are approximate to zero.

Table 13. Geographic heterogeneity analysis

Pre-tax profits	Northern China	Eastern China	Central China	Southern China	North-West	North-East	South-West
	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.
Assets	0.01 ***	0.01 ***	0.02 ***	0.01 ***	0.01 ***	0.02 ***	0.03 ***
AdjCoreSeason	0.18	0.13 ***	0.03 *	0.16 ***	0.24 ***	0.05	0.05
NonFamControl	1.09 *	0.30 ***	-0.05 *	0.18 *	0.05	-0.05 *	-0.11
HiTech	-1.15 **	-0.04	-0.02	-0.18 *	-0.07	-0.01	0.00
Age1Foundation	-0.10 *	0.00	0.00	-0.01	-0.01	0.00	0.00
DebtR2	0.00	0.00	0.00 ***	0.00	0.00 **	0.00	0.00
_cons	2.65 **	0.10	0.10 *	0.34 *	0.24 *	-0.04	0.06
Nmb Obs.	17,543	49,793	10,360	20,216	6,478	6,475	9,129
Nmb groups	480	1,563	276	647	158	152	247
sigma_u	3.22	0.62	0.17	0.77	0.34	0.13	0.78
sigma_e	15.55	1.16	0.43	1.69	0.57	0.54	0.87
rho	0.04	0.22	0.14	0.17	0.26	0.05	0.44
overall R2	0.48	0.68	0.28	0.76	0.42	0.39	0.13

Table 14. Industrial heterogeneity analysis

Pre-tax profits	Industry10	Industry15	Industry20	Industry25	Industry30	Industry35	Industry40	Industry45	Industry50	Industry55	Industry60
	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.	Coef. sig.
Assets	0.04 ***	0.02 ***	0.02 ***	0.05 ***	0.12 ***	0.05 ***	0.01 ***	0.02 ***	0.00	0.03 ***	0.02 ***
AdjCoreSeason	0.07	0.12 ***	0.06 **	-0.10 ***	-0.27 ***	0.03 ***	5.20	0.02 **	0.30	0.14	0.02
NonFamControl	0.85	0.03	0.02	-0.01	0.02	0.02	0.94	0.06 *	6.11 ***	-0.01	-0.05
HiTech	-1.00	0.05	-0.04	0.08 **	0.03	-0.01	-1.05	-0.06	0.04	-0.37	0.05
Age1Foundation	-0.08	0.00	0.00	0.00	-0.01	0.00	-0.18	-0.01 ***	0.02	-0.01	-0.01
DebtR2	-0.03 **	0.00	0.00 ***	0.00	0.00 ***	0.00 ***	0.00	0.00 ***	0.00	0.00 *	0.00
_cons	3.06 **	0.05	0.01	-0.04	0.03	0.09 *	4.15	0.22 ***	-0.43	0.31	0.33
Nmb Obs.	3,144	20,549	28,190	19,582	7,727	8,615	3,136	17,456	282	4,541	6,772
Nmb groups	78	561	874	595	210	263	89	611	7	101	134
sigma_u	1.11	0.36	0.45	0.33	0.50	0.13	0.00	0.28	0.00	0.57	0.27
sigma_e	7.87	0.76	0.87	0.77	0.75	0.28	36.06	0.36	1.80	1.16	2.29
rho	0.02	0.18	0.21	0.15	0.31	0.18	0.00	0.38	0.00	0.20	0.01
overall R2	0.63	0.24	0.61	0.72	0.61	0.52	0.49	0.20	0.63	0.50	0.33

As demonstrated in Table 15, ESOP firms have overperformed more than Non-ESOP firms in all the types of firm organization, including big firms listed in Shanghai and Shenzhen, small and medium firms, and start-ups. However, ESOPs' contributions are entirely different under different organizations. Furthermore, far from our previsions, the implementation of Core-staff-based ESOPs enables big firms to overperform more than small firms. We have observed only 0.02 points contributed to start-ups, but 0.41 points to the big firms listed in the Shanghai exchanges' principle panel.

Table 15. Heterogenic effects of ESOPs in different firm organizations

Pre-tax profits	SHPrin		SZPrin		SME		SZStartups	
	Coef.	sig.	Coef.	sig.	Coef.	sig.	Coef.	sig.
Assets	0.01	***	0.01	***	0.01	***	0.03	***
AdjCoreSeason	0.41	*	0.09	**	0.09	***	0.02	**
NonFamControl	0.54	***	0.07		0.10	***	-0.01	
HiTech	-0.36	*	-0.04		-0.05	**	-0.05	***
Age1Foundation	-0.05	***	-0.01		0.00		0.00	
DebtR2	0.00		0.00		0.00	***	0.00	***
_cons	1.34	***	0.38		0.19	***	0.14	***
Nmb Obs.	51,145		23,842		29,470		15,537	
Nmb groups	1,421		463		911		728	
sigma_u	1.78		0.80		0.24		0.12	
sigma_e	9.24		0.93		0.35		0.24	
rho	0.04		0.43		0.33		0.20	
overall R2	0.49		0.40		0.28		0.19	

Finally, as demonstrated in Table 16, we observe a significant mirror-like effect in different business situations in executing Core-staff-based ESOPs. That means: ESOP firms strongly overperform more than Non-ESOP firms when firms gain positive performance; while firms are in loss, most ESOP firms cannot decrease losses, they even increase losses more than Non-ESOP firms. The main reason is probably due to the costs, for example, the inherent costs to implement ESOP schemes, the new costs indirectly generated by ESOP channels like the improvement of social benefits of working staff, and the costs to maintain the labor force if we do not want to fire employees or reduce their salaries. If the firms are healthy enough to gain positive

performance, with these costs invested through ESOPs, employees are motivated to create more values, and firms can increase the profits. However, in the case where the firms lose in business operation, especially in challenging environments, employees' new values cannot cover these costs; thus, firms' losses will increase. Moreover, when firms are in loss, ESOP participants will not receive the expected gains of ESOPs; consequently, the relevant motivation effects will be shaped, and the probability of agency problems will be highly increased in the adverse situation. With employee-owners' participation power, the related social costs will also be more significant than other firms if we want to reduce previous benefits assigned to employees or fire employees.

Table 16. Mirror-like effects of ESOPs in different business situations

Pre-tax profits	Positive performance		Negative performance	
	Coef.	sig.	Coef.	sig.
Assets	0.01	***	0.00	*
AdjCoreSeason	0.18	**	-0.17	***
NonFamControl	0.45	***	-0.14	***
HiTech	-0.25	***	0.06	*
Age1Foundation	-0.02	***	0.01	*
DebtR2	0.00		0.00	
_cons	0.64	***	-0.26	***
Nmb Obs.	104303		15691	
Nmb groups	3523		1764	
sigma_u	1.03		0.48	
sigma_e	6.42		0.47	
rho	0.03		0.52	
overall R2	0.50		0.02	

However, we are astonished to see that no mirror effect has occurred in debt ratios and market values. As shown in Table 17, ESOP firms significantly bear fewer debts than Non-ESOP firms, whether their firms are in gain or loss. This prudence should be owed to the strict agency controls organized by the new design of ESOPs in China.

On the other hand, we believe that the family culture probably plays a role in the market values, motivating employee-owners to support their firms even in serious difficulty. We cannot forget that employees are also investors. Furthermore, employees

will transfer information directly and indirectly to market investors. More than 80% of market investors in China are small individual investors, and most of their analyses rely on experience, qualitative observations, price trends, and private information spread by word of mouth inside social communities. Thus, the market value trends are not impacted by adverse firm performance in the short term.

Table 17. Debt ratio and market value analysis in different business situations

Debt Ratios	Positive performance		Negative performance		Market Values	Positive performance		Negative performance	
	Coef.	sig.	Coef.	sig.		Coef.	sig.	Coef.	sig.
Assets	0.91	***	0.90	***	NetProf	1.35	***	-0.57	***
AdjCoreSeason	-2.01	***	-0.39	***	AdjCoreSeason	2.57	***	1.59	***
NonFamControl	-3.74	***	-2.36		NonFamControl	13.92	***	8.72	***
HiTech	1.57	*	0.67		HiTech	-8.55	***	-4.61	**
Age1Foundation	0.08		0.06		Age2Listing	-0.25	***	-0.36	**
_cons	-3.55	*	-2.61		DebtR2	0.00		0.00	
					M2	0.06		0.03	
					_cons	5.64	***	7.51	**
Nmb Obs.	104,303		15,691		Nmb Obs.	102,445		15,322	
Nmb groups	3,523		1,764		Nmb groups	3,523		1,757	
sigma_u	20.76		28.4691		sigma_u	27.30		32.68	
sigma_e	8.29		1.4029		sigma_e	22.10		4.55	
rho	0.86		0.9976		rho	0.60		0.98	
overall R2	1.00		0.9980		overall R2	0.31		0.00	

5.3 Analyzing heterogenic ESOP effects under different sub-models and business situations

Following Ren and her partners' research steps in 2019, we analyze heterogenic ESOP effects under various sub-models and distinguish different business situations in gain and loss. The "ESO" called in Ren's paper refers to the "SIPs" in the current paper, the "Share incentive plans" launched in 2005. The "EO" called in Ren's paper refers to two sub-models in our research: the schemes implemented during 1992-1998 and characterized by the typical broad-based ESOPs; and the schemes called "ESOPs-2014" in our research, which have been implemented since 2014 and are grouped under the Core-staff-based ESOPs instead of broad-based ESOPs. Our tests focus on the sub-models of Core-staff-based ESOPs, including SIPs, ESOPs-2014, and the mixed ESOPs in which firms implement both SIPs and ESOPs-2014. We utilize two different

databases consisting of 119994 and 53123 data to compare firm performance between ESOP firms and Non ESOP firms, and between Prior-ESOPs and Post-ESOPs.

As summarized in Table 18, although significant effects at different levels have been demonstrated among different sub-models of Core-staff-based ESOPs, this internal heterogeneity cannot change the common mirror-like effects in different business situations. These ESOPs contribute positive effects in the case of gain but adverse effects in the case of loss. Furthermore, comparing ESOP firms to Non-ESOP firms, SIPs have significant effects both in the cases of gains and in losses, while ESOPs-2014 and mixed ESOPs have stronger effects than SIPs, but significant in the case of losses, and insignificant in the case of gains under the criteria of 95%. On the other hand, even though most ESOP firms have been confirmed to be more excellent than Non-ESOP firms prior-ESOPs, our regression test results strongly support that ESOP firms, under whichever sub-model of Core-staff-based ESOPs, have improved their performance after the implementation of ESOPs more than before in the case of gains. Among these sub-models, the mixed ESOPs have the most forceful impacts, and ESOPs-2014 are allocated in the second position. Entirely like the mirror, in the case of losses, the mixed ESOPs have lost more than the other schemes, and SIPs have lost the least.

Double-side effects are also clearly observed under the variables of Non-family controlled governance and Hi-Tech sectors.

In sum, all the above hypotheses regarding heterogeneous effects have been well supported. We confirm that the generation of positive effects and the efficiency of Core-staff-based ESOPs need conditions through our heterogeneity tests. In the favorable environments, this new design of ESOPs will deliver positive effects; while in unfavorable environments, the positive effects are not significant, even adverse effects occur. We should pay attention to the strengths and weaknesses of Core-staff-based ESOPs, and adjust the ESOP design in practice to adapt to specific contexts both at the best time and the worst time.

**Table 18. Performance analysis under different sub-models
and different business situations**

NON ESOP /ESOP FIRMS	Positive performance		Negative performance		PRIOR-ESOP /POST-ESOP	Positive performance		Negative performance	
	Coef.	sig.	Coef.	sig.		Coef.	sig.	Coef.	sig.
ProfBefTax					ProfBefTax				
Assets	0.0096	***	-0.0001	*	Assets	0.0133	***	-0.0076	***
SIPs	0.1502	*	-0.1258	***	SIPs	0.1472	***	-0.1200	***
ESOP2014	0.2194	<i>0.0540</i>	-0.2069	***	ESOP2014	0.1699	***	-0.1884	***
MixedESOPs	0.2846	<i>0.0900</i>	-0.2881	***	MixedESOPs	0.2498	***	-0.2739	***
NonFamControl	0.4464	***	-0.1430	***	NonFamControl	0.3410	***	-0.0442	
HiTech	-0.2540	***	0.0550	*	HiTech	-0.1498	***	0.0106	
Age1Foundation	-0.0218	***	0.0060	*	Age1Foundation	-0.0030		-0.0003	
DebtR2	0.0000		0.0000		DebtR2	0.0000		-0.0002	**
_cons	0.6430	***	-0.2570	***	_cons	0.2055	**	-0.0734	
Nmb Obs.	104,303		15,691		Nmb Obs.	48,172		4,951	
Nmb groups	3,523		1,764		Nmb groups	1,496		705	
sigma_u	1.0337		28.4691		sigma_u	0.6391		0.3553	
sigma_e	6.4180		1.4029		sigma_e	1.3171		0.5278	
rho	0.0253		0.9976		rho	0.1906		0.3118	
overall R2	0.5039		0.9980		overall R2	0.6923		0.1016	

6. Summary and open questions

Mostly, we succeed in learning with a trial-error-trial model.

After revisions, we have reconfirmed the value of Agency Theory and developed the contextualization of agency costs with the analyses based on Prospect Theory. To overcome the traditional models' weakness, we have proposed a new ESOP design in China called "Core-Staff-Based ESOPs." Through the qualifications and assessments organized for ESOP participants, agency controls have been recalled to execute these new ESOP schemes, filling inherent gaps of standard models of ESOPs.

We have conducted performance analyses to examine the efficiency of Core-staff-based ESOPs. We have compared the performance between ESOP firms and Non-ESOP firms (traditional models), before and after implementing ESOPs in the ESOP firms, and between Chinese firms' experience of broad-based ESOPs in the 1990s and the Core-staff-based ESOPs implemented by Chinese listed firms since 2005. Our findings significantly support the positive effects of Core-staff-based ESOPs in improving firms' performance, reducing business risks, and increasing firms' market values. Modeling

the contexts in regressions, we have confirmed the heterogeneous effects of this new ESOP design and revealed its strength and weakness in specific surroundings.

Nevertheless, the contexts we have introduced represent the simplest situations based on one single criterion of segmentation. In reality, the environments in which organizations operate consist of the complexity that is superimposed by various contexts. Even though we have collected 119994 data in our database, the data volume and the unbalanced data nature cannot support an efficient segmentation of multiple criteria. We will model multiple context criteria with the database of a bigger size in the future.

To simplify the cases in tests, we have used the original quarterly data. However, we cannot neglect the potential impacts of seasonal effects and the stationarity of data. Thus, we need further tests with annual logarithm data to control and complement the current test results.

Finally, we notice an interesting question: Why have Hi-Tech firms underperformed more than Non-Hi-Tech firms? Have Core-staff-based ESOPs contributed efficiency to Chinese Hi-Tech firms? Reexamining the current results, we will devote ourselves to explore the roles of ESOPs in innovation in the next research.

CHAPTER IV.

THE ROLES OF ESOPS IN INNOVATION

1. Can Core-staff-based ESOPs enhance Hi-Tech firms' survival chances?

Innovation has entirely changed the world in which we are living. People believe that innovation will enhance survival chances for firms. In reality, the innovative firms operating in Hi-Tech sectors have much higher business risks than other firms working in traditional sectors.

Because of a high probability of failures, innovative firms have their product life cycle curves much steeper than the normal ones. A delay of two years will lead to firms' failure, being defeated by disruptive innovators in the new market. To gain market shares, most innovative firms lower their margins, even earn no gains. How to stand on the wave of technology and keep financial reporting positive is the innovators' dilemma. For this reason, most high-tech firms underperform more than Non-Hi-Tech firms, except for the top ones who become billionaires. The lesson of the technological bubble in 2000 reminds us to search for reliable business models for Hi-Tech firms and sustain their life and innovation.

Which forces should innovative firms account for, enabling them to efficiently transform the capital into innovation, economically scale the innovative production, and dynamically commercialize innovative outcomes in diversified markets? We are searching for potential energy sources both in and out of firms.

Workers are considered as the labor force in traditional business models. Directors are also employees. Few people are aware of the multi-capital that employees can contribute. Capital does not only refer to the money, but also human capital, organization capital, and social capital, like knowledge, experience, ideas, information,

social networks, technologic patterns, organization of processes.

Thus, we propose to construct a high-efficiency innovative team inside firms with the implementation of ESOPs, motivating employees' potential to resolve the innovators' dilemma. Our focus is fixed on Core-staff-based ESOPs, a specific ESOP mechanism recalling agency controls. We verify whether these Core-staff-based schemes implemented by Chinese Hi-Tech firms enable enhancing R & D investments' efficiency, reducing business risks, improving firm performance, and increasing innovators' survival chances with employees' active and appropriate participation.

Furthermore, a system thinking encourages us to conceptualize an open innovation ecosystem, calling up other social actors to sustain innovation, like governments, developing agencies, research institutions, and incubators. Thus, we attempt to analyze the potential interactions between the Chinese government's policies and Core-staff-based ESOPs in the innovation ecosystem.

2. Theoretical framework and hypotheses

2.1 Employees' multi-capital potential and participation

The notion of capital was born together with its counterpart: labor. Capital can be defined as the amount of wealth used in making profits (Sombart, 1953), while labor is defined as the work of working people enforced by transaction contracts with employers (Marx, 1867; Simon & Frank, 2005). In traditional business models, firm owners provide financial wealth for production organizations and pay for workers' and directors' employment. In Solow's model, the labor force is considered a factor of physical capital (Solow, 1957).

Human capital represents the core part of the system of innovation. Each technological revolution in our history was generated and developed by human knowledge and creativity. However, most people confuse labor and human capital. As defined in the Oxford English Dictionary as "the skills the labor force possesses, human

capital is regarded as a resource or asset" to explain the workforce's difference. Historically, this notion goes back to the work of Adam Smith and Irving Fisher, and it was reintroduced in modern society in the 1950s to explain the residual gap discovered in Solow's model (Goldin, 2016). In the 1960s, Mincer, Schultz, and Becker founded the Human Capital Theory (Mincer, 1958; Schultz, 1961; Becker, 1964), affirming that the "investment in people" in education and health care can produce human capital and "improve the quality of human efforts" (Schultz, 1961).

According to behavioral economics, firms are managed by human beings. Being made up of different individuals, the firm organization becomes a vital theme of management. Generally, a vertical hierarchical structure has been introduced in the traditional organization, in which directors at different levels control working sessions and processes, and the administrators at the top management are engaged in firms' decision-making processes. However, firms' decision-makers are constrained to make rational choices in the context of uncertainty and ambiguity, even though they intend to do it (March, 1994). Being challenged by extremely high risks and rapid technological evolution in innovation, a choice "good enough" made by financial decision-makers will rarely be enough either for big incumbents or small entrants.

Because disruptive technologies frequently signal the emergence of new markets or market segments, managers must create information about such markets – who the customers will be, which dimension of products will match most of which customers, what the right price points will be. Managers can create this kind of information by experimenting rapidly, iteratively, and inexpensively with both the products and the market (Bower & Christensen, 1995).

In modern management, information is also an asset to the firm. Prescott and Visscher named it "organization capital" (Prescott & Visscher, 1980). However, how can decision-makers "create" alone all vital information for innovation rapidly, iteratively, and inexpensively? For the severe asymmetry of information, decision-makers make bias in decisions and lose time reacting to competitors' challenges

correctly. If employees take advantage of their social networks and actively collect information for decision-makers, these information gaps will be reduced, and firms' competitiveness will be improved.

According to the latest research, social networks are useful assets, especially for those innovative firms with smaller sizes and fewer financial resources. The definition of social capital, as commonly accepted, is "the ability of actors to secure benefits by virtue of membership in social networks or other social structures" (Portes, 1998). Employees' social capital will contribute indispensable power to enhance firms' innovation, performance, and reputation.

Employees are also financial investors, purchasing the firms' stocks with their own savings.

For us, employees' participation, beyond the "participation voices" for demanding interests for themselves, is one type of investment enabling firms to activate employees' multi-capital potential and create more values.

With the active participation of employees at all levels, decision-makers' can understand their errors in stereotypical routines, find more alternative solutions, estimate more precisely the alternatives' values and probabilities, diversify strategy focuses, anticipate negative results, and balance different interests in and out of firms.

Moreover, through participation, employees learn how to analyze firms' problems, express their opinions, and develop a further social network in the firms' interest. In this way, they change their mentality beyond the usual working positions, generate new social capital, and increase human capital by developing new competencies.

To sum up, beyond the traditional labor force, employees can contribute multi-capital to firms' growth, including physical capital, human capital, organization capital, social capital, and financial capital. Motivating employees' multi-capital potential and their participation enables firms to improve the decisions' quality, reduce innovation

failures, enhance the efficiency of organization structure (Tomer, 1987), facilitate firms' adaption to the challenging technology changes, and increase their survival chances in the competitive surroundings.

2.2 Aligning conflicts between different capital with Core-staff-based ESOPs

In traditional firm organizations, employees work in contractual positions. Based on performance, they are rewarded in wage, or salary, and the bonus. Delivering values as defined in contracts is the employees' task, while the participation out of the contractual framework is usually considered "troublesome" involvements. Few sharing incentives are organized for employees' work or their participation. The workplace is full of controls against agency problems, ignoring the motivation of employees' value-creating potential.

As explained in the above chapters, together with the shares and a bundle of property rights, the ESOP gives employees chances to participate in corporate governance. As the agent + principal, employee-owners' presence aligns the regular divergence of interests between employees and firm owners. Among two standard ESOP models, the broad-based ESOP draws the mainstream's attention, even though the diffusion of executive-based ESOPs is more significant in western firms.

Theoretically, when all the staff becomes employee-owners, the divergence of interests between the principal and the agent would be reduced or eliminated, and the employees' potential development would reach the maximal point for firm performance. However, few people discover that new agency conflicts will be generated among employee-owners, financial capital owners, and creditors.

Although employees buy stocks of firms, the amount of financial capital contributed to firms represents a small proportion in the capital structure. In case that the firms are defeated in market competitions, employee-owners have to bear the loss both of financial capital and multi-capital invested through their work and participation. Thus, employees should not and cannot take the primary responsibility as financial

capital contributors. Unavoidably, other shareholders as financial capital contributors and creditors lending loans sustain business together with employees' multi-capital.

In modern society, most firms are incorporated in stock exchanges. Directly or indirectly, the main financial contributors supporting these firms are small and medium investors with their individual or family savings. Moreover, like the structure of leader and followers, one controlling shareholder or one group of controlling shareholders outstands alongside the small-and-medium-sized shareholders of. They are engaged in defending firms against hostile take-overs and mobilizing market investors to raise capital at the moment of crises.

Specifically, employees' multi-capital is bounded with "Jura personarum," indivisible with their lives and activities. This value-creating ability will remain with them until death or being disabled. In case that firms bankrupt, the employees will lose their jobs but will not lose their potential. When they find other jobs, they can reactivate this ability in new work. However, most financial capital will disappear when the firms become insolvent, and financial capital contributors will lose all their investments without any rewards; some of them will even lose personal assets because of being collateralized. The super-rich men of capitalist legends are only particular stories in our society.

Based upon Jensen's analyses on the manager-owner model (1976), we believe that agency problems will remain even with the implementation of broad-based ESOPs, because of the conflicts between employee-owners and other shareholders, and the conflicts between employee-owners and creditors. Moreover, the participation of employee-owners will probably address different directions based on personal interests.

As introduced in the above chapters, Chinese firms have designed a new ESOP model based on their failure experience, called "Core-staff-based ESOPs." In the standard ESOP models, firms distribute shares to executives or working staff based on their multi-capital potential. While in Core-staff-based ESOPs, Chinese firms distribute

shares to the qualified “core-staff” based on their contribution already delivered to firms. This new ESOP mechanism is not closed to firm executives at the top management, involving senior managers, directors at the middle level, and excellent staff who go through the assessments. Vitaly, the qualifications and assessments required in the Core-staff-based ESOPs drive employees’ participation in one prevailing direction: the firms’ growth and the protection of all the actors’ interests. In this way, the conflict of interests between different capital will be aligned with ESOP participants’ disciplines, and employees’ participation will be developed within the explicit boundaries established by financial capital contributors, including the market investors and the creditors.

2.3 Roles of ESOPs in innovation and hypotheses

We have experienced bubbles in innovation, in which numerous Hi-Tech firms have fallen, including small start-ups and those “the best in the class.” Distinct from research institutes, innovative firms are engaged to create values through their innovative activities. To stand on the wave of technology and achieve a positive performance, these two primary keys to sustaining firms’ survival and growth, can cause conflicts among themselves, and generate the innovators’ dilemma. Thus, we search for solutions, enabling innovators to balance their financial engagements and innovative activities with a continuous innovation cycle. Based on the above analyses, we believe in employees’ multi-capital potential and research the feasibility of a high-efficiency innovative team-building with the implementation of Core-staff-based ESOPs. In this way, Hi-tech firms can resolve the innovators’ dilemma and increase their survival chances.

The R&D, the spirit of innovation, penetrates all the firm working processes, for instance: the conceptualization, the concretization of new ideas, the evaluation of R&D outcomes, the transformation of R&D outcomes into production, even new solutions enabling firms to improve the efficiency of scaling production or commercialization of products and services in the market. Thus, we conduct the first group of tests to analyze

the roles of Core-staff-based ESOPs contributing to Chinese Hi-Tech firms' R&D activities, and verify whether employee-owners' work and participation would have addressed a suitable direction for firms' development and enhance the efficiency of R&D investments. We explore the ESOP's potential contribution to R&D processes in two dimensions: improving firms' performance and increasing assets. As below, we set up our hypotheses:

Hypothesis 1: The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to improve their performance with R&D investment.

Hypothesis 2: The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to increase firms' assets with R&D investment.

Since R&D investments may delay outcomes or continue to deliver positive effects in follow-up projects, we introduce the non-lagged data and lagged data in the following sub-hypotheses under the first hypothesis:

H (1.1): The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to improve their performance of year t with R&D investment of year t .

H (1.2): The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to improve their performance of year $t+1$ with R&D investment of year t .

Firms' assets consist of fixed assets and intangible assets. Aiming to observe the details of ESOP effects in different asset domains, we split the second hypothesis into two sub-hypotheses:

H (2.1): The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to increase fixed assets with R&D investment.

H (2.2): The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to increase intangible assets with R&D investment.

As previously tested (He, 2019), R&D intensity also depends on firms' performance. We insert the third hypothesis, aiming to verify whether employee-owners' participation enables Hi-Tech firms to enhance R&D investments for continuous innovation.

Hypothesis 3: The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to increase R&D investments based on firms' performance.

Usually, people use past data as reference points in decision-making processes. However, prompt reporting is diffused in business operations like monthly reports or quarterly reports. Thus, we set up the following sub-hypotheses, using lagged and non-lagged data to imitate the decision-makers' mentality:

H (3.1): The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to enhance R&D investment of year t , based on firms' net profits of year $t-1$.

H (3.2): The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to enhance R&D investment of year t , based on firms' net profits of year t .

As the other aspect of the innovators' dilemma, financial balance is an indispensable condition constraining firms' survival. It acts as a vital linkage to maintain financial capital contributors' confidence and the incentives to motivate employees' potential. In reality, the fatal drama of burned capital is derived from the negative performance of firms. Only when financial capital contributors are positively rewarded, they are encouraged to add investments. Furthermore, only when firms continuously operate with healthy cash flows, employees are motivated to contribute their multi-capital with positive expectancy. For this reason, we organize the second group of tests to verify whether Core-staff-based ESOPs enable Hi-Tech firms to achieve positive performance at a lower risk, encourage employee-owners' participation and fulfill agency controls. As below, we set up our hypotheses:

Hypothesis 4: the implementation of Core-staff-based ESOPs enables ESOP firms to improve performance more than Non-ESOP firms working in the Hi-Tech industry.

Hypothesis 5: The implementation of Core-staff-based ESOPs enables ESOP firms to reduce debt risk more than Non-ESOP firms in the Hi-Tech industry.

Finally, we are interested in testing ESOP firms' market values: whether market investors will appreciate ESOP firms more than other firms in the Hi-Tech industry, based on their expectancy of superior returns.

Hypothesis 6: The implementation of Core-staff-based ESOPs enables ESOP firms to gain higher market values than Non-ESOP firms in the Hi-Tech industry.

The PE or PB ratios which market investors usually use for stock evaluation are based on the net profits or assets of year $t-1$. On the other hand, the quarterly reporting system is already mature in China. Thus, the stock prices quoted on Dec.31st of year t are estimated by market investors based on the financial ratios of year $t-1$, quarterly reports of year t , other macro indicators, and qualitative analyses. For this reason, we have developed the above hypothesis into two following sub-hypotheses:

H (6.1): The implementation of Core-staff-based ESOPs enables ESOP Hi-Tech firms to gain higher market values than Non-ESOP firms based on the financial reporting of year t .

H (6.2): The implementation of Core-staff-based ESOPs enables ESOP Hi-Tech firms to gain higher market values than Non-ESOP firms based on the financial reporting of year $t-1$.

As explained in Chapter III, we have observed a substantial improvement when ESOP firms gain positive performance. However, a mirror-like effect will occur if ESOP firms are in difficulty. Thus, we distinguish different business situations in testing the above ESOP effects in the current research.

3. Methodology and data

Our main approach is linear panel regression. We use random models and logarithm data. The general formula is demonstrated below:

$$\lg|Y_{i,t}| = \alpha_t + \beta_1(\lg|X_{i,t}|) + \beta_2(\text{Adjyear}) + \sum_n \gamma_n CV_{i,t} + \sum_k \lambda_k CV_i + \mu_{i,t}$$

α_t is an intercept term, and the “Adjyear” is the dummy variable which indicates the implementation of Core-staff-based ESOPs. $\sum_n \gamma_n CV_{i,t}$ represents time-variant control variables, and $\sum_k \lambda_k CV_i$ stands for the time-invariant control variables. $\mu_{i,t}$ is the error term, including individual disturbing terms μ_i and time disturbing terms v_t .

With the logarithm data, the relationship between $Y_{i,t}$ and $X_{i,t}$ will be drawn in the curves of convex or concave functions. Even being coded in 0 or 1, the “Adjyear” represents the values of $\lg 10$ or $\lg 1$. If $\beta_2 > 0$, potential effects impacted by $|X_{i,t}|$ on $|Y_{i,t}|$ will be increased 10^{β_2} times by ESOPs. On the other hand, if $\beta_2 < 0$, the relevant effects will be decreased by ESOPs. If ESOP firms are in gain, the positive value of β_2 indicates the improvement of gains through the ESOP mechanism. However, if ESOP firms are in loss, the positive value of β_2 means that firm loss increases after implementing ESOPs. Thus, we should specify different situations in our test analyses.

We construct two databases for our research. The first one is made up of 15031 annual panel data of 1961 Hi-Tech firms from 2006 to 2018. The second one consists of 30963 panel data during the period 2006-2018, covering all the 3523 Chinese firms listed on Shanghai and Shenzhen Stock exchanges. We use the first database to analyze R&D efficiency and firm performance between ESOP firms and Non-ESOP firms working in the Hi-Tech industry. In the session “Further analyses,” we utilize the second one to design a triple-dimensional comparison between ESOP firms and Non-ESOP firms, between Hi-Tech firms and Non-Hi-Tech firms, and before and after implementing government policies.

The definition of Hi-Tech firms in China corresponds to the standard of OECD. Moreover, they should be qualified by the Chinese government with specific procedures, and operate the business with a specific license. The qualified Hi-Tech firms benefit from governments' supportive policies: they pay 15% of income taxes, 10% less than Non-Hi-Tech firms. Moreover, 50% or 75% of the R&D expenses can be deducted from the pre-tax profits. For this reason, we measure Hi-Tech firms' performance with the pre-tax profits before deducting R&D expenses. Meanwhile, we use net profits to measure market values and R&D investments to imitate decision-makers or investors' mentality.

Ren and her partners (Ren et al., 2019) used lagged data $X_{i,t-1}$ for all the $Y_{i,t}$. However, we believe that the psychological effects of employee ownership and competition start to play roles even when ESOPs are announced. Thus, we generally use non-lagged data in our current research. Only in the tests for the first and the third hypotheses do we use the lagged data X_{it+1} or X_{it-1} for specific test questions.

Following the work mentioned in Chapter III, we select various variables as control variables: firm ages, debt ratios, M2, interest rates, exchange rates, and Non-family-controlled structures. The former five variables are time-variant variables, and the last one is a time-invariant dummy variable.

4. Results and interpretations

4.1 A positive cycle of R&D enhanced by Core-staff-based ESOPs

As shown in Table 19, the implementation of Core-staff-based ESOPs has significantly improved R & D's contribution to the firm performance both of Year t and $t+1$. The effects of the R&D itself are more robust in the current year than the next year; however, the ESOP effects reacted on R&D are more influential in the year $t+1$. The debts, the experience of firms, and the non-family-controlled governance structure have amplified the R&D effects.

Table 19. R&D contributions to the firm performance of the years t and t+1

LogProfBefRD (Y_{it})	Coef. Sig.	LogProfBefRD (Y_{it+1})	Coef. Sig.
LogRD (X_{it})	0.4520 ***	LogRD (X_{it})	0.3647 ***
Adjyear	0.0606 ***	Adjyear	0.0755 ***
NonFamilyControlled	0.1100 ***	NonFamilyControlled	0.0853 ***
LogFirmAges	0.0704 ***	LogFirmAges	0.1624 ***
LogDebtRatio	0.0767 ***	LogDebtRatio	0.0755 ***
_cons	4.5554 ***	_cons	5.2246 ***
Number of obs	13180	Number of obs	11201
Number of groups	1954	Number of groups	1949
sigma_u	0.2401	sigma_u	0.2528
sigma_e	0.2872	sigma_e	0.3076
rho	0.4114	rho	0.4032
overall R ²	0.4749	overall R ²	0.4114

Moreover, as demonstrated in Table 20, ESOP firms increase assets more than Non-ESOP firms through R&D investments, especially in the field of intangible assets.

The test results, as shown in Table 21, significantly support our hypotheses: employee-owners' participation has encouraged Chinese Hi-Tech firms to invest in R&D whether the firms are in gain or loss. The references that decision-makers have used for evaluation include real-time reporting and the performance reports of the years before. Reasonably, the effects based on the reference of year “t-1” are more potent than that of the year “t.” In R&D spending, family-controlled firms have invested more than non-family-controlled firms. Considering the cases in loss, firms’ potential motives for R&D investment probably include both technology innovation and tax benefits.

Table 20. R&D contributions to firm assets

LogAssets	Coef.	Sig.	LogFixedAssets1	Coef.	Sig.	LogIntanAssets	Coef.	Sig.
LogRD	0.2921	***	LogRD	0.2080	***	LogRD	0.3159	***
Adjyear	0.0391	***	Adjyear	0.0212	**	Adjyear	0.0418	***
NonFamilyControlled	0.1368	***	NonFamilyControlled	0.1584	***	NonFamilyControlled	0.0500	
LogFirmAges	0.3410	***	LogFirmAges	0.4645	***	LogFirmAges	0.4787	***
LogDebtRatio	0.1508	***	LogDebtRatio	0.3031	***	LogDebtRatio	0.3126	***
_cons	6.7015	***	_cons	6.2110	***	_cons	4.6880	***
Number of obs	13180		Number of obs	13017		Number of obs	13103	
Number of groups	1954		Number of groups	1951		Number of groups	1952	
sigma_u	0.2368		sigma_u	0.4336		sigma_u	0.4560	
sigma_e	0.1443		sigma_e	0.2050		sigma_e	0.2897	
rho	0.7292		rho	0.8174		rho	0.7124	
overall R ²	0.5987		overall R ²	0.4178		overall R ²	0.3765	

Table 21. R&D investments based on net profits of the years t-1 and t

LogRD _{it}	<i>NetProf>0</i>		<i>NetProf<0</i>		LogRD _{it}	<i>NetProf>0</i>		<i>NetProf<0</i>	
	Coef.	Sig.	Coef.	Sig.		Coef.	Sig.	Coef.	Sig.
LogNetProf _{it}	0.3754	***	0.2504	***	LogNetProf _{it-1}	0.3857	***	0.1453	***
Adjyear _{it}	0.0973	***	0.2195	***	Adjyear _{it}	0.1130	***	0.2186	**
NonFamilyControlled	-0.1174	***	0.0446		NonFamilyControlled	-0.0844	***	-0.0044	
LogFirmAges	0.5132	***	0.1616	*	LogFirmAges	0.4670	***	0.4573	***
LogDebtRatio	0.1047	***	-0.0549		LogDebtRatio	0.1444	***	0.0651	
_cons	4.2229	***	5.4935	***	_cons	4.1086	***	5.8857	***
Number of obs	12282		898		Number of obs	11012		694	
Number of groups	1954		520		Number of groups	1954		390	
sigma_u	0.2908		0.4121		sigma_u	0.2767		0.4565	
sigma_e	0.3047		0.3716		sigma_e	0.3071		0.3785	
rho	0.4766		0.5516		rho	0.4481		0.5927	
overall R ²	0.3415		0.2097		overall R ²	0.3456		0.1113	

With the above significant test results, we notice a spiral effect between R&D investments and firm performance: the performance of year "t-1" impacts the R&D investment of year "t," and the R&D activities of the year "t" influence the performance of the year "t+1." In the case of real-time reporting, such a spiral effect will be presented in a cycle within the same year "t" based on monthly or quarterly reports. This discovery provides us a pivotal solution to resolve the innovators' dilemma.

Moreover, the implementation of Core-staff-based ESOPs has significantly reinforced the above cycle effects. The participation of employee-owners successfully convince decision-makers to invest more resources in the R&D based on the improved performance, and the motivation of employees' multi-capital enhances the R&D efficiency both in improving firm performance and increasing assets. Thanks to an innovative internal team-building through Core-staff-based ESOPs, Chinese Hi-Tech firms have achieved specific advantages both in technological advancement and financial balance with a continuous dynamic cycle of innovation.

4.2 A safe risk-taking attitude of ESOP firms

Besides the roles of R&D, we should pay attention to the business risks related to the loans. As shown in Table 22, the strict agency controls in the design of Core-staff-based ESOPs have influenced Chinese Hi-Tech firms' risk management attitude: only when firms' debt ratios are under 55%, and firms are in gain, employee-owners have significantly encouraged Hi-Tech firms' to take more loans for investments. When firms' are in loss or bear more than 55% in loans, ESOP participants intend to lower debts; however, their efforts result in insignificance. Thus, ESOP Hi-Tech firms are eager to grow but have a safe risk-taking attitude.

Among these Chinese Hi-Tech firms, elder firms generally accumulate more debts than younger firms. Furthermore, non-family-controlled firms, including state-owned firms and foreign capital firms, have taken more loans when firms are in gain, and their debt ratios are less than 55%.

Table 22. Debt ratio analysis in different situations

LogLiability	Pre-tax profits before R&D deduction>0, Debt>=55%		Pre-tax profits before R&D deduction<0, Debt>=55%		Pre-tax profits before R&D deduction>0, Debt<55%		Pre-tax profits before R&D deduction<0, Debt<55%	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LogAssets	0.9511	***	0.8323	***	1.0694	***	1.1577	***
Adjyear	-0.0030		-0.0186		0.0289	***	-0.0157	
NonFamilyControlled	0.0079		0.0007		0.0321	**	0.0498	
LogFirmAges	0.0608	***	0.1237	***	0.1575	***	0.0299	
_cons	0.2307	***	1.3670	***	-1.3068	***	-1.9827	***
Number of obs	2946		459		11149		477	
Number of groups	655		254		1870		324	
sigma_u	0.0722		0.1003		0.1895		0.1430	
sigma_e	0.0633		0.1386		0.1513		0.1486	
rho	0.5658		0.3438		0.6108		0.4810	
overall R ²	0.9762		0.8985		0.8161		0.8596	

Table 23. Asset-based performance analysis in different situations

LogProfBefRD	Pre-tax profits before R&D deduction>0, Debt>=55%		Pre-tax profits before R&D deduction<0, Debt>=55%		Pre-tax profits before R&D deduction>0, Debt<55%		Pre-tax profits before R&D deduction<0, Debt<55%	
	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.	Coef.	Sig.
LogAssets	0.9386	***	0.8509	***	1.0370	***	0.7940	***
Adjyear	0.0862	***	0.1921	*	0.0507	***	0.1668	**
NonFamilyControlled	0.0108		-0.1694	*	-0.0026		-0.0685	
LogFirmAges	-0.1694	***	0.1008		-0.2172	***	0.2707	**
LogDebtRatio	0.2771	**	1.0912	***	-0.1132	***	-0.0209	
_cons	-1.2002	***	-1.8933	**	-1.2388	***	0.3285	
Number of obs	2946		459		11149		477	
Number of groups	655		254		1870		324	
sigma_u	0.2290		0.3113		0.1901		0.0000	
sigma_e	0.3033		0.4888		0.2286		0.5825	
rho	0.3630		0.2886		0.4087		0.0000	
overall R ²	0.6918		0.4693		0.6459		0.3164	

Table 24. Equity-based performance analysis in the cases of gain and loss

LogProfBefRD	Pre-tax profits before R&D deduction>0		Pre-tax profits before R&D deduction<0	
	Coef.	Sig.	Coef.	Sig.
LogEquity	0.9747	***	0.5088	***
Adjyear	0.0576	***	0.2135	***
NonFamilyControlled	0.0162		-0.0417	
LogFirmAges	-0.1736	***	0.3867	***
LogDebtRatio	0.1968	***	0.6910	***
_cons	-0.9584	***	1.9746	***
Number of obs	14095		936	
Number of groups	1961		503	
sigma_u	0.1684		0.2741	
sigma_e	0.2601		0.5556	
rho	0.2953		0.1957	
overall R ²	0.6653		0.2854	

Table 25. Market value analysis based on net profits of the years t and t-1 in different situations

LogMarketvalue1 _{it}	NetProf>0		NetProf<0		LogMarketvalue1 _{it}	NetProf>0		NetProf<0	
	Coef.	Sig.	Coef.	Sig.		Coef.	Sig.	Coef.	Sig.
LogNetProf _{it}	0.3624	***	0.0993	***	LogNetProf _{it-1}	0.2998	***	0.1043	***
Adjyear	0.0395	***	0.0032		Adjyear	0.0697	***	0.0411	
NonFamilyControlled	0.0579	***	0.1346	***	NonFamilyControlled	0.0574	***	0.1189	**
LogFirmAges	0.1352	***	0.0578		LogFirmAges	0.1826	***	0.0665	
LogDebtRatio _{it}	-0.0215	*	-0.1262	**	LogDebtRatio _{it-1}	0.0338	**	-0.1330	**
LogM2 _{it}	0.3699	***	0.6853	***	LogM2 _{it}	0.2896	***	0.5075	***
_cons	1.5259	***	-0.7829		_cons	3.0365	***	1.7484	
Number of obs	13574		1052		Number of obs	12103		807	
Number of groups	1961		557		Number of groups	1961		418	
sigma_u	0.1237		0.1896		sigma_u	0.1146		0.2343	
sigma_e	0.2109		0.2402		sigma_e	0.2246		0.2453	
rho	0.2560		0.3839		rho	0.2065		0.4772	
overall R ²	0.5747		0.2816		overall R ²	0.4879		0.2038	

Table 26. Market value analysis based on assets of the years t and t-1 in different situations

LogMarketvalue1 _{it}	NetProf>0		NetProf<0		LogMarketvalue1 _{it}	NetProf>0		NetProf<0	
	Coef.	Sig.	Coef.	Sig.		Coef.	Sig.	Coef.	Sig.
LogAssets _{it}	0.6065	***	0.3710	***	LogAssets _{it-1}	0.4644	***	0.3453	***
Adjyear	0.0490	***	0.0087		Adjyear	0.0674	***	0.0174	
NonFamilyControlled	0.0114		0.0120		NonFamilyControlled	0.0293	**	0.0262	
LogFirmAges	-0.0435	***	0.0508		LogFirmAges	0.0099		0.0301	
LogDebtRatio _{it}	-0.1989	***	-0.0954	**	LogDebtRatio _{it-1}	-0.0844	***	-0.0849	*
Interest12months _{it}	-0.0704	***	-0.1388	***	Interest12months _{it}	-0.0625	***	-0.1090	***
exchange1 _{it}	-0.0444	***	-0.1545	***	exchange1 _{it}	0.0110		-0.0248	
_cons	4.7543	***	7.4870	***	_cons	5.5156	***	6.8768	***
Number of obs	13574		1052		Number of obs	12103		807	
Number of groups	1961		557		Number of groups	1961		418	
sigma_u	0.1231		0.1236		sigma_u	0.1266		0.1715	
sigma_e	0.2116		0.2254		sigma_e	0.2233		0.2357	
rho	0.2528		0.2311		rho	0.2433		0.3463	
overall R ²	0.5934		0.4706		overall R ²	0.4987		0.3879	

4.3 Overperformance at the best time

As shown in Tables 23, 24, 25, and 26, when firms operate in gains, the implementation of Core-staff-based ESOPs enables firms to improve firm performance and increase market values. Between the reporting data of year t and year $t-1$, market investors react based on real-time data of year t more than the year before $t-1$. However, employee-owners' participation of year $t-1$ brings stronger effects to influence the following year's market values of t . That means a delayed effect for employees' intervention in corporate governance going through all the working processes of the organization.

As for the ownership structure, non-family-controlled governance is insignificant in performance tests but significant in market value tests.

Reasonably, the equity-based performance has been amplified by the debts, while the debt burdens generally increase risk evaluation and reduce stock prices. However, we have observed a scale effect on the asset-based performance: if the debt ratio is more than 55%, the loans significantly improve the asset-based performance, while if the debt ratio is less than 55%, the loans decrease the efficiency of the asset-based performance's growth. Thus, even though ESOP firms have a safe risk-taking attitude, the loans they take under the debt ratio of 55% will only contribute positive effects to the equity-based performance but not asset-based performance.

In the Hi-Tech industry, the elder firms appear to underperform more than younger firms in profit-creating processes. Regarding market values, firm ages have brought ambiguous effects: increasing the profit-based stock prices probably due to potential goodwill, but decreasing the asset-based evaluation probably for their cumulated debts or lack of updating operations.

Finally, macro-economic indicators play indispensable roles in the formation of the prices of financial assets. For example, the volume of monetary supply "M2" positively correlates with stock prices, while interest rates negatively are correlated

with stock prices. As for exchange rates, conflictual effects can be forecast. Since we use the direct quote currency exchange rates between RMB and USD, when the exchange rates increase, the Chinese domestic currency depreciates; thus, financial assets will be naturally devalued. However, when RMB depreciates, the exportation will increase due to the lower prices in USD, and those firms specialized in exportation will gain more earnings and increase their market values. For this reason, we have observed ambiguous results about exchange rates in our tests: significantly negative in the tests of year t , but insignificantly positive in the tests of year $t-1$.

4.4 Weakness under the mirror-like effects

Agreeing with the test results in Chapter III, we confirm that the mechanism of Core-staff-based ESOPs has its weakness. As shown in the Tables 23 and 24, the values of β_2 are significantly positive both in case of gain and loss, that means the mirror-like effect having occurred in Chinese Hi-Tech firms: the implementation of Core-staff-based ESOPs has improved firm performance when they operate in gain; however, it has amplified the loss when these firms are in difficulty. Since we use annual logarithm data in the current paper, the assumption of seasonal loss can be eliminated.

As demonstrated in Tables 25 and 26, the positive effects of ESOPs on market values are insignificant in our tests based on the annual data. Compared to the season test results in Chapter III, we believe that the positive effects on market values occurring when ESOP firms increase their loss can only exist over a short period. When firms are in difficulty, the effects of increasing stock prices, probably caused by the employee-owners' investment and their information, would have limits on scale and on time.

Regarding the debt ratios, the loans also play double-side effects, especially for the equity-based performance: increasing gains at the moment of gain and increasing losses at the moment of loss. The older Hi-Tech firms have fewer survival chances than younger firms: they earn less in case of gain and lose more in case of loss.

Finally, we analyze the frequency of firms in the loss in a matrix. Among a total of 11178 panel data of Non-ESOP-Hi-Tech firms during 2006-2018, there are 93.4% in gain and 6.59% in the loss. While among 3853 panel data of ESOP Hi-Tech firms, there are 94.84% in gain and 5.16% in loss. These statistics reveal that the number of ESOP firms in loss represents only a small amount during thirteen years, and the proportion of Non-ESOP firms in loss is more significant than that of ESOP firms. Nevertheless, we cannot neglect the weakness of Core-staff-based ESOPs under mirror-like effects, especially at the moment when particular and unpredictable difficulties occur in external environments.

4.5 Particular impacts of family-controlled governance in Chinese firms

Theoretically, the family-controlled culture in China conflicts with employee-owners' participation. For this reason, we develop further regressions under different types of corporate governance. As shown in Table 27, the effects of ESOPs are confirmed to be less intense in Chinese family-controlled firms, either in the case of gain or loss. However, our findings discover later specific governance under which the mirror-like effect of ESOPs has disappeared. As demonstrated in Table 28, the direct family-controlled Hi-Tech firms which have implemented Core-staff-based ESOPs in China, enable the improvement of firm performance at the best time and disable increasing loss at the worst time. Relatively, the positive effects of ESOPs are smaller under direct family-controlled governance than other governance in case of gain. Thus, we induce that employee-owners' participation in the design of Core-staff-based ESOPs plays roles like double sides of a coin, enabling firms to improve gains and increase loss. Under direct family-controlled governance, such participation of employee-owners is limited by the strength of family power in Chinese firms.

**Table 27. Asset-based performance analysis
under different types of firm governance**

LogProfBefRD _{it}	Non-Family-Controlled governance		Family-Controlled governance	
	Pre-tax profits before R&D deduction>0	Pre-tax profits before R&D deduction<0	Pre-tax profits before R&D deduction>0	Pre-tax profits before R&D deduction<0
	Coef. Sig.	Coef. Sig.	Coef. Sig.	Coef. Sig.
LogAssets _{it}	0.9944 ***	0.7752 ***	0.9556 ***	0.7498 ***
Adjyear	0.1048 ***	0.2743 *	0.0667 ***	0.1610 **
LogFirmAges	-0.1470 ***	0.2839 *	-0.2028 ***	0.2211 *
LogDebtRatio _{it}	-0.2906 ***	0.5822 ***	-0.1300 ***	0.5584 ***
_cons	-0.6687 ***	-0.5565	-0.4897 ***	-0.0665
Number of obs	4362	387	9733	549
Number of groups	434	166	1527	337
sigma_u	0.2291	0.2441	0.1620	0.2676
sigma_e	0.2822	0.5102	0.2449	0.5260
rho	0.3972	0.1863	0.3045	0.2055
overall R ²	0.7003	0.4701	0.5994	0.3787

**Table 28. Asset-based performance analysis
with and without direct-family-controlled governance**

LogProfBefRD _{it}	Direct family-controlled governance		Other governance	
	Pre-tax profits before R&D deduction>0	Pre-tax profits before R&D deduction<0	Pre-tax profits before R&D deduction>0	Pre-tax profits before R&D deduction<0
	Coef. Sig.	Coef. Sig.	Coef. Sig.	Coef. Sig.
LogAssets _{it}	0.9837 ***	0.8781 ***	0.9707 ***	0.7264 ***
Adjyear	0.0586 ***	0.1029	0.0771 ***	0.2533 ***
LogFirmAges	-0.2250 ***	0.1659	-0.1788 ***	0.2336 **
LogDebtRatio _{it}	-0.1135 ***	0.4558 **	-0.1956 ***	0.5651 ***
_cons	-0.7560 ***	-1.0070	-0.5564 ***	0.0288
Number of obs	4512	233	9583	703
Number of groups	719	156	1242	347
sigma_u	0.1583	0.1902	0.1894	0.2834
sigma_e	0.2213	0.5347	0.2729	0.5182
rho	0.3383	0.1123	0.3252	0.2303
overall R ²	0.6132	0.3830	0.6610	0.4312

In sum, hypotheses 1, 2, and 3 are strongly supported. The implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to generate a positive cycle between R&D investments and firm performance. While hypotheses 4 and 6 are supported under specific conditions. The employee-owners' participation and other employees' participation voices enable ESOP firms to improve firm performance, increase market values at the best time, and increase loss at the worst time. For hypothesis 5, our findings explain that ESOP Hi-Tech firms cannot significantly reduce

debts more than Non-ESOP-Hi-Tech firms; however, the strict agency controls oblige them to take loans safely.

Finally, we confirm that the mechanism Core-staff-based ESOP enables to enhance Chinese Hi-Tech firms' organization efficiency in the normal business situation in gain. On the other hand, it will bring adverse outcomes under the mirror-like effects when the firms are in loss. Surprisingly, direct family-controlled governance in Chinese firms can reduce this negative effect implementing Core-staff-based ESOPs. In comparison, the ESOP Hi-Tech firms of pyramid family-controlled governance demonstrate the same risk exposure as Non-family-controlled Hi-Tech firms. This particularity reminds us to pay attention to the interactions between firm decision-making efficiency in challenging technological changes and employee-owners' participation under different firm governance structures and social cultures.

5. Further analyses

The innovation pathway evolves over time. With respect to the first ones who worked by themselves in a closed system, nowadays, we call up different social actors to support innovation together, involving governments, capital investors, developing agencies, research institutions, incubators, start-ups or firms, professionals, and social networks. Directly, the system thinking has laid birth to the concept of the innovation ecosystem. As defined by the International Development Innovation Alliance (IDIA):

An innovation ecosystem is made up of enabling policies and regulations, accessibility of finance, informed human capital, supportive market, energy, transport and communications infrastructures, a culture supportive of innovation and entrepreneurship, and networking assets, which together support productive relationships between different actors and other parts of the ecosystem.

In the previous analyses, we have discovered a continuous positive cycle of innovation being activated by an internal innovation team-building through Core-staff-

based ESOPs, which motivates employees' value-creation, enhances the Hi-Tech firms' performance, promotes innovation outcomes in the market, and returns safely and positively to investors and creditors. At this step, we take the external supports into the innovation framework and introduce a triple-dimensional comparative approach to observe the potential interactions between public policies and ESOPs in and out of the Hi-Tech industry. As below, we set up our hypothesis:

Hypothesis 7: Core-staff-based ESOPs and government policies cooperate and improve Chinese Hi-Tech firms' performance together.

In the precedent research in Chapter III, a performance gap was observed between Chinese Hi-Tech firms and Non-Hi-Tech firms before paying taxes. We believe that the improvement of performance through ESOPs can reduce or compensate for this gap. Thus, we reverify the roles of ESOPs on the pre-tax performance as the departure point of our tests.

Since the Chinese government has issued laws and provided 10% of tax reduction to Hi-Tech firms, we assume that Hi-Tech firms may align the post-tax profitability with other firms working in traditional sectors, and the ESOPs may provide further positive help on net profits if firms are in gain.

Based on the above analysis, we develop the following sub-hypotheses, comparing the firm performance before and after taxes, between Hi-Tech firms and Non-Hi-Tech firms, and distinguishing different business situations.

H (7.1): A pre-tax performance gap is assumed between Hi-Tech firms and Non-Tech firms. However, the implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to reduce their pre-tax performance gaps in case of gain.

H (7.2): With specific tax reduction policies, smaller performance gaps, or insignificant gaps will be exposed between Hi-Tech and Non-Hi-Tech firms. Furthermore, the

implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to increase their net profits more than Non-ESOP firms when firms operate in gain.

In addition, with the purpose to encourage the R&D investments, the Chinese government has authorized several R&D deduction policies except for six service sectors like real estate, tobacco production, catering, trade, renting, and entertainment (Chinese State Administration of Taxation, 2003 No.244; 2006, No.88; 2008, No.116; 2017, No.18; 2018, No.99). In these R&D deduction policies, the priority of Hi-Tech firms has legally been enforced. Thus, we adjust the pre-tax profits with the relevant R&D policies and verify whether Hi-Tech firms take more advantage than Non-Hi-Tech firms in R&D cycles, and the ESOPs provide further benefits with employees' multi-capital invested in R&D and scaling. As below, we insert the third sub-hypothesis to our central assumption:

H (7.3): With specific R&D deduction policies, smaller or insignificant performance gaps, even positive effects will be exposed in the comparison between Hi-Tech and Non-Hi-Tech firms. Moreover, the implementation of Core-staff-based ESOPs enables Chinese Hi-Tech firms to increase their positive profits before R&D deduction.

As shown in Table 29, even in the circumstance of gaining, Hi-Tech firms have significantly underperformed more than Non-Hi-Tech firms on pre-tax profits, but the positive effects of Core-staff-based ESOPs have compensated for this gap. In comparison, High-Tech firms appear to overperform after taxes more than Non-Hi-Tech firms; however, this overperformance is insignificant, but the ESOP mechanism has significantly contributed higher values created by employees' multi-capital. With regards to the pre-tax profits before R&D deductions, Hi-Tech firms have significantly overperformed more than Non-Hi-Tech firms, and become healthier with employee-owners' efforts.

Table 29. Asset-based performance analysis before and after implementing government policies

	Pre-tax profits		Post-tax profits		Pre-tax profits before R&D deductions	
	Pre-tax profits>0 Coef. Sig.	Pre-tax profits<0 Coef. Sig.	Net Profits>0 Coef. Sig.	Net Profits<0 Coef. Sig.	Pre-tax profits before R&D deduction>0 Coef. Sig.	Pre-tax profits before R&D deduction<0 Coef. Sig.
LogAssets _{it}	0.9201 ***	0.6826 ***	0.9132 ***	0.6703 ***	0.9320 ***	0.6938 ***
Adjyear	0.0720 ***	0.2388 ***	0.0816 ***	0.2317 ***	0.0868 ***	0.2497 ***
Non-family-controlled	0.0118	-0.0529	0.0093	-0.0644 *	-0.0142	-0.0783 **
Hi-Tech	-0.0190 *	-0.0281	0.0094	-0.0268	0.0692 ***	-0.0287
LogFirmAges	-0.2308 ***	0.0877 *	-0.2313 ***	0.0521	-0.1729 ***	0.1473 **
LogDebtRatio _{it}	-0.1610 ***	0.6344 ***	-0.1812 ***	0.6542 ***	-0.1561 ***	0.6538 ***
_cons	-0.1966 ***	0.5314 **	-0.2057 ***	0.6484 **	-0.3201 ***	0.3472
Number of obs	27982	2973	27916	3039	28125	2830
Number of groups	3523	1294	3523	1311	3523	1236
sigma_u	0.2221	0.2774	0.2207	0.2699	0.2041	0.2836
sigma_e	0.3420	0.5345	0.3558	0.5139	0.3074	0.5053
rho	0.2967	0.2122	0.2779	0.2162	0.3058	0.2396
overall R ²	0.6600	0.3942	0.6422	0.3992	0.7024	0.4217

Thus, all the above sub-hypotheses are well supported in the normal situations of gain. The policies of tax reduction and R&D deduction, which are supported by the Chinese government, enable Hi-Tech firms to eliminate their performance gaps, even overperform more than Non-Hi-Tech firms with enhanced R&D investments. In the meantime, the implementation of Core-staff-based ESOPs enables Hi-Tech firms to enhance their competitiveness. Confirming our assumption, specific firm organizations like ESOPs and supportive public policies can cooperate to sustain innovation.

While in the particular situations of loss, employee-owners' participation will potentially increase loss both before and after taxes, and the performance net of R&D deductions. The dynamic forces of Hi-Tech firms also result in an insignificant decrease in their losses. Even the government allows firms to reduce taxes with the cumulated loss, these supportive policies of tax reduction contribute little power to transform firms' loss into gain. However, the R&D reduction policies have encouraged Chinese Hi-Tech firms to invest in R&D also in case of loss.

Furthermore, we observe a difference between the test results regarding the effects of Non-family-controlled governance in Table 29 and Table 27. In our tests, these two regressions are conducted with two different databases: the first database contains 15031 annual panel data of 1961 Hi-Tech firms, while the second one consists of 30963 panel data covering all the 3523 Chinese listed firms. Non-family-controlled governance in China refers to the management in state-owned companies, foreign capital companies, or Non-family-controlled private companies. In the Hi-Tech industry, the majority of Non-family-controlled firms are state-owned companies, while foreign capital companies and Non-family-controlled private firms represent only a tiny proportion. Distinct from the Hi-Tech industry, Non-family-controlled firms working in all the sectors would have advantages in case of loss, probably due to a higher presence of foreign capital firms, higher stability of state-owned firms in specific sectors like banking and financing, and a higher power against crises among Non-family-controlled private firms working in traditional sectors. Therefore, we should

take in consideration the specific environments into researching the ESOP effects under different governance.

6. Summary and open questions

We are sailors on an ocean of change and the organization we are part of are the ships we sail. We cannot sail against the prevailing winds, but we can learn to work with the winds and the waves and harness their energy to arrive at the destination we aspire to reach. (Hugos, 2009)

In reality, we cannot change the challenging environments in the Hi-Tech industry due to the rapid technological revolutions. However, we can change our organizations to learn how to adapt ourselves and achieve the goals. Facing the innovators' dilemma, we have proposed a high-efficiency innovative team-building through Core-staff-based ESOPs, a specific ESOP model discovered in China.

We have capitalized employees' contributions in multi-capital and highlighted that employees' participation is one type of investment. We have also revealed that the divergence of interests between different capital remains in the traditional ESOP mechanisms. Alongside motivating employees' multi-capital potential in the Chinese new ESOP design, agency controls are recalled to protect all the actors' interests involved in ESOPs. Vitally, the qualifications and assessments required in Core-staff-based ESOPs enable firms to establish the boundaries for employee-owners' participation and drive them towards the firms' common growth.

We have confirmed these new ESOPs' positive roles in the ordinary situation of gain with empirical research. Implementing Core-staff-based ESOPs enables Chinese Hi-Tech firms to sustain innovation with a continuous cycle between R&D investments and firm performance, and increase their survival chances by actively improving their performance, safely taking loans, and adequately achieving financial investors' appreciation. Furthermore, our findings support the assumption that specific firm

organizations like ESOPs can cooperate with other social actors' policies, such as the government's tax reduction policies. Such cooperative interactions enable Hi-Tech firms to reduce their performance gaps and enhance the innovation ecosystem's efficiency as a whole.

However, the mechanism of Core-staff-based ESOPs has its weakness under the mirror-like effects. The participation of employee-owners and other employee participation voices may significantly increase firms' gains at the best time but aggravate firms' losses at the worst time. In our future research avenue, we will analyze the causality of aggravation in ESOP firms when the firms encounter difficulty, and research the interactions between employee-owners' participation and governance power in different organizations and social cultures.

CONCLUSION AND DISCUSSIONS

Our underlying thesis is focused on the “Core-staff-based ESOPs,” a discovery of employee share ownership plans in China. The ESOP is a firm management strategy being linked to multiple disciplines. Utilizing approaches in the domains of corporate finance and human resources, we have analyzed these new ESOPs’ specificity, performance, and roles in innovation, in addition to the ESOP firms’ characteristics and motives. We attach a detailed research summary in English and French to this dossier, and summarize the research values, pioneer trials and open questions below.

1. Contributions and implications

1.1 Theoretical implications

Our discovery, the “Core-staff-based ESOPs,” adds diversity to the common framework of ESOPs alongside the standard models of executive-based ESOPs and broad-based ESOPs. It enables firms to enhance organizational efficiency. Penetrating its mechanism, we renew our knowledge in the field of ESOP research.

We challenge the traditional definition of labor and capitalize employees’ contributions in multi-capital. Beyond the “participation voices” demanding for interests, we believe that participation is also one type of investment. Incisively, we unveil the essential mechanism of ESOPs in motivating employees’ potential: recognizing employees’ value-creating contribution as one type of capital that enables employees to share benefits and rights with financial capital providers.

On the other hand, we respect the financial capital providers’ contributions in bearing risks, most of which are small and medium investors supporting firms with their individual or family savings.

Moreover, we clarify that the controlling costs are one type of agency costs, filling knowledge gaps that numerous research papers have disregarded. Traditionally,

previous ESOP research believes that the implementation of ESOPs can reduce controlling costs between firm owners and employees. However, we discover that new agency risks will probably be generated among employee-owners, other shareholders outside firms and creditors.

Different capitals compete, conflict, cooperate and integrate. They can be transformed into each other, and give birth together to the new capital. Going beyond the firms' boundaries, we extend our perspective to the whole market's balance and highlight the protection of all the actors' interests involved in the ESOP design to achieve real "fair play."

Based on these innovative analyses, we construct a new theoretical framework to research why Core-staff-based ESOPs contribute the efficiency to firms' organization.

1.2 Managerial implications

In managerial practice, the implementation of Core-staff-based ESOPs enables firms to improve performance, reduce business risks, and increase market values in the normal business situations in gain.

These new ESOPs have enhanced the cycle effects between R&D and firm performance in the Hi-Tech industry, enabling innovators to increase their survival chances in the challenging competition, both of technologies and business.

Furthermore, our empirical findings reveal the cooperative effects of Core-staff-based ESOPs and governments' supportive policies. Together, they sustain innovative firms and contributing efficiency to an open innovation ecosystem.

However, the above effects vary significantly according to situations. We have observed more potent effects in certain regions, industry, or firm organization, but insignificant even adverse outcomes in other cases. Especially a mirror-like effect is evident at the moment when firms are in gain or loss. Thus, we should pay attention in

practice to the strength and weakness of Core-staff-based ESOPs in specific contexts, and adjust our ESOP design to the environments.

1.3 Social implications

Symmetrically, agents bring both gains and costs to organizations. How to motivate agents to create more values and control agency costs is vital in management research.

The Core-staff-based ESOP, an organizational innovation, provides a new alternative to stimulate the firms' growth. Like basic cells in society, the firms' continuous performance improvement contributes energies to economic growth.

Employees' potential is also capital. Under specific conditions, they can compensate for the lack of financial capital to achieve goals. Facing challenging environments, they will develop particular creativity and step out of the impasse together with financial capital's supports. We will continue our research to analyze the potential of Core-staff-based ESOPs to increase the firms' dynamic capacity and to resist the adverse impacts during the recession.

On the other hand, we highlight the importance of financial supervision to regulate employee-owners' activities. We need disciplines and controls in ESOPs to balance the interests among employee-owners, market investors, and creditors. The qualifications and assessments in Core-staff-based ESOPs define the boundaries of employees' participation, representing a compromise between employee-owners' interests and financial capital providers' expectations.

Following the normative credentials, most people have difficulty to accept the difference. However, we learn and change to adapt ourselves to the environments. The birth and the development of Core-staff-based ESOPs provide us with a better understanding of Chinese firms' learning paths based upon a trial-error-trial model.

From different departure points, people accumulate their own experience in learning. Efficient communication between the people of different ideas, in different systems, and with different historical backgrounds, enables us to enhance exchanges of experience, knowledge, opinions and solutions. With the current research, we fill the gaps in knowledge and communication between the eastern and the western hemispheres, hoping to provide useful help for our final goals of development.

2. Pioneer trials and discussions

2.1 Isomorphic processes at different dimensions

Initially, we learned the institution theories from Douglass North's work and supported Hannan and Freeman's organization diversity (1977). We are surprised to find out the isomorphisms coinciding with our test results, reading "the iron cage revisited: institutional isomorphism and collective rationality in organizational fields" (Di Maggio and Powell, 1983). In the ESOP development, the assumed Isomorphic process does not occur between Chinese firms and western firms due to the specificities of environments, firm structures, and learning paths.

Besides the usual comparisons cross-borders, we develop a comparative approach at the dimension of time and discover a "historical isomorphism" between two ESOP mechanisms surging in different periods. Based on the similarity of the main features at the structural level, we merge these two ESOP mechanisms into one single model, called "Core-staff-based ESOPs."

Furthermore, we are aware that Chinese people rely on the normative credentials established by developed countries. Thus, they believe that Chinese firms would be implementing the same ESOP models as western firms. This interesting phenomenon reminds us that isomorphism can also happen in human perceptions. Besides the dependence at the organization level and the field level, we should take into consideration the dependence at the psychological level in analyzing isomorphic processes.

Nevertheless, Di Maggio and Powell provide us with an institutional approach for the isomorphism and three mechanisms in collective rationality; few studies develop theoretical models in mathematical languages. With New-institutionalism, we analyze better social phenomena; however, it is a difficult task to link this theory directly to empirical studies. Thus, we call up academic researchers to fill these gaps together.

2.2 Conciliate the debates between diversification and homogenization in a multi-layer organizational structure

Based on the evidence proved by our ESOP studies, we propose a multi-layer organizational structure to conciliate the debates between organizational homogenization and diversification. Being inspired by the cellular structure in science, the categories and sub-categories in biology, and the organization identity in organization theories, we allocate the processes of homogenization and diversification at the different levels of organizations or populations and analyze their interactions driven by different mechanisms or cross-level. By this means, we succeed in presenting a full picture of the development of Chinese ESOPs and their sub-models at the lower levels. However, we need further theoretical discussions and examples to support our trial.

2.3 Apply Prospect Theory to organizational studies

We introduce Kahneman and Tversky's Prospect Theory in the ESOP research and analyze the Chinese ESOP mechanisms from a resource-based view. This theory has been well applied with experimental approaches to explore individuals' decision-making processes under risks. However, few people use it in organization research. For the cross-level approaches between individual and organization studies, Whetten followed Morgeson and Hofmann's trial (1999) to defend the concept of organization identity (2006). Much earlier, when Cyert, March, and Simon founded the "Carnegie School" in the theory of organization, developing four essential concepts like conflicts, uncertainty avoidance, problematic research, and organizational learning (Augier and

March, 2008), the studies of individual cognitions had been introduced in the domain of organization research. We choose Prospect Theory that clearly translates the logic of appropriateness in resource-based modelling to explain firm decision-makers' choice-making processes.

However, we also notice the limitations of using this approach in organization studies. Going back to the classic organizational decision-making cycle as shown in Chart 2 (Chapter II), there is a gap between individuals' actions and organizations' decisions: not all individuals working in firms have the power to influence and determine organizations' decisions. Even though the firms are managed by human beings, in practice, only decision-makers' cognitions and actions significantly influence the firms' decision-making processes, based on the power defined in the organization structure. For this reason, the validity of imitating experiments and questionnaires needs further controls to avoid mistakes.

In our current research, we utilize the Prospect Theory to explain the probable decision-making mechanisms of ESOP or Non-ESOP firms' choices. However, the Prospect theory needs further concretization to achieve a full application. For example, the functions v and π in the prospect formula lack the explicit definitions and measuring approaches: $V(x, p; y, q) = \pi(p)v(x) + \pi(q)v(y)$.

Moreover, we have noticed that subjective estimations are not constant, which means the functions v and π will change depending on time and situations. We need further research to quantify and measure the rhythms, the rules of these changes and the relevant conditions.

Finally, we have observed the convergence in trends between our subjective estimations and objective beings. That means, with enough time and trials, the outcomes of $\Sigma\pi(p)v(x) + \Sigma\pi(q)v(y)$ will be approximate to the sum of $\Sigma px + \Sigma qy$. In other words, we can discover truth through continuous explorations and learning.

We will devote ourselves to continue research in this field.

2.4 Bridging Institutionalism and decision-making theories

In the development of economics theories, three clusters of ideas have been identified, which keep intruding on economic consciousness (March, 2014):

the idea of organizational decision making as stemming from limits on rationality, conflict, and standard operating procedures; the idea of institutions as shaping economic behavior through norms and regimes of conventionality; the idea of evolution as characterizing the historical development of behavioral precepts.

The research of institutions and organizational decision-making is usually separated. However, more and more researchers have crossed borders. Di Maggio and Powell (1983) introduced three mechanisms representing “collective rationality” and revised the classical institutionalism. Mantzavinos, North and Shariq (2004) combined learning with institutions and performance and defended special mental models of rationality from psychology. We followed in these researchers’ footsteps and launched trials to bridge institutional analyses and decision-making theories in our theoretical framework for firm behavior studies.

2.5 Direct and indirect approaches exploring the firms’ motives

Firm characteristics analyses that we have used are direct approaches in institutional research. For example, Di Maggio and Powell (1983) presented their predictions and isomorphic conditions with organization characteristics analyses. Kahneman and Tversky also pointed out their findings on properties in the advanced prospect theory (1991). However, firm characteristics analyses are indirect approaches to explore motives in decision-making research.

We were inspired by criminal investigation processes for this methodological trial. The police can never penetrate the decision-making processes of murders before their actions, but they investigate all traces of murders after criminal actions. Based on analyses, the police can draw potential suspects' profiles and explore their probable

motives, with which they advance their research. Thus, when we are limited to research organizational decision-making processes, e.g., decisions were made in the past, decision-makers quit the firms, little feed-back from questionnaires is received, people do not tell the truth in interviews and questionnaires, or people feel ambiguity in their preferences, we can use indirect approaches to investigate their decision-making processes and examine the results of direct approaches.

On the other hand, we need direct approaches to reexamine the results obtained through indirect approaches, like the police need to interrogate suspects for direct evidence. We have conducted direct investigations with three tests. The first one is the literature synthesis of firms' announcements. The second one is sending questionnaires. The third one is asking questions on the open platform organized by stock exchanges to facilitate the communication between Chinese listed firms and the public.

In the first test, we collected information from 61522 firm announcements and analyzed firms' objectives that are explicitly reported to the public. With specific data mining skills, we have fulfilled our task. In the second test, we sent 3736 emails to all the 3523 Chinese listed firms, inviting them to reply to our questionnaires. However, we received only 75 feedbacks, among which 56 were automatically replied by computer systems, 11 firms accepted our questionnaires, visits or interviews, and 8 firms refused or replied to read the announcements. Since the replies' percentage was too low, we cannot conduct analyses through questionnaires. In the third test, we tried to communicate directly with the listed firms on the platform. However, we received the same answers as the public announcements or ambiguous answers like "our company will take into consideration your requirement and publish our answers in firm announcements as soon as possible."

In reality, because of the discipline of transparency, Chinese listed firms are constrained to provide the information distinct from the announcements reported to all the public. Thus, we have conducted our analyses on firms' motives with a combination of indirect and direct approaches based on the public information collected from

announcements. We do not only read the announcements to hear what they say to the public, but also research the specific environments in which they worked, and check the traces that they have left.

2.6 Agency cost model's development

Our research has revised the agency cost model with the concept of contextualization, and reconfirmed its value based on Chinese firms' experience. We have measured the organizational efficiency of Core-staff-based ESOPs at three dimensions, corresponding to three potential agency risks among firms, employees, employee-owners, market investors, and creditors.

Mainly, we have used the Prospect Theory to analyze the agent's and the principal's decision-making process, and found out the symmetrical outcomes of agency: agency gains and agency costs. We will continue this research and develop the whole theoretical model for agency issues, containing Jensen's agency costs and Simon's bounded rationality.

2.7 Specific big data skills and methodology system

We have applied for specific big data skills in this thesis, with which we have transformed qualitative material in quantitative data, accelerated our research speed, and avoided an amount of research bias.

However, our big data mining skills have limits in collecting information from all types of materials. Moreover, they require an enormous investment in time to collect information and construct a database. Big data skills cannot guarantee the significance of results. If we do not design suitable variables, we will lose ourselves in data without outcomes. Thus, we highlight the importance of a methodology system, carrying out case studies, questionnaires and metanalyses in preliminary research to enhance the efficiency of big data analyses.

2.8 Advantages and disadvantages of structured equations

We found specific software for structured equations with a cross-section database. Being inspired by this software, we have designed one series of panel regressions to explain a complex phenomenon or a specific effect, for example, the cycle effects between R&D and firm performance, the business model efficiency based on three agency risks' tests, the heterogeneity tests, and the triple-dimensional tests between ESOP and Non-ESOP firms, the Hi-Tech and Non-Hi-Tech firms, before and after implementing the government's supportive policies.

We have changed the modeling structure to enhance the robustness. Each regression consists of a small number of variables with a clear modeling focus. For instance, in the asset-based performance tests, the primary function is between pre-tax profits and assets, and we observe the roles of dummy variable ESOP: whether the implementation of ESOPs enables firms to gain more profits before taxes based on each unit of assets. We have checked the correlations and multicollinearity when choosing regression variables. We have also examined our results with statistics and theories. For example, according to Keynes, the market values increase if interest rates decrease. Thus, we can confirm our model when observing a negative correlation between firms' market values and annual interest rates. Otherwise, we should carry out an in-depth analysis and reconduct the whole regression research.

In this way, we have achieved high values of R² in our models. However, this method is limited, capturing a single focus in each regression, and we have to use multiple regressions to design structured equations as mentioned above. Thus, some readers will feel inconvenienced to understand many hypotheses and test results presented in our papers.

2.9 Quantitative and qualitative methods

Taking on challenges, we have modeled some institutional and decision-making factors in regressions and used technical analysis skills to observe the post-decision-

making processes. By this means, we have obtained significant results.

However, not all social phenomena can be researched by quantitative approaches. We again highlight the roles of qualitative methods in complementing quantitative analyses and discovering new insights.

3. Open questions in the research of ESOPs

Going back to the theme of Chinese ESOPs, the future research is open to the following questions.

3.1 Interventionist approaches to penetrate in ESOP firms' management

Facing the silence in questionnaire feed-backs and the diplomacy on the communication platform, how can we penetrate firm decision-making processes for a clearer observation of ESOP choices? The interventionist approaches will give us chances. With specific identities, we will be authorized to attend firms' meetings or discuss with firm decision-makers. For example, we purchase shares and attend the firms' general meetings of shareholders.

However, the research view of the interventionist approach is entirely different from the normal research. In the above case, we are researchers and shareholders. Being shareholders, we will care for our own interests regarding firms' policies. While being researchers, we should maintain an objective observation of firms' decision-making processes. Inevitably, we will meet the conflict of interests between subjectivity and objectivity.

If we combine interventionist approaches with big-data quantitative analyses, this conflict will be aligned. Because the interventionist approaches bring us new information from inside firms, and we examine this information objectively with full-sample and big-data skills. We will utilize this new methodology system in our future research.

3.2 In-depth studies regarding the heterogeneity tests

The mechanism of Core-staff-based ESOPs has its weakness under the mirror-like effects in different business situations. Do employee-owners participation and other employees' voices significantly increase firms' gains at the best time but aggravate firms' losses at the worst time? What is the causality of aggravation with the implementation of Core-staff-based ESOPs in the situation of loss?

In the other heterogeneity tests, we have observed that Core-staff-based ESOPs have insignificant, even adverse effects in specific regions and industries. By combining the specificity analyses of each region and industry, we will undertake in-depth studies: why does this new mechanism not work well in these regions or industries?

Following Ren and her partners' research in 2019, we found the heterogenic ESOP effects under various sub-models of Core-staff-based ESOPs. In reality, these sub-models contain different participation mechanisms of employee-owners. As we know, Chinese family-controlled firms have limited openness to accept employee participation. How do different mechanisms under Core-staff-based ESOPs interact with the governance power of family-controlled firms?

3.3 Other focuses on Non-listed firms

In the current research, we have selected the Chinese listed companies as our research targets. In reality, Non-listed firms have also implemented various types of ESOPs, and these ESOPs are not supervised by the Chinese Securities Regulation Commission.

In China, Non-listed ESOP firms have different sizes and diverse organizations. Some of them are gigantic players in the market, like the Huawei and the Wahaha; while the majority are small firms. Distinct from the listed firms, Non-listed firms' shares are not publicly traded by market investors in the stock market. Thus, the risks of agency

problems should be different from those listed firms, and the ESOP participants bear different obligations in ESOPs. Complementing the current research, further research on ESOPs implemented by Chinese Non-listed firms enables us to observe a fuller picture of the ESOP development in China.

3.4 Further research in the domain of Market Finance

The analyses of market values in our research are still limited in the field of corporate finance and firm management. Further research can be conducted in the domain of market finance. For example, employee-owners enjoy the same rights as market shareholders, trading the shares distributed through ESOPs after locking periods. We can compare the coefficients Beta between ESOP firms and Non-ESOP firms based upon the given market indexes.

Moreover, since 2014, specific ESOP investment funds have been issued, and authorized to use leveraged loans provided by financial institutes. We can explore the risk perceptions of employees and financial institutes, and verify alpha values of ESOP funds in which the strategy of concentration has primarily been used instead of diversification.

3.5 International comparison among different ESOP mechanisms

Essentially, Core-staff-based ESOPs belong to a mechanism of ESOP limited by a small proportion of participants. We have conducted comparative analyses between ESOP firms and Non-ESOP firms, before and after implementing ESOPs in the ESOP firms, and between Chinese firms' experience of broad-based ESOPs in the 1990s and the performance of Core-staff-based ESOPs implemented by Chinese listed firms since 2005.

We need further research cross-borders, comparing the performance of broad-based ESOPs implemented in western firms and that of Core-staff-based ESOPs implemented in China, and analyzing their specificities in adapting to the environments

characterized by different institutions and cultures.

3.6 The potential of ESOPs in sustainability

We stand on the brink of a technological revolution that will fundamentally alter the way we live, work, and relate to one another” (Schwad, 2016). Evolving at an exponential speed, the fourth industrial revolution is blurring the frontiers between physical, digital and biological spheres, changing almost every industry in every country, even the entire system of production, management and governance. Globally, about 50% of current jobs could be automated in the age of robots. Do Core-staff-based ESOPs enable the protection of employment in the competing environments of robotization? And what is the mechanism to concretize this protection through ESOPs: enhancing CSR duties or improving firms’ economic performance? We will explore the potential of Core-staff-based ESOPs in sustainability.

RESEARCH SUMMARY

The employee share ownership plan, known as “ESOPs,” is a corporate finance approach that a company gives its shares fully or partly to employees working in their company (Shields & Brown, 2007). More than financial benefits through the implementation of ESOPs, the traditional boundary between workers and owners is blurring, as workers increasingly participate as owners in the firm (Rousseau & Shperling, 2003). Like chain reactions, changes in ownership on one side, induce changes in social roles and the relationship; on the other side, induce changes in the perception that employees perceive themselves and their firm environment. Finally, the satisfaction of expectations enhances employees' commitments to the firm and stimulates employees to increase productivity in the perspectives of the firm's common growth.

In 1980, Deng Xiaoping led the Chinese people into economic reforms. In 1992, he affirmed his determination to introduce a market economy within a socialist framework. Since then, the modernization of state-owned companies has made a remarkable start, and private firms have actively emerged on the Chinese economic stage. In this scenario, the ESOPs have played a substantial role in Chinese firms' growth.

The ESOP development in China has evolved with a trial-error-trial model. The first trials of ESOPs during 1992-1998 were grouped under total-based ESOPs. “Share Incentive Plans” or “Equity Incentive Plans” (briefly called SIPs as below), that have been implemented according to SIPs laws issued in 2005, have been popularly regarded as executive-based ESOPs. While "Employee Share Ownership Plans" (briefly called ESOPs-2014), that have been implemented according to the ESOP-2014 laws promulgated in 2014, have been perceived as broad-based ESOPs.

Numerous studies have been carried out on ESOPs practiced by western firms (Kruse, 1996; Pendleton, 1997; 2001; 2006; Festing et al, 1999; Jones, 2004; Robison

& Zhang, 2005; Lavelle et al, 2012; Kim et al, 2014; Guery & Pendleton, 2016; Jaakson & Kallaste, 2016; Pendleton & Robinson, 2016; Ray, 2016; Torp, 2016; Guery & Guery, 2017; Poutsma & Ligthart, 2017; Richter & Schrader, 2017). Concerning the Chinese ESOPs, findings have provided a better understanding of the first ESOP trials implemented in the 1990s, SIPs and ESOPs-2014 (Wang, 2001; 2005; Chiu, Huang & Lu, 2005; Lin, Trenberth & Kelly, 2010; Meng et al., 2011; Lian, Su & Gu, 2011; Fang, Nofsinger & Quan, 2015; Faigen, 2016; Zhang, Sun & Wan, 2016; Ren et al., 2019). However, most previous researches are focused on performance analyses, having ignored: the design of mechanisms, ESOP firms' characteristics, the environments influencing the ESOP development, triple bottom lines of sustainable development, and inherent strengths and weaknesses in the structure demonstrated in specific contexts. Thus, we attempt to fill these gaps and provide a global perspective of interactions between the ESOP development and specific environments in China, where the institutions and cultures are entirely different from the western world.

Reappraising the mechanism of Chinese ESOPs, we have thought over classical theories utilized in the domain of ESOPs.

Firstly, beyond the traditional definition as the labor force, we capitalize on employees' contributions and highlight their multi-capital potential. For us, the participation represents one type of investments, enabling firms to motivate employees' potential, correct the bias of the decision-makers in the top management, enhance employees' learning by opinion expressions, and stimulate employees' self-control, self-trainings, and self-investments in social networks in the firms' interests.

Secondly, we redefine the controlling costs as one type of agency costs and explain their coherence based on the historical development of the relevant theories. In the view of resource-based prospects (Kahneman and Tversky, 1979; 1991), we also revise the agency cost model developed by Jensen and Meckling (1976) and reconfirm its value with Chinese firms' ESOP experience. The agency costs do not exist only between employees and firm owners in the firms; but also between different types of firm owners

and between owners and creditors. Nevertheless, the implementation of ESOPs enables firms to reduce agency costs in the vertical structure between employees and firm owners; new interest conflicts will be generated between employee-owners working in the firms and other shareowners out of firms, between employee-owners and creditors.

Thirdly, we explore ESOP participants' cognitive processes with decision-making theories and affirm that subjective evaluations are not constant. The marginal utilities of ESOP ownership effects can decrease with time. Employee owners' participation will also be constrained if they realize that they have a limited power in corporate governance, especially when employee-owners' efforts devoted to change cannot succeed. This is one of the fundamental reasons to generate free-rider effects in the ESOP execution. If the implementation of ESOPs fails to motivate employees to improve firm performance, the conflicts generated by divergent interests between employee-owners and market investors will break out, and adverse outcomes will harm all the actors in the capital structure. Thus, to achieve a real "fair play," we should search for solutions to balance and protect all the actors' interests involved in the ESOP mechanism.

In methodology, we apply big data skills for research. For example, we use specific mining skills to collect information from 61522 firm announcements of more than one million pages. We also conduct ESOP performance analyses based upon 119994 firm-quarter data.

With these specific big data skills, we have discovered in China a new ESOP mechanism, called "Core-staff-based ESOPs" that contributes diversity to the traditional ESOP framework. Distinct from broad-based ESOPs and executive-based ESOPs, this mechanism requires the qualification for participants. Only those "core staff" who succeed in qualification can participate in the new ESOPs and enjoy the distributed benefits or particular risk compensations. The participation qualifications are accessible to all working staff, involving senior executives, directors at the middle level, and any other employees that make particular contributions to firms.

Motivating employee-owners' potential and recalling agency controls in the ESOP framework, this new ESOP concept provides an example of efficiency in organization. Based on comparative performance analyses, we confirm the positive effects of Core-staff-based ESOPs in improving firms' performance, reducing business risks, and increasing firms' market values in normal business situations. Moreover, our findings significantly support that implementing these new ESOPs provides efficient solutions to resolve innovators' dilemma, enabling Hi-Tech firms to enhance the continuous cycle between R & D investments and firm profits, improve firm performance and market values, and increase their survival chances.

For us, the emergence of Core-staff-based ESOPs is not a surprise. We introduce organization theories in the ESOP research and observe the Chinese ESOP development in "an interacting ecology" in which individual actors, organizations, and societies play together (March, 1994). In reality, the Chinese ESOP development is characterized by a subsequent evolution in time of different ESOP mechanisms, and an organization heterogeneity based upon firms' different choices regarded the ESOP implementation.

Due to specific environments in China, the assumed isomorphic structuration (DiMaggio & Powell, 1983) has not happened between Chinese firms and western firms. On the other hand, we discover a historical isomorphism with which SIPs and ESOPs-2014, having emerged in different historical periods, can be structured into one single model because of the similarity of targets, strategies, procedures, and structures of participants and capitals. This is the origin of "Core-staff-based ESOPs."

Trying to bridge institutional analyses and decision-making theories, we explore ESOP firms' motives: which factors would have influenced Chinese firms' choices and stimulated them to challenge and change, especially in a society where traditional culture values conflict with the inherent properties of Core-staff-based ESOPs. Rejecting coercive impacts and risk-taking desires in worrisome situations of performance, our findings support that the firm specificities and particular institutional

policies have encouraged a specific group of Chinese firms to launch ESOP trials. With supplementary characteristics statistics, we draw ESOP firms' profiles and define the boundaries of organizational heterogeneity between ESOP firms and Non-ESOP firms.

Moreover, we contextualize the ESOP performance analyses in specific environments of China, like geographic heterogeneity and industrial heterogeneity. We confirm the heterogeneous effects of Core-staff-based ESOPs, unveiling their strengths and weaknesses in particular contexts.

Globalization is also one type of institution. We introduce our innovation analyses in the global trend of constructing an open innovation ecosystem. Through structured equation modeling skills, we reveal cooperative effects between Core-staff-based ESOPs and governments' supportive policies, enabling Chinese Hi-Tech firms to reduce the inherent performance gaps of the Hi-Tech industry, and enhance the efficiency of the innovation ecosystem as a whole.

Our underlying thesis is focused on the ESOPs implemented by Chinese listed firms. Further research on Non-listed firms enables us to observe a full picture of the ESOPs in China. Moreover, the analyses of market values are still limited in the field of firm management and corporate finance. Specific research can be carried out in the domain of market finance based upon market indexes.

Big data skills also have limits, and not all social phenomena can be researched by quantitative approaches. We highlight the importance of qualitative approaches. Faced with the silence in questionnaire feed-backs, we need other direct approaches complementing indirect approaches and penetrate firm decision-making processes.

In the future, we will devote ourselves to research the interactions between employee-owners' participation and the governance power of family-controlled firms, analyze the causality of ESOP adverse effects at the moment of loss, and explore the roles of ESOPs in sustainability.

Essentially, Core-staff-based ESOPs belong to a mechanism of ESOP limited to a small proportion of participants. We need further research cross-borders, comparing broad-based ESOPs implemented in western firms and that of Core-staff-based ESOPs implemented in China, and analyzing their specificities in adapting to the environments characterized by different institutions and cultures.

SYNTHÈSE DE RECHERCHE

L'actionnariat salarié, ce que l'on appelle dans le langage courant « AS » en français et « ESOPs » en anglais, est une approche financière d'entreprise dans laquelle une entreprise donne ses actions totalement ou partiellement aux employés travaillant chez elle (Shields & Brown, 2007). En plus des bénéfices financiers obtenus à travers la mise en œuvre de l'AS, la frontière traditionnelle entre travailleurs et propriétaires devient floue, car les travailleurs participent de plus en plus en tant que propriétaires au sein de l'entreprise (Rousseau & Shperling, 2003). Comme les réactions en chaîne, les changements en propriété entraînent des changements, d'une part dans les rôles sociaux et les relations, d'autre part dans la perception que les travailleurs ont d'eux-mêmes et de leur environnement d'entreprise. Enfin, la satisfaction des attentes renforce le sens d'engagement envers l'entreprise et stimule les travailleurs à augmenter la productivité dans la perspective de la croissance commune d'entreprise.

En 1980, Deng Xiaoping a dirigé le peuple chinois vers la réforme économique. En 1992, il a affirmé sa détermination à introduire une économie de marché au sein d'un cadre socialiste. Depuis lors, la modernisation des entreprises publiques d'État a pris un départ remarquable et les entreprises privées émergent activement sur la scène économique chinoise. Dans ce scénario, les plans de l'AS ont joué un rôle substantiel dans la croissance des entreprises chinoises.

Le développement de l'AS en Chine évolue sur la base d'un modèle d'essai-erreur-essai. Les premiers essais d'AS pendant la période 1992-1998 étaient rassemblés sous le modèle d'AS « total-based ». Les « Share Incentive Plans » ou « Equity Incentive Plans » (dénommés ci-après SIPs), lesquels sont mis en œuvre selon les règles SIPs promulguées en 2005, sont connus sous le modèle d'AS « executive-based ». Par ailleurs, les « Employee Share Ownership Plans » (dénommés ci-après ESOPs-2014), lesquels sont mis en œuvre selon les règles ESOP-2014 promulguées en 2014, sont perçus comme l'AS « broad-based ».

De nombreuses études sont effectuées sur les plans d'AS pratiqués par les entreprises occidentales (Kruse, 1996; Pendleton, 1997; 2001; 2006; Festing et al, 1999; Jones, 2004; Robison & Zhang, 2005; Lavelle et al, 2012; Kim et al, 2014; Guery & Pendleton, 2016; Jaakson & Kallaste, 2016; Pendleton & Robinson, 2016; Ray, 2016; Torp, 2016; Guery & Guery, 2017; Poutsma & Ligthart, 2017; Richter & Schrader, 2017). À l'égard des plans d'AS exécutés par les entreprises chinoises, les constats permettent d'avoir une meilleure compréhension sur les premiers essais d'AS dans les années 1990, les SIPs et les ESOPs-2014 (Wang, 2001; 2005; Chiu, Huang & Lu, 2005; Lin, Trenberth & Kelly, 2010; Meng et al., 2011; Lian, Su & Gu, 2011; Fang, Nofsinger & Quan, 2015; Faigen, 2016; Zhang, Sun & Wan, 2016 ; Ren et al., 2019). Cependant, la plupart des études précédentes sont focalisées sur les analyses de performance, ayant ignoré : la conception des mécanismes ; les caractéristiques des entreprises d'AS ; les environnements impactant leur développement ; le triple bilan en développement durable ; les forces et faiblesses inhérentes à la structure dans des contextes spécifiques. Donc, nous tentons de combler ces lacunes et de donner une vision complète en interactions entre le développement de l'AS et l'environnement spécifique en Chine où les institutions et cultures sont entièrement différentes de celles du monde occidental.

Réévaluant le mécanisme d'AS en Chine, nous ont réfléchi aux théories classiques utilisées dans le domaine de l'AS.

Premièrement, en dépassant la limite de la définition traditionnelle en tant que force d'emploi, nous capitalisons les contributions d'employés et soulignons leur multi-capital potentiel. Pour nous, la participation représente un type d'investissement, en permettant aux entreprises de motiver le potentiel des employés, de corriger les biais des décideurs de top management, de renforcer l'apprentissage des employés à travers leur expression d'opinions, et de stimuler l'autocontrôle, l'autoformation et l'auto-investissement des employés dans les relations sociales en faveur des entreprises.

Deuxièmement, nous redéfinissons que les coûts de contrôles sont un type de coûts d'agence, en expliquant la cohérence entre les deux selon le développement historique

des théories respectives. À travers des prospectus fondés sur les ressources (Kahneman and Tversky, 1979; 1991), nous révisons le modèle du coût d'agence développé par Jensen et Meckling (1976), et reconfirmons sa valeur sur la base de l'expérience d'AS des entreprises chinoises. Les coûts d'agence n'existent pas seulement entre les travailleurs et les propriétaires dans les entreprises, mais aussi entre différents types de propriétaires, entre les propriétaires et les prêteurs. Néanmoins, la mise en œuvre de l'AS permet aux entreprises de réduire les coûts d'agence au sens vertical entre les employés et les propriétaires ; les nouveaux conflits d'intérêts peuvent être créés entre les actionnaires salariés travaillant dans les entreprises et les autres actionnaires hors des entreprises, et entre les actionnaires salariés et les prêteurs.

Troisièmement, nous explorons les processus cognitifs des participants d'AS avec des théories de prise de décisions, et affirmons que les évaluations subjectives ne sont pas constantes. Les utilités marginales des effets de l'AS peuvent diminuer dans le temps. La participation d'actionnaires salariés peut aussi être contrainte s'ils comprennent qu'ils ont un pouvoir limité en gouvernance d'entreprise, surtout aux moments où leurs efforts consacrés aux changements n'aboutissent pas. Ceci est une des raisons essentielles de générer les effets « free-rider » pendant l'exécution de l'AS. Si la mise en œuvre des plans d'AS échoue à motiver les employés pour améliorer la performance des entreprises, les conflits générés par les intérêts divergents entre les actionnaires salariés et les investisseurs du marché éclateraient, et les conséquences porteraient préjudice à tous les acteurs présents dans la structure du capital. Or, afin d'achever un vrai jeu équitable, nous devons chercher des solutions pour équilibrer et protéger les intérêts de tous les acteurs présents dans le mécanisme d'AS.

En méthodologie, nous appliquons des techniques de grandes données dans notre recherche. Par exemple, nous utilisons les techniques spécifiques d'extraction pour chercher l'information parmi 61522 annonces de plus d'un million de pages. Nous effectuons aussi les analyses de performance d'AS avec 119994 données du panel trimestrielles.

Grâce à ces techniques de grandes données, nous découvrons en Chine un nouveau mécanisme d'AS appelé « Core-staff-based ESOPs », lequel apporte diversité dans le cadre traditionnel de l'AS. Étant distinct de « broad-based ESOPs » et de « executive-based ESOPs », ce mécanisme demande la qualification des participants. Seulement les « core staff » ceux qui réussissent à se qualifier peuvent participer aux nouveaux plans d'AS et jouir des bénéfices distribués ou des compensations particulières. Les qualifications de participation sont accessibles à toute l'équipe de travailleurs, impliquant les administratifs supérieurs, les directeurs au niveau moyen et autres employés qui contribuent particulièrement à l'entreprise.

En motivant la potentialité des actionnaires salariés et rappelant les contrôles d'agence dans le cadre de l'AS, ce nouveau concept d'AS présente un exemple d'efficacité en organisation. D'après des analyses comparatives sur la performance, nous confirmons les effets positifs apportés par les « Core-staff-based ESOPs » en termes d'amélioration de la performance d'entreprises, de réduction de « business risks », et d'accroissement de valeurs du marché dans les situations normales. D'ailleurs, nos constats soutiennent significativement que la mise en œuvre de ces nouveaux plans d'AS présente des solutions efficaces pour résoudre le dilemme des innovateurs, permettant aux entreprises Hi-Tech de renforcer le cycle continu entre les investissements de R&D et les rendements d'entreprises, d'améliorer leur performance et valeurs du marché et d'augmenter leurs chances de survie.

Pour nous, l'émergence de ces « Core-staff-based ESOPs » n'est pas une surprise. Nous introduisons les théories d'organisation dans le champ de recherche de l'AS, et observons le développement de l'AS en Chine au sein d'une écologie d'interactions où les acteurs individuels, organisationnels et sociétaux jouent ensemble (March, 1994). En réalité, le développement de l'AS en Chine est caractérisé par une évolution séquentielle de différents mécanismes d'AS, et une hétérogénéité organisationnelle se fondant sur les choix d'entreprises concernant l'adoption de l'AS.

À cause de l'environnement spécifique en Chine, la structuration isomorphique

supposée (DiMaggio & Powell, 1983) ne survient pas entre les entreprises chinoises et occidentales. Par ailleurs, nous révélons un processus historique d'isomorphisme à travers lequel SIPs et ESOPs-2014, ayant émergé pendant les différentes périodes historiques, peuvent se structurer sous un seul modèle à cause de similitudes de cibles, de stratégies, de procédures, de structures de participants et de capitaux. Ceci est l'origine de l'AS « Core-staff-based ESOPs ».

En essayant de combler les analyses institutionnelles et les théories de la prise de décisions, nous explorons les motivations des entreprises d'AS : quels facteurs auraient impacté les choix des entreprises chinoises et les auraient stimulés à lancer des défis et changer, surtout dans une société où les valeurs de culture traditionnelle vont à l'encontre des caractéristiques inhérentes de l'AS « Core-staff-based » ? En rejetant les impacts coercitifs et les désirs risquophiles dans les situations peu performantes, nos constats soutiennent que les spécificités d'entreprises et les politiques institutionnelles ont encouragé un groupe spécifique d'entreprises chinoises de lancer les essais d'AS. À travers des statistiques supplémentaires en caractéristiques, nous traçons les profils des entreprises d'AS et définissons les frontières de l'hétérogénéité organisationnelle entre les entreprises d'AS et sans AS.

En plus, nous contextualisons les analyses de performance d'AS dans l'environnement spécifique en Chine, par exemple, les hétérogénéités géographique et industrielle. Et nous confirmons les effets hétérogènes de « Core-staff-based ESOPs », en dévoilant leurs forces et faiblesses dans les contextes particuliers.

La globalisation est aussi un type d'institutions. Nous introduisons nos analyses en innovation dans une tendance globale : la construction d'un écosystème ouvert en innovation. À travers la modélisation d'équations structures, nous révélons les effets coopératifs entre les « Core-staff-based ESOPs » et les politiques favorables des gouvernements, permettant aux entreprises Hi-Tech chinoises de réduire les gaps inhérents existant dans leur industrie et de renforcer dans l'ensemble l'efficacité de l'écosystème en innovation.

Notre thèse est focalisée sur les plans d'AS mis en œuvre par les entreprises cotées en Chine. Une recherche ultérieure concernant les entreprises non cotées, nous permettrait d'observer un panorama de l'AS en Chine. En plus, les analyses de valeurs du marché sont encore limitées en gestion et finance d'entreprise. Des recherches spécifiques peuvent s'effectuer dans le domaine de la finance du marché sur la base des indices du marché.

Pourtant, les techniques de grandes données ont aussi leurs limites, et tous les phénomènes ne peuvent pas être étudiés par les approches quantitatives. Or, nous mettons en relief l'importance des approches qualitatives. Face au silence dans les réponses aux enquêtes, nous avons besoin d'autres approches directes complétant les approches indirectes et de pénétrer les processus de prise de décisions d'entreprises.

Dans le futur, nous nous consacrerons à étudier les interactions entre la participation des actionnaires salariés et le pouvoir de gouvernance des entreprises familiales, à analyser la causalité des effets négatifs d'AS aux moments économiquement difficiles, et à explorer les rôles de l'AS dans la durabilité.

Essentiellement, « Core-staff-based ESOPs » appartiennent à un mécanisme d'AS limité à une petite proportion de participants. Nous avons besoin de recherches transnationales ultérieures, en comparant les plans « Broad-based ESOPs » mis en œuvre par les entreprises occidentales et les « Core-staff-based ESOPs » impliqués en Chine, et en analysant leurs spécificités en adaptation aux environnements caractérisés par des institutions et des cultures différentes.

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LIST OF ILLUSTRATIONS

Tables

Table No.	Descriptions	Chapter	Pages
Table 1	Frequency analysis of SIPs (Executive participants out of total SIP participants)	I	31
Table 2	Frequency analysis of SIPs (SIP participants out of total staff)	I	32
Table 3	Frequency analysis of ESOPs-2014 (ESOP participants out of total staff)	I	33
Table 4	Frequency analysis of ESOPs-2014 (executive participants out of total ESOP participants)	I	34
Table 5	VIF Test Results	II	57
Table 6	Test results of binary logistic regressions	II	60
Table 7	Performance analyses between SIP firms and Non-SIP firms, Prior-SIP and Post-SIP	II	68
Table 8	Asset-based pre-tax profit analysis	III	88
Table 9	Equity-based pre-tax profit analysis (Debt ratio $\leq 85\%$)	III	88
Table 10	Debt ratios analysis	III	89
Table 11	Net-profit-based market value analysis	III	90
Table 12	Comparative analysis between Prior-ESOP and Post-ESOP	III	92
Table 13	Geographic heterogeneity analysis	III	95
Table 14	Industrial heterogeneity analysis	III	96
Table 15	Heterogenic effects of ESOPs in different firm organizations	III	97
Table 16	Mirror-like effects of ESOPs in different business situations	III	98
Table 17	Debt ratio and market value analysis in different business situations	III	99

Table No.	Descriptions	Chapter	Pages
Table 18	Performance analysis under different sub-models and different business situations	III	101
Table 19	R&D contributions to the firm performance of the years “t” and “t+1”	IV	115
Table 20	R&D contributions to firm assets	IV	116
Table 21	R&D investments based on net profits of the years t-1 and t	IV	117
Table 22	Debt ratio analysis in different situations	IV	119
Table 23	Asset-based performance analysis in different situations	IV	120
Table 24	Equity-based performance analysis in the cases of gain and loss	IV	121
Table 25	Market value analysis based on net profits of the years t and t-1 in different situations	IV	122
Table 26	Market value analysis based on assets of the years t and t-1 in different situations	IV	123
Table 27	Asset-based performance analysis under different types of firm governance	IV	127
Table 28	Asset-based performance analysis with and without direct-family-controlled governance	IV	127
Table 29	Asset-based performance analysis before and after implementing government policies	IV	131

LIST OF ILLUSTRATIONS

Charts

Chart No.	Descriptions	Chapter	Pages
Chart 1	Development of SIPs and ESOPs-2014	I	45
Chart 2	Organizational Choice Cycle	II	49
Chart 3	The ESOP development in China (2005-2017)	II	66
Chart 4	Annual variation of new ESOP schemes put into execution	II	66

TABLE OF CONTENTS

Acknowledgement.....	i
Abstract.....	iii
Résumé.....	iv
Contents.....	v
Introduction.....	1
1 Brief presentation of ESOPs.....	1
2 Research territory defined: A reappraisal of ESOPs in China.....	2
3 Research challenge: the discovery of a new ESOP concept in China.....	3
3.1 To clarify the truth behind stereotypes: Are the new ESOPs implemented in China broad-based or executive-based ESOPs?	3
3.2 Discovering a new ESOP concept in China: Core-staff-based ESOPs.....	4
4 Research framework: an organizational ecology of interactions between environments, organizations and individuals.....	6
4.1 Applying organization theories for the ESOP research.....	6
4.2 Multi-layer organization structure.....	7
4.3 Organizations, institutions and decision-making theories.....	8
4.4 Exploring firms' motives with institutions, firm characteristics and performance analyses.....	10
4.5 Modeling institution and decision-making factors in regressions.....	11
5 New research insights: capitalizing employees' potential and recalling agency controls in the ESOP design.....	12
5.1 Revising the agency cost model in specific contexts.....	12
5.2 Capitalizing employees' contributions in the multi-capital potential.....	13
5.3 Defining employees' participation as one type of investment.....	14
5.4 Balancing diverse capital providers' interests in the ESOP design.....	15
5.5 Recalling agency controls based upon experience.....	16
6 Research trials: applying for big data skills and structured equations.....	18

7	Research dossier: research papers fit-into a structured thesis.....	19
Chapter I.	Core-staff-based ESOPs: a new concept of ESOPs.....	21
1	Basic knowledge on employee share ownership plans (ESOPs).....	21
1.1	ESOPs defined.....	21
1.2	Main rationales supporting ESOPs.....	22
1.3	Standard ESOP mechanisms practiced by western firms.....	23
2	Truth or stereotypes:	
	Are ESOPs in China broad-based or executive-based ESOPs?	24
2.1	Sequential evolving path of ESOPs in China.....	25
2.2	Contrasts between popular beliefs and our preliminary research.....	26
3	Theoretical framework and hypotheses.....	27
3.1	Diversification and homogenization.....	27
3.2	Hypotheses.....	28
4	Methodology and data.....	29
4.1	Data.....	29
4.2	Methodology.....	30
5	Results on the isomorphic structuration.....	31
5.1	SIPs are neither executive-based nor broad-based ESOPs.....	31
5.2	ESOPs-2014 are neither broad-based nor executive-based ESOPs.....	33
5.3	The birth of Core-staff-based ESOPs: a historical isomorphic process between SIPs and ESOPs-2014.....	35
5.4	Specificities of environments, firm structures and learning paths.....	37
6	Multi-layer organization structure under Core-staff-based ESOPs.....	41
6.1	A compromise between homogenization and diversification in the multi-layer organization structure.....	41
6.2	Specificity of SIPs and ESOPs-2014.....	42
6.3	Interactions between SIPs and ESOPs-2014: competition and cooperation.....	44
7	Summary and open questions.....	46

Chapter II. Potential factors influencing ESOP firms' choices	48
1 Challenge and change: Which factors have influenced firms' choices and stimulated the ESOP development in China?.....	48
2 Theoretical framework and hypotheses.....	49
2.1 Decision-making processes and Prospect Theory.....	49
2.2 Resource-based view on organizational change processes.....	51
2.3 Choices of Chinese firms and hypotheses.....	52
3 Methodology and data.....	56
3.1 Approach for institutional analyses out of firms.....	56
3.2 Approach for prior-ESOP performance analyses of firms.....	56
3.3 Approach for firms' characteristics analyses.....	57
3.4 Selection of data.....	58
4 Results and interpretations.....	58
4.1 No evident coercive force for the ESOP implementation in China.....	58
4.2 Overperformance of ESOP firms during Prior-ESOP period.....	59
4.3 A significant difference between ESOP firms and Non-ESOP firms.....	60
4.4 Hidden institutional benefits for the ESOP implementation.....	64
5 Further analyses.....	65
5.1 Trends analysis: concavely increasing ESOPs and volatility in first trials.....	65
5.2 Discovering the ESOP mechanisms' inherent benefits with time.....	67
6 Summary and open questions.....	69
 Chapter III. Performance analyses of Core-staff-based ESOPs	 72
1 Have Core-staff-based ESOPs improved firms' performance?.....	72
2 Theoretical framework and hypotheses.....	73
2.1 Agency problems.....	73
2.2 The agent's choices in the traditional business model.....	75
2.3 The principal's choices in the traditional business model.....	77
2.4 Explaining the behavioral logic of ESOPs with prospects.....	78

2.5	Recalling agency controls in Core-Staff-Based ESOPs.....	80
2.6	Hypotheses.....	84
3	Methodology and data.....	86
4	Results and interpretations.....	87
4.1	Significant improvements in performance.....	87
4.2	Significant prudence to borrow loans.....	89
4.3	Significant contribution to increase firms' market values.....	90
5	Further analyses.....	91
5.1	Analyzing ESOP effects between prior and post-ESOP.....	91
5.2	Analyzing ESOP effects in heterogenic contexts.....	92
5.3	Analyzing heterogenic ESOP effects under different sub-models and business situations.....	99
6	Summary and open questions.....	101
Chapter IV. Roles of ESOPs in innovation.....		103
1	Can Core-staff-based ESOPs enhance Hi-Tech firms' survival chances?.....	103
2	Theoretical framework and hypotheses.....	104
2.1	Employees' multi-capital potential and participation.....	104
2.2	Aligning conflicts between different capital with Core-staff-based ESOPs.....	107
2.3	Roles of ESOPs in innovation and hypotheses.....	109
3	Methodology and data.....	113
4	Results and interpretations.....	114
4.1	A positive cycle of R&D enhanced by Core-staff-based ESOPs.....	114
4.2	A safe risk-taking attitude of ESOP firms.....	118
4.3	Overperformance at the best time.....	124
4.4	Weakness under the mirror-like effects.....	125
4.5	Particular impacts of family-controlled governance in Chinese firms.....	126
5	Further analyses.....	128
6	Summary and open questions.....	133

Conclusion and discussion	135
1 Contributions and implications.....	135
1.1 Theoretical implications.....	135
1.2 Managerial implications.....	136
1.3 Social implications.....	137
2 Pioneer trials and discussions.....	138
2.1 Isomorphic processes at different dimensions.....	138
2.2 Conciliate the debates between diversification and homogenization in a multi-layer organizational structure.....	139
2.3 Apply Prospect Theory to organizational studies.....	139
2.4 Bridging Institutionalism and decision-making theories.....	141
2.5 Direct and indirect and approaches exploring the firms' motives.....	141
2.6 Agency cost model's development.....	143
2.7 Specific big data skills and methodology system.....	143
2.8 Advantages and disadvantages of structured equations.....	144
2.9 Quantitative and qualitative methods.....	144
3 Open questions in the research of ESOPs.....	145
3.1 Interventionist approaches to penetrate in ESOP firms' management.....	145
3.2 In-depth studies regarding the heterogeneity tests.....	146
3.3 Other focuses on Non-listed firms.....	146
3.4 Further research in the domain of Market Finance.....	147
3.5 International comparison among different ESOP mechanisms.....	147
3.6 The potential of ESOPs in sustainability.....	148
Research summary.....	149
Synthèse de recherche.....	155
Bibliography.....	161
List of illustrations.....	171
Table of contents.....	174
Appendices.....	179
	178

LIST OF APPENDICES

Appendix No.	Descriptions	Pages
Appendix 1	Summary of literature review for variable selection for firm characteristics analysis	180
Appendix 2	Performance analyses between ESOP firms and Non-ESOP firms, Prior-ESOP and Post-ESOP	182
Appendix 3	Firm characteristics analyses by pilot charts (percentages of firms)	183
Appendix 4	Descriptions and proportions of observations in heterogeneity tests	188
Appendix 5	Submission report	190
Appendix 6	Conference participation and proceedings	191

APPENDIX 1

Summary of Literature Review For Variable Selection For Firm Characteristics Analysis

ID	Description of Firm Characteristics Variables	Literature Summary
1	Company size measured by staff number	Kruse 1996; Pendleton 1997; 2006; Festing et al. 1999; Jones 2004; Meng et al. 2010; Kim et al.2014; Fang et al. 2015; Guery and Pendleton 2016; Jaakson and Kallaste 2016; Torp 2016; Guery and Guery 2017; Poutsma and Ligthart 2017; Mygind and Faigen 2017; Pendleton and Robinson 2016
2	Company size measured by asset values	Meng et al. 2010; Kim et al. 2014; Fang et al. 2015; Sun et al. 2017
3	Company size summarized in three levels: small, medium and big size	Pendleton 2006; Ray 2016; Poutsma and Ligthart 2017; Sun et al. 2017; Richter and Schrader 2017
4	Firm age	Meng et al. 2010; Kim et al. 2014; Fang and al. 2015; Torp 2016; Guery and Guery 2017;
5	Company nature (State-owned or private firms)	Meng et al. 2010; Mygind 2012; Fang et al.2015;
6	Company nature (Domestic or foreign companies)	Pendleton 1997; Robison and Zhang 2005; Lavelle et al. 2012
7	Company nature (Legal person ownership)	Meng et al. 2010; Fang and al.2015;
8	Sector	Kruse 1996; Pendleton 1997; 2006; Kim et al. 2014; Torp 2016; Jaakson and Kallaste 2016; Guery and Pendleton 2016; Guery and Guery 2017; Poutsma and Ligthart 2017
9	Country	Jones 2004; Meng et al. 2010; Fang et al. 2015; Guery and Pendleton 2016; Ray 2016; Guery and Guery 2017; Poutsma and Ligthart 2017; Mygind and Faigen 2017; Richter and Schrader 2017; Sun et al. 2017; Ismiyanti and Mahadwartha 2017
10	Capital intensity measured by capital per capita	Richter and Schrader 2017; Mygind and Faigen 2017
11	Automation level	Pendleton 1997
12	Proportion of R&D out of total cost	Kruse 1996
13	Proportion of executives at the top level	Pendleton 2006
14	Proportion of middle managers and group chiefs	Pendleton 2006
15	Proportion of skilled workers	Pendleton 1997

ID	Description of Firm Characteristics Variables	Literature Summary
16	Proportion of basic operative staff out of total employees	Pendleton 1997
17	Proportion of graduates	Poutsma and Ligthart 2017
18	Proportion of female staff out of total employees	Pendleton 1997
19	Financial leverage measured by the ratio of debt to equity	Meng et al. 2010; Fanga et al. 2015
21	Company structure (single company or group)	Guery and Guery 2017
22	Family-controlled	Guery and Guery 2017
23	Trade-union	Kruse 1996; Pendleton 1997; 2006; Kim et al.2014; Guery and Pendleton 2016; Pendleton and Robinson 2016; Guery and Guery 2017; Poutsma and Ligthart 2017
24	Performance (measured by productivity)	Pendleton 1997

APPENDIX 2

Performance Analyses Between ESOP Firms And Non-ESOP Firms, Prior-ESOP And Post-ESOP

	Obs.	ROA	ROE	ROS	Pre-tax _Assets	Pre-tax _Equity	Pre-tax _Sales
Non-ESOP firms	86139						
Q25%		0.0032	0.0080	0.0126	0.0044	0.0109	0.0178
Q50%		0.0138	0.0307	0.0513	0.0177	0.0392	0.0659
Q75%		0.0343	0.0695	0.1209	0.0430	0.0873	0.1497
ESOP firms (Prior-ESOP)	33579						
Q25%		0.0064	0.0129	0.0247	0.0084	0.0168	0.0328
Q50%		0.0197	0.0371	0.0692	0.0248	0.0463	0.0865
Q75%		0.0431	0.0752	0.1382	0.0524	0.0931	0.1680
ESOP firms (Post-ESOP)	19544						
Q25%		0.0099	0.0181	0.0405	0.0122	0.0219	0.0498
Q50%		0.0254	0.0448	0.0881	0.0303	0.0538	0.1060
Q75%		0.0499	0.0845	0.1504	0.0591	0.1010	0.1792
Total obs.	139262						
<i>Firms</i>	3523						
<i>Quarters</i>	68 (2002.3-2018.12)						

APPENDIX 3

Firm Characteristics Analyses By Pilot Charts (Percentages of Firms)

Variable	Description	Frequency Grades	Non-ESOP	SIP	ESOP	Mixed	ESOP	Total
			Firms	Firms	_2014	ESOP	Firms	firms
			Firms	Firms	Firms	Firms	Firms	Firms
			Group	Group	Group	Group	Subtotal	Subtotal
			0	1	2	3	1+2+3	0+1+2+3
Hi-Tech	Non-Hi-Tech	0	54%	28%	38%	29%	31%	44%
	Hi-Tech	1	46%	72%	62%	71%	69%	56%
	Total		100%	100%	100%	100%	100%	100%
Experience (In the 1990s)	No experience in 1990s	0	73%	91%	85%	91%	89%	80%
	Experience in 1990s	1	27%	9%	15%	9%	11%	20%
	Total		100%	100%	100%	100%	100%	100%
ISIN Code	600*	1	50%	29%	28%	22%	28%	40%
	000*	2	17%	7%	10%	8%	8%	13%
	002*	3	20%	29%	40%	37%	33%	26%
	300*	4	13%	34%	22%	34%	31%	21%
	Total		100%	100%	100%	100%	100%	100%
Company Size (Market Value In Billion RMB)	<5	1	55%	47%	41%	30%	44%	50%
	5-10	2	20%	28%	28%	31%	28%	23%
	10-15	3	8%	9%	11%	18%	11%	9%
	15-20	4	4%	4%	5%	7%	4%	4%
	20-25	5	3%	3%	4%	2%	3%	3%
	25-30	6	2%	1%	3%	5%	2%	2%
	30-35	7	1%	2%	2%	1%	2%	1%
	35-40	8	1%	1%	1%	2%	1%	1%
	40-45	9	1%	1%	0%	1%	1%	1%
	45-50	10	0%	1%	0%	1%	1%	1%
	>50	11	4%	4%	5%	2%	4%	4%
Total		100%	100%	100%	100%	100%	100%	100%
Company Nature	No data	0	3%	3%	1%	2%	2%	2%
	State owned	1	44%	10%	16%	7%	11%	30%
	Private	2	52%	86%	83%	91%	86%	66%
	Foreign capital	3	1%	1%	0%	0%	1%	1%
	Association	4	0%	0%	0%	0%	0%	0%

Variable	Description	Frequency Grades	Non-ESOP	SIP	ESOP	Mixed	ESOP	Total
			Firms	Firms	_2014	ESOP	Firms	firms
			Firms	Firms	Firms	Firms	Firms	Firms
			Group	Group	Group	Group	Subtotal	Subtotal
			0	1	2	3	1+2+3	0+1+2+3
	Collective partnership	5	0%	0%	0%	0%	0%	0%
	Total		100%	100%	100%	100%	100%	100%
Family-Controlled	Non-family-controlled		49%	14%	18%	11%	15%	35%
	Direct controls	1	20%	39%	37%	38%	38%	28%
	Pyramid	2	31%	46%	45%	49%	46%	37%
	Cross-holding	3	0%	0%	0%	1%	0%	0%
	Deviation from one share one vote	4	0%	0%	0%	0%	0%	0%
	No specifications	5	0%	1%	0%	1%	0%	0%
	Total		100%	100%	100%	100%	100%	100%
CR_5	<10	1	8%	7%	9%	7%	7%	8%
In %	10-20	2	1%	1%	0%	0%	1%	1%
	20-30	3	4%	5%	4%	4%	5%	4%
	30-40	4	13%	12%	11%	16%	12%	13%
	40-50	5	16%	19%	22%	29%	21%	18%
	50-60	6	20%	24%	26%	24%	24%	22%
	60-70	7	20%	21%	17%	10%	19%	19%
	70-80	8	14%	9%	9%	9%	9%	12%
	80-90	9	3%	2%	2%	1%	2%	3%
	90-100	10	1%	0%	0%	0%	0%	1%
	Total		100%	100%	100%	100%	100%	100%
Function 1	10%	1	17%	19%	18%	18%	19%	18%
Production	10-20%	2	5%	7%	7%	4%	6%	6%
	20-30%	3	6%	9%	7%	9%	9%	7%
	30-40%	4	7%	10%	9%	12%	10%	8%
	40-50%	5	11%	11%	10%	15%	11%	11%
	50-60%	6	15%	15%	13%	13%	14%	15%
	60-70%	7	18%	15%	17%	15%	15%	17%
	70-80%	8	14%	10%	14%	9%	11%	13%
	80-90%	9	6%	3%	5%	5%	4%	5%
	90-100%	10	1%	0%	0%	0%	0%	0%

Variable	Description	Frequency Grades	Non-ESOP Firms	SIP Firms	ESOP _2014 Firms	Mixed ESOP Firms	ESOP Firms	Total firms
			Group 0	Group 1	Group 2	Group 3	Subtotal 1+2+3	Subtotal 0+1+2+3
			Total	100%	100%	100%	100%	100%
Function 2	10%	1	31%	18%	23%	20%	20%	26%
Technical +	10-20%	2	37%	34%	37%	34%	35%	36%
R&D + QC	20-30%	3	15%	19%	15%	16%	18%	16%
	30-40%	4	8%	8%	8%	11%	9%	8%
	40-50%	5	3%	7%	6%	4%	6%	5%
	50-60%	6	2%	3%	4%	4%	4%	3%
	60-70%	7	2%	4%	3%	5%	4%	3%
	70-80%	8	1%	3%	3%	3%	3%	2%
	80-90%	9	1%	2%	1%	1%	2%	1%
	90-100%	10	0%	1%	0%	1%	1%	0%
	Total		100%	100%	100%	100%	100%	100%
Function 3	10%	1	27%	29%	27%	27%	28%	28%
Management	10-20%	2	45%	48%	47%	52%	48%	46%
	20-30%	3	19%	18%	18%	14%	18%	18%
	30-40%	4	5%	3%	6%	5%	4%	4%
	40-50%	5	2%	1%	0%	1%	1%	2%
	50-60%	6	1%	0%	1%	0%	0%	1%
	60-70%	7	0%	0%	0%	0%	0%	0%
	70-80%	8	0%	0%	0%	0%	0%	0%
	80-90%	9	0%	0%	0%	0%	0%	0%
	90-100%	10	0%	0%	0%	0%	0%	0%
	Total		100%	100%	100%	100%	100%	100%
Function 4	10%	1	63%	56%	54%	50%	55%	60%
Sales	10-20%	2	15%	21%	24%	21%	22%	18%
	20-30%	3	8%	9%	10%	10%	9%	8%
	30-40%	4	3%	5%	5%	7%	5%	4%
	40-50%	5	3%	4%	2%	7%	4%	3%
	50-60%	6	3%	2%	2%	1%	2%	2%
	60-70%	7	2%	2%	1%	2%	2%	2%
	70-80%	8	1%	1%	1%	1%	1%	1%
	80-90%	9	1%	0%	1%	1%	1%	1%
	90-100%	10	0%	0%	0%	0%	0%	0%
	Total		100%	100%	100%	100%	100%	100%
Function 5	10%	1	88%	92%	91%	93%	92%	90%
Other	10-20%	2	6%	4%	4%	4%	4%	5%
Functions	20-30%	3	2%	2%	2%	2%	2%	2%
	30-40%	4	1%	0%	0%	1%	0%	1%
	40-50%	5	0%	1%	1%	0%	1%	1%

Variable	Description	Frequency Grades	Non-ESOP	SIP	ESOP	Mixed	ESOP	Total
			Firms	Firms	_2014	ESOP	Firms	firms
			Firms	Firms	Firms	Firms	Subtotal	Subtotal
			Group	Group	Group	Group	1+2+3	0+1+2+3
			0	1	2	3		
	50-60%	6	1%	0%	0%	0%	0%	0%
	60-70%	7	0%	0%	0%	0%	0%	0%
	70-80%	8	1%	0%	0%	0%	0%	0%
	80-90%	9	0%	0%	0%	0%	0%	0%
	90-100%	10	0%	0%	0%	0%	0%	0%
	Total		100%	100%	100%	100%	100%	100%
Region	Northern China	1	14%	15%	10%	12%	13%	14%
	Eastern China	2	44%	45%	46%	41%	45%	44%
	Center China	3	8%	7%	8%	7%	7%	8%
	Southern China	4	15%	22%	21%	33%	23%	18%
	North-east China	5	6%	2%	3%	2%	2%	4%
	North-west China	6	5%	3%	5%	1%	3%	4%
	South-west China	7	8%	6%	6%	4%	6%	7%
	Total		100%	100%	100%	100%	100%	100%
Assets Per Staff	<1	1	20%	20%	18%	21%	19%	20%
(In 10 ⁶ RMB)	1-2	2	31%	34%	30%	28%	33%	32%
	2-3	3	16%	18%	19%	20%	19%	17%
	3-4	4	7%	10%	10%	12%	10%	8%
	4-5	5	6%	6%	5%	5%	6%	6%
	5-6	6	3%	2%	2%	5%	2%	3%
	6-7	7	2%	2%	3%	2%	2%	2%
	7-8	8	2%	1%	1%	1%	1%	2%
	8-9	9	1%	1%	2%	0%	1%	1%
	9-10	10	1%	1%	0%	0%	1%	1%
	>10	11	11%	5%	9%	5%	6%	9%
	Total		100%	100%	100%	100%	100%	100%
Sector	Energy	10	3%	2%	1%	1%	1%	2%
	Materials	15	17%	13%	17%	12%	14%	16%
	Industrials	20	25%	25%	23%	26%	25%	25%
	Consumer	25	18%	17%	15%	15%	16%	17%
	Discretionary							

Variable	Description	Frequency Grades	Non-ESOP Firms	SIP Firms	ESOP _2014 Firms	Mixed ESOP Firms	ESOP Firms	Total firms
			Group 0	Group 1	Group 2	Group 3	Subtotal 1+2+3	Subtotal 0+1+2+3
	Consumer Staples	30	7%	4%	8%	7%	5%	6%
	Health Care	35	6%	10%	10%	7%	9%	7%
	Financials	40	4%	0%	1%	0%	1%	3%
	Information Technology	45	12%	26%	21%	29%	25%	17%
	Communica tion Services	50	0%	0%	0%	1%	0%	0%
	Utilities	55	5%	0%	1%	1%	1%	3%
	Real Estate	60	4%	4%	3%	1%	3%	4%
	Total		100%	100%	100%	100%	100%	100%

APPENDIX 4

Descriptions and proportions of observations in heterogeneity tests

ID	Groups	Description	Proportions	Total Obs.	ESOP firms	Non-ESOP firms
Different regions						
1	NorthernChina	Region Northern China	14.62%	17,543	16.03%	83.97%
2	EasternChina	Region Eastern China	41.50%	49,793	16.84%	83.16%
3	CentralChina	Region Central China	8.63%	10,360	15.16%	84.84%
4	SouthernChina	Region Southern China	16.85%	20,216	23.83%	76.17%
5	NorthWest	Region North-western China	5.40%	6,478	5.29%	94.71%
6	NorthEast	Region North-eastern China	5.40%	6,475	9.10%	90.90%
7	SouthWest	Region South-western China	7.61%	9,129	11.21%	88.79%
Total			100%	119,994		
Different industries						
1	Ind10	GICS sector_Energy	2.62%	3,144	6.68%	93.32%
2	Ind15	GICS sector_Materials	17.13%	20,549	12.56%	87.44%
3	Ind20	GICS sector_Industrials	23.49%	28,190	16.88%	83.12%
4	Ind25	GICS sector_Consumer Discretionary	16.32%	19,582	15.23%	84.77%
5	Ind30	GICS sector_Consumer Staples	6.44%	7,727	13.34%	86.66%
6	Ind35	GICS sector_Health Care	7.18%	8,615	21.16%	78.84%
7	Ind40	GICS sector_Financials	2.61%	3,136	2.30%	97.70%
8	Ind45	GICS sector_Information Technology	14.55%	17,456	29.26%	70.74%
9	Ind50	GICS sector_Communication Services	0.24%	282	30.85%	69.15%
10	Ind55	GICS sector_Utilities	3.78%	4,541	2.80%	97.20%
11	Ind60	GICS sector_Real Estate	5.64%	6,772	11.24%	88.76%
Total			100%	119,994		

ID	Groups	Description	Proportions	Total Obs.	ESOP firms	Non- ESOP firms
Different types of firms						
1	SHPrin	Big firms listed in Shanghai Exchanges (ISIN codes starting from "600")	42.62%	51,145	9.15%	90.85%
2	SZPrin	Big firms listed in Shenzhen Exchanges (ISIN codes starting from "000")	19.87%	23,842	7.22%	92.78%
3	SZSME	Small and medium enterprises listed in Shenzhen Exchanges (ISIN codes starting from "002")	24.56%	29,470	24.67%	75.33%
4	SZStartups	Start-up firms listed in Shenzhen Exchanges (ISIN codes starting from "300")	12.95%	15,537	37.77%	62.23%
Total			100%	119,994		
Different business situations						
0	Negative Performance (losses)	Negative situation when firms lose money	13.08%	15,691	9.13%	90.87%
1	Positive Performance (gains)	Positive situation when firms gain money	86.92%	104,303	17.36%	82.64%
Total			100%	119,994		

Appendix 5

Submission Report

1. Core-staff-based employee share ownership, new concept in China

(Chapter 1 in thesis)

Journal: Journal of Participation and Employee Ownership

Submission code: JPEO-02-2020-0006

Submission date: Feb. 27th, 2020

Reply: Modification

APPENDIX 6

Conference Participation and proceedings

1. ESOPs in the context of innovation: New concept developed in China

Conference proceedings (DIF-2019)

International Conference on Digital, Innovation, Entrepreneurship and Financing: Universitat Politècnica de València (ES), John Molson School of Business, Concordia University (CA), University of Jilin (CN),

December 2-3, 2019 in Valencia, Spain

2. ESOPs in the cycle of sustainability: Evidence of Chinese firms

Conference proceedings (ARTEM OCC 2020)

The 3rd ARTEM Organizational Creativity and Sustainability International Conference
Chemnitz University of Technology, CEREFIGE (ICN, University of Lorraine), University of Kwazulu-Natal, Kunstfabrik Palumbo-Donahue School of Business at the Duquesne University
Deutsch-Französischen Hochschule (DFH)/Université franco-allemande (UFA)

March 19-21, 2020, Chemnitz, Germany

(The conference was cancelled because of COVID-19, but conference proceedings have been print.)

3. Firm characteristics analyses: which type of firms have accepted risk-taking and implemented the core-staff-based ESOPs in china?

Participation in “Remember James March” Conference, organized by Management and Organization Review, University of Nottingham, Ningbo, China, June 17-19, 2018

Conference Proceedings 1

ESOPs in the context of innovation: New concept developed in China

International Conference on Digital, Innovation, Entrepreneurship and Financing (DIF-2019), December 2-3, 2019 in Valencia, Spain

Abstract

The power of science and technology has enormously altered the world we live in. However, the labor market is dramatically threatened by industrial revolutions. Human capital, defined as the knowledge, information, ideas, skills and health of individuals, contributes to economic growth together with physical capital. The high-commitment HR solutions like ESOPs, enable to align divergent interests in firms and enhance the efficiency of the introduction of new technology. Our paper focuses on Core-Staff-Based ESOPs, a new ESOP concept discovered in China. With specific big data skills, we explore the mechanism and performance of these new ESOPs in Chinese Hi-Tech firms.

Keywords: Technology Innovation, Human capital, High-Commitment HR solutions, New ESOPs in China, Performance in Hi-Tech firms

Extended Abstract

Since the first industrial revolution, the power of science and technology has enormously altered the world we live in, and opened a new page in the history of human civilization. However, a lot of manual work is being substituted by machinery, and the labor market is dramatically threatened by the forth coming industrial revolution. According to a study of the World Economic Forum announced in Davos in 2016, the rise of robots and artificial intelligence assumed a net loss of 5 million jobs by 2020 in fifteen leading countries. How can we respond to the challenges launched by technology innovations, defend our employment and create more value? This question actively attracts our attention both in academic research and managerial practice,

regarding innumerable fields such as human resources, finance, technology and sociology etc.

Human work is usually materialized as the labor in the process of production, being registered as variable costs in accounting. However, in Solow's model, a "residual" economic growth has been discovered beyond the accumulation of physical capital inputs, and it is explained to be generated by the knowledge creation and the augmentation of the labor input through education and training (Goldin C. 2016). From this, the concept of human capital has emerged (Mincer J. 1958, Schultz, Theodore W. 1961, Becker G. 1964). It is defined by Becker as "the knowledge, information, ideas, skills, and health of individuals". Even the innovation of technology, can be considered as one of the application results of human capital (Becker G. 1964).

Our paper focuses on the development of ESOPs in the context of innovation. The ESOP, Employee Share Ownership Plan, also known as the Employee Equity Ownership Plan, is a corporate finance approach that a company gives its shares fully or partly to employees working in their company (Shields & Brown, 2007). It enables to align divergent interests in firms, enhance employees' participation, create opportunities of equal dialogues between employees and employers, lower the turnover of working staff, reduce controlling costs, and improve firms' performance (Pierce, Kostova & Dirks, 2001; 2003; Pendleton 2006; Landau, Mitchell, O'Connell & Ramsay, 2007). Since the 1970s, more than fifty quantitative academic studies have been conducted in the US and the UK, among which two-thirds of findings have proved that a favorable relationship exists between employee ownership and employee attitudes and behavior (Kaarsemaker, Pendleton & Poutsma, 2009). Thus, with implementation of high-commitment HR devices like ESOPs, the efficiency of the introduction of new technology will be enhanced in a positive environment of the workplace.

However, double-side effects can be observed in ESOP firms during the promotion of technology innovation, because employ owners possess double identities both as firm owners and employees. In the common practice of broad-based ESOPs or total-

based ESOPs, more than 80% of working staff participates in ESOPs. When advanced production equipments controlled by automative devices are installed in the workplace, the employment of the majority of working staff will be naturally threatened. At this moment, almost all the employee owners will make a reasonable choice from their point of view, to protect employees' interests and fight against the introduction of new technology. In reality, the refusal of technological innovation will put firms into crisis due to intensive competition in the market. How to introduce new technology with high-commitment HR solutions and reduce labor's sufferance during technological evolutions, is challenging traditional ESOP frameworks in the context of a modern societal background. In order to create new ESOP designs and adapt to the evolution of environments, we should listen to diversified opinions and learn from the experience of others. For this reason, we fix our focus on ESOPs in China, that are flourishing along with economic reforms.

With information collected from 61522 announcements, we have discovered a new concept of ESOPs in China. Distinct from the popular devices practiced by western firms, the Chinese new ESOP is neither the broad-based ESOP nor the executive-based ESOP, involving senior executives, directors at the middle level and any other excellent staff that makes particular contributions to firms. We call it "Core-staff-based ESOPs". The participation of these new ESOPs is not accessible to total working staff but to the qualified working staff. Performance has been highlighted as a main criterion for the qualification of ESOP participation and the distribution of ESOP benefits.

The main method of information collection and analysis is the document reading. However, it is challenged by our sample size. For 3065 ESOP schemes, we have to search for useful information in documents of more than one million pages. In order to fulfill the task in the limited time and resources, we utilize specific application of big data skills in collaboration with computer programming companies.

Later, we have found the Hi-Tech label of ESOP firms through logit regressions (Pan, 2019). Among 1961 Chinese Hi-Tech firms, 1034 firms have implemented Core-

Staff-Based ESOPs. Based on this statistics, we conduct further analyses to compare the performance of ESOP firms and Non-ESOP firms working in the Hi-Tech field, and examine whether this new ESOP design has made contributions to Hi-Tech firms in China.

As Michael H. Hugos told us, *“We are sailors on an ocean of change and the organization we are part of are the ships we sail. We cannot sail against the prevailing winds, but we can learn to work with the winds and the waves and harness their energy to arrive at the destination we aspire to reach.”*

We hope that our findings will fill gaps in knowledge, clarify the truth behind stereotypes, provide insights and promote communication between the people with different ideas, so that we can achieve our final goals of learning and development in the context of continual and rapid evolutions brought by technological innovations.

Acknowledgments

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Hugos, M. (2009). Business Agility: Sustainable Prosperity in a Relentlessly Competitive World.

[https://wiki.businessagility.institute/w/CaseStudies:Human Resources versus Human Capital](https://wiki.businessagility.institute/w/CaseStudies:Human_Resources_versus_Human_Capital)

Conference Proceedings 2

ESOPs in the cycle of sustainability: Evidence of Chinese firms

The 3rd ARTEM Organizational Creativity and Sustainability International Conference

March 19-21, 2020, Chemnitz, Germany

(The conference was cancelled because of COVID-19, but conference proceedings have been print.)

Extended Abstract

As recommended by UN global compact principles, “sustainability begins with a principles-based approach to doing business.” Beyond the traditional view only focusing on economic development, systems thinking of sustainable development builds the framework of triple bottom lines, integrating economic, social, and environmental developments. Responding to the calls for sustainability, firms expand their aims. Instead of maximizing shareholders' gains, they should defend the interests of all stakeholders both inside and outside firms, including employees, suppliers, creditors, local communities, and other entities. In managerial practice, environmental and social audits have been introduced to assess social and environmental performance, in addition to financial performance.

However, firms struggle to survive in the competition of the market. Philanthropy, voluntary social participation with paid employees and other activities of social responsibility, will unavoidably increase firms' costs. Without enough financial incomes and supports of shareholders' capital, firms are not strong enough to fight in crises and upgrade themselves in trends of technological innovations. If firms fail and die, they cannot fulfill promises of social responsibility. Furthermore, their working staff will become unemployed and create more social problems for the whole society.

Faced with this conflict in firm management, can we find one solution to create a positive cycle of interactions between various types of performance? For example, the implementation of a specific mechanism can improve social performance. This

improvement will enhance financial performance. Meanwhile, financial performance provides more resource to support activities of social responsibility. Like a cycle, the implementation of this mechanism can reinforce the interactions of various factors and strengthen the whole system.

Based on this system thinking, our underlying thesis will examine various types of performance of ESOPs in China and their cycle effects.

The ESOP, Employee Share Ownership Plan, also known as the Employee Equity Ownership Plan, is a corporate finance approach that a company gives its shares fully or partly to employees working in their company (Shields & Brown, 2007). With the implementation of ESOPs, employees become firm owners, enjoying the same rights as the shareholders who contribute financial capital. Thus, the ESOP itself is one of the solutions to fulfill social responsibility, enabling firms to enhance employees' human rights and to facilitate the social mobility of employees. On the other hand, with the change of identity from working staff to employee-owners, their interest will be more firmly bounded by firms' growth. Thus, the conflicts of different interests due to Agency problems will be aligned with the implementation of ESOPs, enabling firms to lower the turnover rate of working staff, to improve the efficiency of firm management, and enhance firms' financial performance. Finally, with accumulated financial outcomes, individuals and firms can afford more social and environmental activities, and with more tax paid by individuals and firms, the government can provide better services for retired people, children, environmental protection and technology research.

To overcome free-rider effects and shaping effects existing in traditional models of ESOPs, Chinese firms put a new ESOP concept into practice: Core-Staff-Based ESOPs, which involves the participation of senior executives, directors at the middle level, and any other excellent staff that make particular contributions to their firms. Distinct from the standard practice of western firms, these ESOPs, neither broad-based ESOPs nor executive-based ESOPs, require employee qualifications for their participation. Some of them also require performance assessments for distribution of

ESOP benefits (Pan 2019).

All these ESOP qualifications and assessments introduce further competition among working staff in the workplace. We wonder if the implementation of Core-Staff-Based ESOPs will improve social performance for the whole working staff and any other stakeholders or reduce activities of social responsibility to maximize the benefits of shareholders and qualified employee-owners. Moreover, with possible gaps and conflicts between the qualified working staff and the unqualified working staff, we wonder if these Core-Staff-Based ESOP firms can achieve their goals and improve the firm's financial performance. Based on this thinking, we elaborate two hypotheses as below:

Hypothesis 1. The implementation of Core-Staff-Based ESOPs can improve the social performance of firms.

Hypothesis 2. The implementation of Core-Staff-Based ESOPs can improve the financial performance of firms.

For lack of information on pollution treatments of Chinese firms, the environmental performance research is limited in the current paper. We will continue this work in our future research.

There are numerous indicators to measure social performance as outlined by CSR guidelines or ISO 26000. In order to understand the attention of Chinese firms and select the most suitable variables, we carried out preliminary research based on Chinese firms' CSR reporting. In reality, very few Chinese firms publish independently CSR reports every year. However, about 900 listed firms out of a total of 3523 firms disclose their CSR activities in their annual financial reports. No matter which guideline they follow, among 5115 CSR disclosures during 2006-2016, 80% of announced CSR activities have focused on the protection of employees, 6% have focused on the benefits of customers and consumers, 6% have focused on the improvement of firms' CSR system, 4% have focused on the protection of environments, 3% have focused on the

protection of shareholders, and 0.43% have focused on the protection of creditors. To follow their logic of behavior and facilitate our quantitative modeling tests, we choose the "payroll paid" as our explanatory variable to measure firms' social performance. This indicator includes employees' wages, salaries, social welfare contributions, performance bonus, private insurance, health cares, employee training expenses, allowance for travel or food, syndicate expenses and other expenses for employee benefits. Also, we select the dichotomy variable of firm nature as our control variable: Non-ESOP firms will be marked as 0 and ESOP firms will be marked as 1. We will use panel regression models for social performance tests.

For Chinese ESOP firms' financial performance, certain previous studies have used various regression models for tests. Their results demonstrate that these ESOP firms have overperformed more than Non-ESOP firms during the periods, both prior and post-ESOPs. Here we meet a logic paradox: whether the firms who overperformed more than other firms have chosen the implementation of ESOPs or the firms have overperformed more than other firms thanks to the implementation of ESOPs? To resolve this problem on causality, we will utilize another method to compare financial performance between Non-ESOP firms and ESOP firms, prior and post-ESOPs. As a continual work of previous studies, we will use the same variables as others: ROE and ROA.

Our preliminary research firstly confirms that Core-staff-based ESOP firms have increased payroll paid for the whole working staff in firms. Secondly, nevertheless this new system has been legally introduced since 2005, the majority of firms fully implemented ESOPs after 2007 and met a serious of crises in their business environments: the global financial crisis in 2008, European difficulty on governments' bonds since 2009, China's growth slowing down since 2011, the crashes of the Chinese stock market in 2015 and 2016, RMB depreciation during 2017, Sino-American international trade war since 2018 etc. If we compared only prior and post-ESOP financial data, naturally we would make bias in observation: ESOP firms have

underperformed after the implementation of ESOPs more than before the implementation. However, if we draw a matrix between Non-ESOP firms and ESOP firms, prior and post-ESOPs, we can understand that the underperformance of ESOP firms in the period of post-ESOP is due to the impacts of environments. Because our test results support that ESOP firms have overperformed more than Non-ESOP firms in the same challenging environments and this overperformance between ESOP and Non-ESOP firms is more significant in the post-ESOP period than in the prior-ESOP period.

Therefore, both Hypothesis 1 and Hypothesis 2 are well defended. The implementation of Core-Staff-Based ESOPs can improve social performance and financial performance of firms. Also, the protection of employees, this specific focus of CSR activities of Chinese firms, has enhanced the participation of employees, not only of qualified employees but also of unqualified employees. Thanks to this participation, more information has been contributed to reduce the bounded rationality of decision-makers, lower staff turnover has enabled firms to conserve the know-how and enhance the R&D process, and more capital flux have flowed into employees' training and health care, resulting in generation of human capital. All these efforts develop specific competences of firms to support themselves under challenging crises. With positive interactions of triple performance, firms and individuals live better and contribute better to society, and this is the charm of humanistic management for sustainability.

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