# Diversity and Inclusion:

## How Can Board Capital Impact Firm Performance in China

### Dissertation

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# List of Abbreviations

BESC            Board External Social Capital

BHC             Board Human Capital

BISC            Board Internal Social Capital

BRIC            Brazil, Russia, India and China

CBRC            China Banking Regulatory Commission

CSMAR           China Stock Market and Accounting Research

CSR             Corporate Social Responsibility

CSRC            China Securities Regulatory Commission

ESG             Environmental, Social and Governance

GVCs            Global Value Chains

OECD            Organization for Economic Co-operation and Development

RKS             Ranking CSR Ratings

ROA             Return on Assets

ROE             Return on Equity

SASAC           State-owned Assets Supervision and Administration Commission

SOE             State-owned Enterprise

SSE             Shanghai Stock Exchange

SZSE            Shenzhen Stock Exchange

TVEs            Townships and Village Enterprises

WIND            Wind Financial Database

WTO             World Trade Organization

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# 1. Introduction: the Chinese Dragon Unleashed

In September 1982, Deng Xiaoping formally ended the Cultural Revolution and proclaimed at the XII Convention of the Communist Party of China that the country would no longer follow the old dogma. Now it would follow a special Chinese version of socialism that aimed to reunify with Taiwan and reach a per-capita income of US$ 1,000 by the year 2000. As a result, he ignited a course of economic development that pushed China to the head of a list of successful countries by the end of the 20th century and the beginning of the 21st century. In his "*Three Steps Theory*", he proclaimed that per-capita income should double in the next ten years and guarantee an adequate supply of food and clothing to the citizens of China. It should double again in the following ten years in order to guarantee a modest level of wealth and, finally, try to achieve convergence with countries with a moderate level of economic development by 2050. With growth rates over 7 % during the first two decades in question, he was able to fulfil his promise. However, by the middle of the second decade of the new century, the Chinese growth engine appears to have decelerated.

**Figure 1.1**: **The West and the Rest: China's Economic Rise**
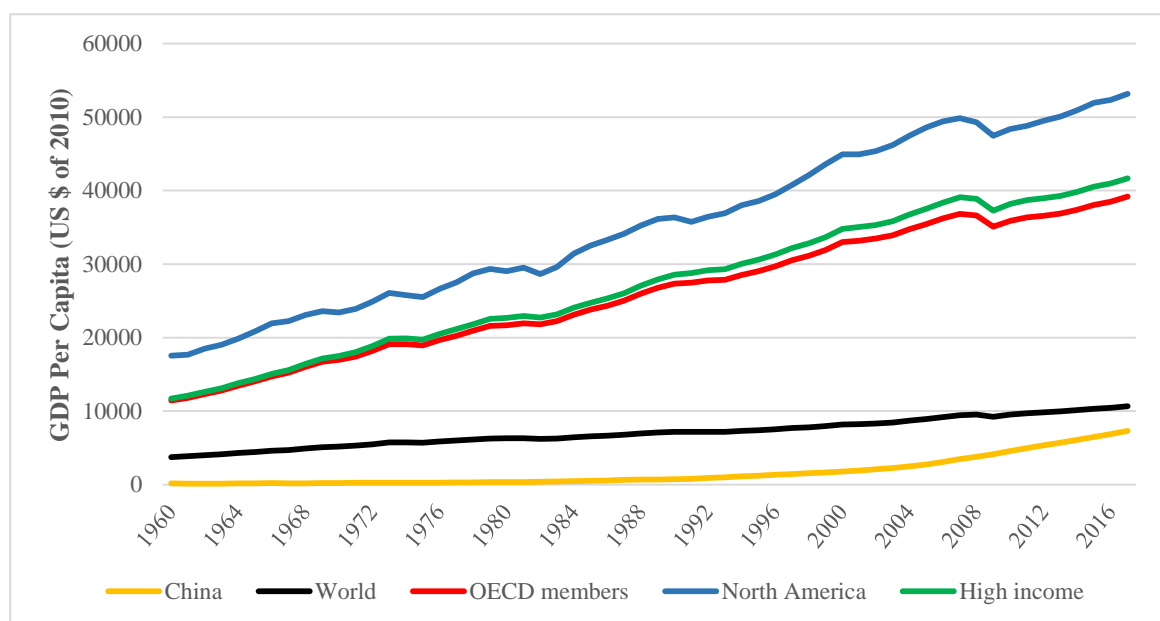


*Source:* update based on Blum (2017), Word Development Indicators

In fact, Figure 1.1 above shows that China has not yet caught up to the world average in terms of GDP per capita (to which it, in fact, belongs as a result of its large share in population).[1] The following Figure 1.2 presents the respective annual growth rate of GDP

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[1] The data in the graph is calculated based on constant 2010 US$ values and shows that, by 2014, China had reached about 50 % of the world's level of income. Based on PPP (Purchasing Power Parity), China surpassed US and became the world's largest economy in 2014 and reached a level of about 80 % of the world's average per-capita GDP.

per capita and documents the most important steps in China's industrial reforms. It reveals that every substantial reform was followed by a sizable acceleration of economic growth. Since the 1950s, China had continually adopted the Soviet centrally planned model, aiming to transform from a primarily agrarian economy into a modern communist society through industrialization and agricultural revolution. But the Maoist "Great Leap Forward" from 1958-1961 ended in a widespread famine and economic depression. Later, the 10-year Cultural Revolution almost destroyed the whole society. Accordingly, industrial growth was unstable even at a low level. In 1978, under the leadership of Deng Xiaoping, party leaders decided to gradually reform the economic system to increase the role of market mechanisms by reducing central planning and direct governmental control. From 1978 to 2001, China's GDP per capita grew at an annual average rate of 8.39 %. At the end of 2001, China joined the WTO, which boomed the economy by average annual growth of 10.18% until the global financial crisis hit in 2007. The number of people living in absolute poverty has been substantially reduced to 0.7% of 13.7 billion in 2015. In fact, through courageous reform and opening up, China was able to overcome its growth problems.

**Figure 1.2**: **China's Growth Rates vs. the Rest and its Economic Policy Assessment**
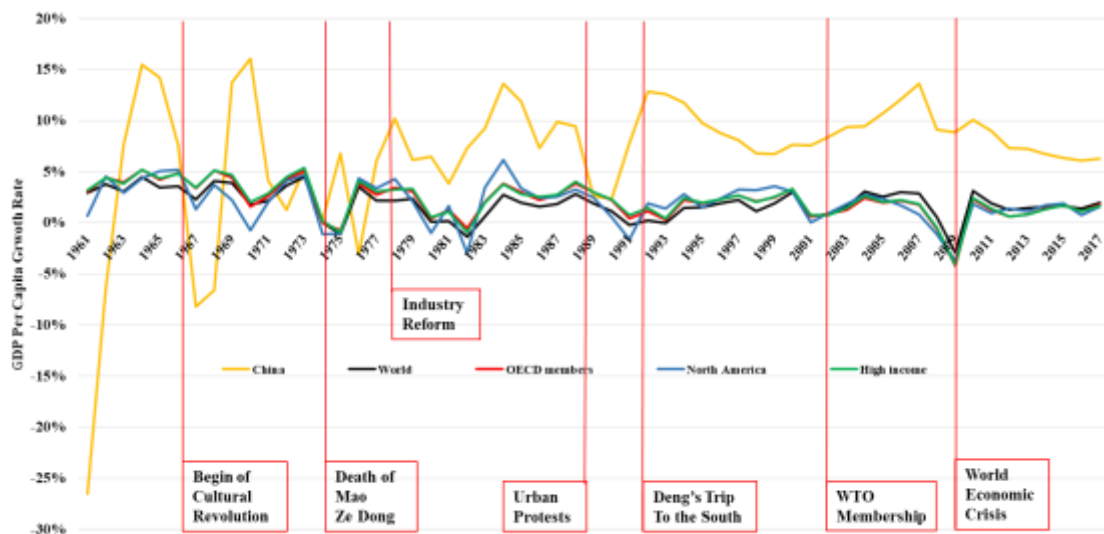
In regard of China's 40-year growth miracle, the intriguing question behind these analyses is, how rapidly can poor economies really catch up? And what can be the relevant drivers for sustainable growth in the future? Empirical evidence based on data of the world economy is bleak. Convergence seems to be a slow and laborious process. Areas that lag behind historically take a painfully long time to develop and some never reach levels that their neighbors regard as normal. Examples include southern Italy vs. northern Italy, certain parts

of the South compared to northern US states and, very apparent: many underdeveloped countries that seem to be caught in a trap. Even countries which seem to be successful and to have attained the level of emerging countries are not immune to relapses in their development, as demonstrated by the BRIC countries. In fact, as the work of Ferguson (2012) shows, there are important "*killer applications*" that explain the rise of the west compared to other areas in the world. This rise started after 1500 and is illustrated in the statistics of Maddison (2010) in Figure 1.3. Looking at Chinese data over the centuries, we realize that the dominance of the west from 1500 AD onwards was, to a very large extent, a result of Chinese development fatigue.

**Figure 1.3**: **The West and the Rest: 500 years of Economic Dominance**
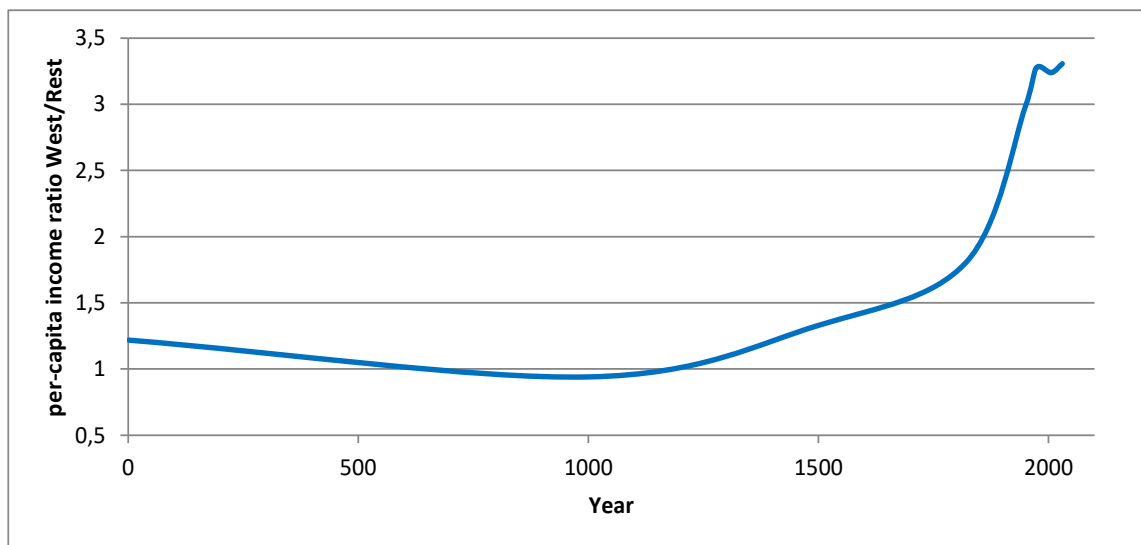


*Source*: Blum (2017), Maddison (2010).

In quantitative terms, Barro and Sala-i-Martin (1992, 1995) and Sala-i-Martin (1996) have estimated that averagely two percent of annual inter-regional per-capita income gaps are closed every year. This even applies to political systems with a strong system of "péréquation", i.e. a fiscal redistribution system that is horizontal, such as the European Community or the countries belonging to it that internally redistribute wealth. For instance, after an initial annual growth rate of around ten percent, which suggested "fast convergence" (Blum & Dudley, 1998), the eastern states of Germany have been unable to close the income gap over the last 20 years and stubbornly remain at 70 % of western levels (Blum, 2013a). Seemingly, we have to accept that large transfers, investments and even international capital flows do not offer much hope in accelerating convergence rates as long as human capital remains relatively immobile (Barro, Mankiw, & Sala-i-Martin, 1995). In fact, countries, like

South Korea, which invested most in their human-capital base, were the ones that experienced a sustainable growth rate over an extended period.

Institutions matter, especially institutions that promote and reward human capital building. A popular preference for investment over consumption has made the south of Germany a net investor in Germany's péréquation fund. Singapore has propelled itself into the future and has become a center of international trade and finance as well as a center of knowledge exchange. In regard of transition and developing countries, Qian (2002) points out that the real challenge of reform in transition countries like China is not so much about knowing where to end up (best-practice institutions) but about searching for a feasible path (transitional institutions) toward the goal, which is both efficiency enhancing and interest compatible. So to what extent has China's path into the modern world been propelled by institutional changes, especially those institutions that promoting the accumulation of intellectual capital?

Functioning as fundamental economic units of exchange and cooperation, firms play a pivotal role in economies. It's aware that good corporate governance makes contribution to financial market stability, investment and economic growth (OECD, 2004). Thus, it can be valuable to lift the veil of China's aggregate development in the past decades from the perspective of firms and diagnose the existing corporate governance problems that may hinter its long-term sustainable growth. Since China's reform and opening up in 1980s, in order to establish a modern enterprise system, the reform of corporate governance was at its core, in particular the reform of state-owned enterprises (SOEs). Until now, both external and internal corporate governance mechanisms in China have evolved by assimilating institutions and experience from the western industrial countries, for example, the establishment of capital markets, the introduction of two-tier board system and the appointment of independent directors. Some similar legislative and regulatory initiatives are already adopted, but subordinating to a fast-developing transition economy, Chinese corporate governance has its own perplexing features.

The corporate governance research agenda suggests that firm competitiveness depends on good internal corporate governance mechanism (e.g., board effectiveness), for example, whether board directors perform well by properly monitoring management on behalf of shareholders and providing resources (Hillman & Dalziel, 2003). Furthermore, to remain competitive in constantly changing circumstances, in which numerous innovations and new business models emerge day by day, good corporate governance is no longer just about

compliance. It's also important that corporate board is able to make right decisions at right time. The demand for flexible and dynamic governance is on the rise. Firms need right people on the board, who are eligible for efficient decision-making. Moreover, as collective action, board decision-making needs cooperation that built on the trust and respect among board directors.

Research on human capital as a source of firm competitiveness has largely focused on employees and top management. As the ultimate decision-makers, board members are assuming an increasingly important role in the firm. Correspondingly, we argue that board capital (i.e., aggregate of board directors' human and social capital) can be a source of firm's competitive advantage as well. So, what kinds of people (talents) are needed on the corporate board? It has puzzled worldwide policy makers, investors, corporations and other stakeholders for quite a long time, especially after the Enron and WorldCom scandal.

In the context of China, during the market-oriented enterprise reform, the modern enterprise system including the board of directors was brought into Chinese firms. Following with the changes of ownership structure in SOEs and the opening-up and reform in the whole economy, the board of directors has been reformed and played an increasingly important role in Chinese listed firms since it was introduced by company law in 1993. It is then interesting to inquire how board capital affects firm performance (e.g., firm growth, corporate social responsibility disclosure and corporate innovation) in Chinese listed firms.

The remainder of this thesis is structured as follows: Chapter 2 presents an overview of corporate governance in Chinese listed firms by illustrating some of its distinguishing features. In Chapter 3, bringing together insights from institutional theories, human and social capital theories and corporate governance research, we develop a conceptual framework for board capital. Chapter 4 empirically examines the relationship between board capital and firm growth. Then we discuss in Chapter 5 how board diversity changes the set of board capital, hence, influence corporate social responsibility disclosure and inquire how board capital contributes to corporate innovation in Chapter 6. Chapter 7 summarizes the main findings.

# 2. Diversity and Inclusion: Corporate Governance in Chinese Listed Firms

## 2.1 Market-oriented Enterprise Reform

Initiated in October 1978 in Sichuan Province, China's gradual and experimental SOE reform has always been a priority of reform in China (Qian, 2002). Since then, Townships and Village Enterprises (TVEs) and foreign investments were allowed to arise in China, which initiated the coexistence and competition of various forms of ownership. At present, according to the Chinese enterprise registration system, three major categories of firms exist: domestic firms, firms with funding from HongKong, Macao and Taiwan, and firms with funding abroad. Table 2.1 presents the existing types of domestic enterprises and their legal basis.

**Table 2.1: Enterprises Classification System in China (Domestic Enterprises)**

| Enterprise Type | Asset Ownership | Legal Basis |
| --- | --- | --- |
| State-owned Enterprise (国有企业） | Owned by state | Law on Industrial Enterprises Owned by the Whole People (1988); Law on the State-owned Assets of Enterprises (2009) |
| Collective Enterprise (集体企业) | Ownership shared by employees and other economic entities | Provisional Regulations on Urban and Township Collective Enterprises (1992) |
| Share Cooperative Enterprise (股份合作企业) | Shareholders are employees of enterprise; initial startup using some public funds | Provisional Regulations on Urban and Township Collective Enterprises (1992) |
| Joint Enterprise (联营企业) | Jointly invested by two or more enterprise legal persons or public institutions of the same or different forms of ownership | Provisional Regulations on Urban and Township Collective Enterprises (1992) |
| Limited Liability Corporation (有限责任公司） | Ownership based on capital contributions | Company Law (1993, revised 2005) |
| Shareholding Limited Corporation （股份有限公司） | Ownership based on shareholdings | Company Law (1993, revised 2005) |
| Private Enterprise (私营企业） | Enterprise established by a natural person or majority owned by a natural person | Provisional Regulations on Private Enterprises (1988); Law on Wholly Individually Owned Enterprises (2000); Law on Partnership Enterprises (1997, revised 2007); Company Law (1993, revised 2005) |

*Source*: Lardy (2014)

The reform of governance in Chinese SOEs can be viewed as a three-step process: corporatization, rearrangements of corporate control, and privatization (Qian, 1994). Using a chronological approach, key events related to China's enterprise reform in the past 40 years, including ownership and governance reform, are highlighted in Figure 2.2.

In contrast to the mass privatization of SOEs in Russia and other transition economies, China's gradual approach to SOE reform did not involve rapid and widespread privatization,

but minimal privatization. Among those SOE reform measures, the most successful are perhaps privatization of small-sized SOEs and layoffs of redundant employees in the mid-1990s under the slogan "seizing the large and letting go of the small (抓大放小) (Qian, 2002), which has transformed 80 percent of China's SOEs from state-owned entities to market players (Yao, 2018) and ended the permanent employment system in SOEs. The percentage of gross industrial output in SOEs has decreased from 80% in 1978 to 40% in 1994 and then 20% in 2016 (Figure 2.2). Nonetheless, SOEs still play an important role in China's economy, accounting for their disproportionate share of bank and non-bank credit (Lardy, 2014, 2019). As shown in Figure 2.1, the flow of bank credit to private firms collapsed after 2013, shortly after president Xi came into power (Lardy, 2019).

**Figure 2.1: Flow of Loans to Nonfinancial Enterprises by Ownership, 2010-2016**
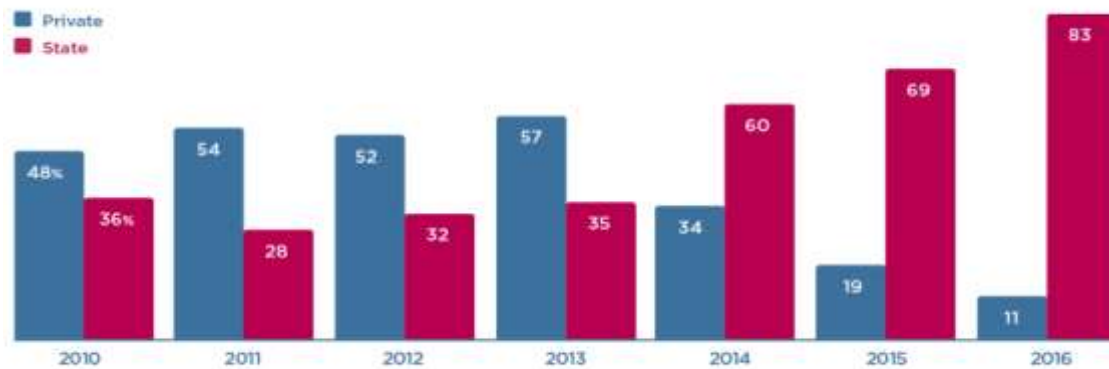


Note: not pictured are loans to collective, Hong Kong, Macau, Taiwan and foreign firms.

*Source*: Lardy (2019), China Banking Society

**Figure 2.2: Gross Industrial Output of SOEs and Enterprise Reform, 1978–2016**
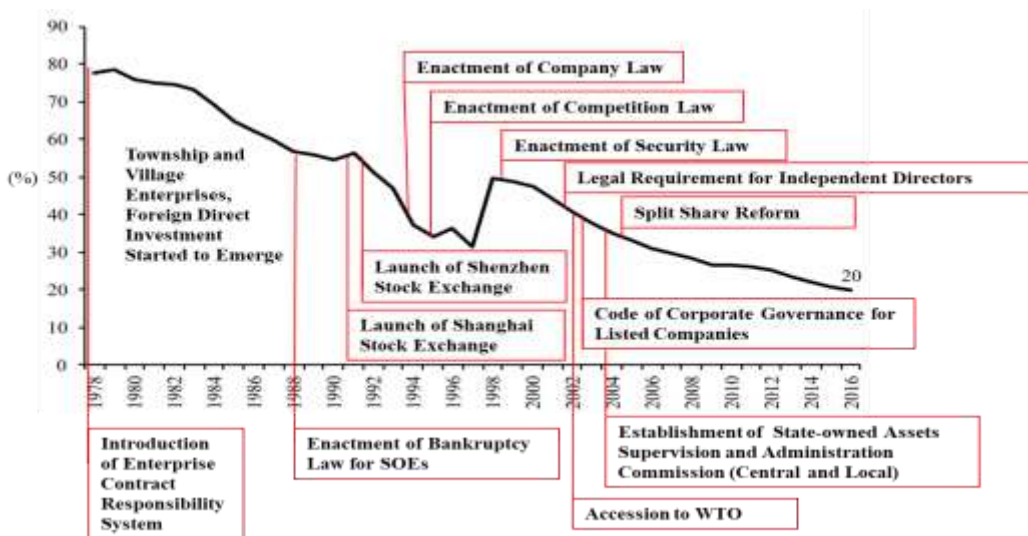


Note: Gross industrial output of SOEs is measured as the percentage of total gross industrial output

*Source*: own illustration based on Lardy (2018) and Tenev and Zhang (2002)

In detail, the corporatization of SOEs tries to separate the commercial function of SOEs from their administrative and social functions in the former planned economy and set up a modern enterprise system. The corporatization of SOEs has driven the change of China's financial system, as after 1986 some enterprises, including some large SOEs, started to issue stocks and the primary stock market started to emerge (CSRC, 2008, p. 4). As the number of stocks and investors increased in late 1980s, the need for secondary trading of stocks facilitated the launch of the Shanghai Stock Exchange (SSE) on December 19, 1990 and the Shenzhen Stock Exchange (SZSE) on July 3, 1991. By market capitalization, China's capital market is now the second largest in the world following United States. Figure 2.3 shows how the number of listed firms in SSE and SZSE and the total market capitalization have increased since 1990. By the end of 2018, there were 1450 and 2134 stocks that listed in SSE and SZSE respectively.

**Figure 2.3**: **Size of Stock Market**
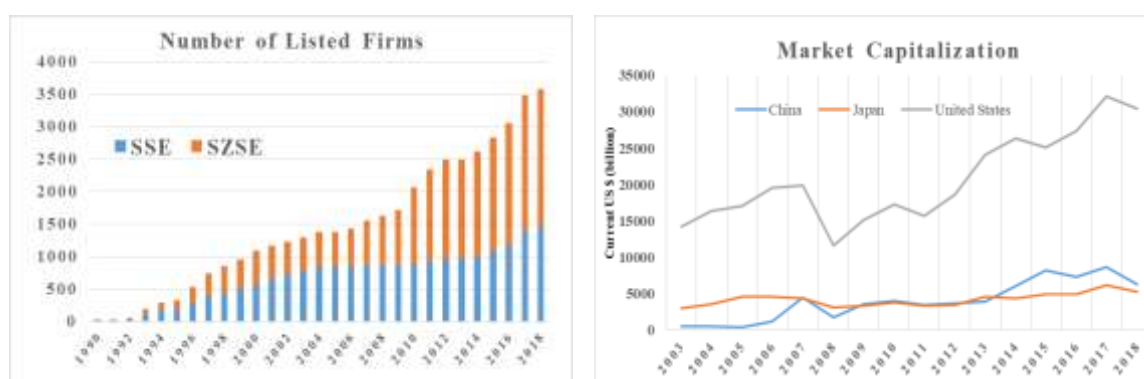


*Source*: own illustration, *National Bureau of Statistics of China* (NBSC) and *World Bank*

Alongside with corporatization, the structure of corporate control in listed SOEs started to change when new institutions representing shareholders (i.e., stockholders' meeting, board of directors, and board of supervisors) encounter with old institutions of social control (e.g., the party committee and the trade unions). The rule of law was then imported by imitating legal system in other market economies, for example, the first company law in 1993, the competition law in 1994 and the security law in 1999. After the accession to WTO in 2001, the Chinese corporate governance started to converge to the international standards. On January 7, 2002, China Securities Regulatory Commission (CSRC) and the State Economic and Trade Commission jointly issued the *Code of Corporate Governance for Listed Companies in China*. To deal with the overlapped control of corporatized SOEs by various government agencies, which leads to higher decision-making costs due to heterogeneous objectives (both organizational and social), the State-owned Assets Supervision and

Administration Commission (SASAC) [2]was established in 2003 as a representative body of state ownership in non-financial SOEs. Financial SOEs are in charge of by Ministry of Finance and Central Huixin Investment. Figure 2.4 describes the relationships among the central government, SASAC and Central SOEs; local governments, local SASACs and local SOEs.

**Figure 2.4: Relationship between Government, SASAC and SOEs**
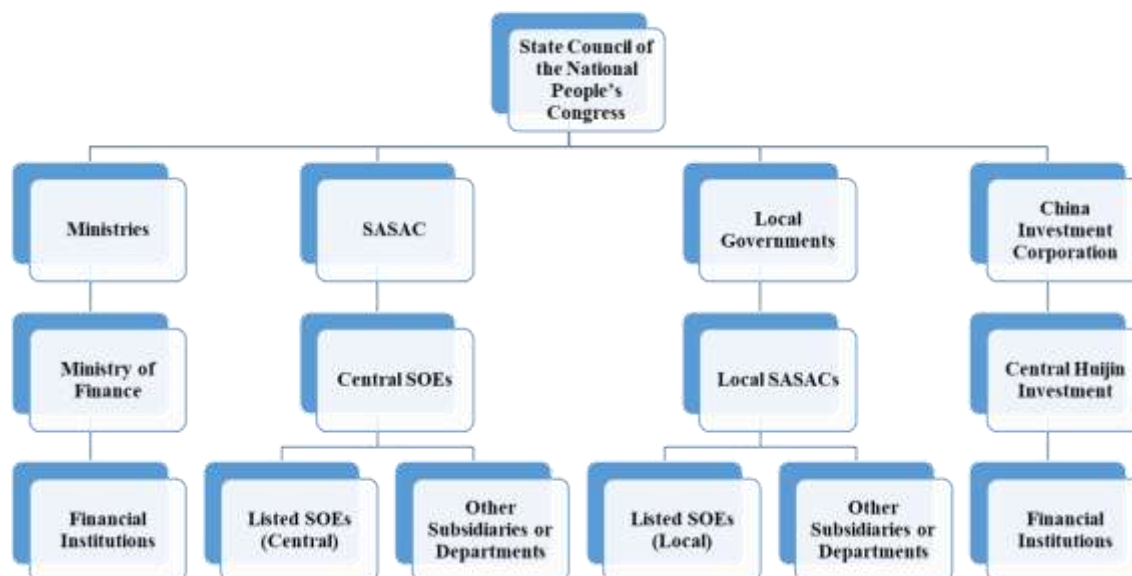


*Source*: own revision based on MSCI (2017)

The shareholding structure of Chinese listed firms comprises state shares, legal person shares, and individual shares. At the very beginning, to retain state control over firms, the stock market was designed with a split share structure, namely the coexistence of tradable (i.e., individual shares) and non-tradable shares (i.e., state shares and legal person shares). By the end of 2014, 64% of the total shares on Chinese stock market were non-tradeable, among which the state held 74% (Shi, 2007). As the majority shares were non-tradeable, the state owned unshakeable ultimate control on most of the listed firms at that time. In order to increase market liquidity and market efficiency while maintain state control, the spilt share reform began in 2005. By the end of 2007, almost all listed firms had established a set plan and a detailed timetable to gradually convert all non-tradable shares to tradable shares by compensating the minority shareholders for the dilution (Jiang & Kim, 2015).

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[2] SASAC itself supervises central SOEs, which are those owned and controlled by the Central Government; local SASACs supervise local SOEs, which are owned and controlled by the provincial governments.

All in all, even though many reforms have been conducted in the past decades, the concentration of ownership, especially in Chinese listed SOEs, still poses challenges for supervision, which requires good corporate governance mechanism to be in place.

## 2.2 Board Structure: A Mixture of Two-tier Board and One-tier Board

Corporate governance involves a set of relationships among a company's management, its board of directors, its shareholders and other stakeholders (OECD, 2004). Among them, boards of directors are often considered as the most important internal corporate governance mechanism. This thesis thus mainly focuses on the boards of directors in Chinese listed firms.

**Figure 2.5**: **Two-tier Board**                          **Figure 2.6: One-tier Board**
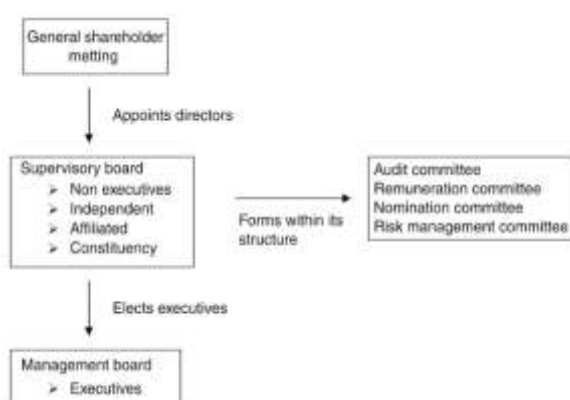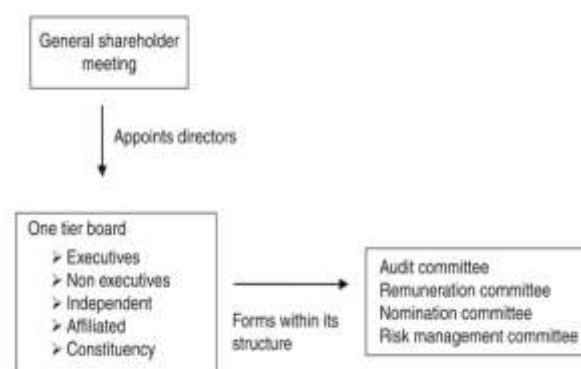


*Source*: Aluchna (2013b)                          *Source:* Aluchna (2013a)

Board structures and procedures vary among countries. The one-tier board representing shareholder primacy is the mainstream in Anglo-American world, whereas the two-tier board reflecting stakeholder primacy is widely used in continental Europe. In regard of internal supervision, with a one-tier board, the major power comes from the independent director system, but in a two-tier board system, supervisory board is responsible for management supervision. As documented by OECD (2004), some countries (e.g. Germany) have two-tier (dual) boards (e.g. Figure 2.5) that divide supervisory function and management function into different bodies, namely a "supervisory board" composed of non-executive board members and a "management board" entirely composed of executives. Some other countries (e.g. UK, USA) have one-tier (unitary) boards (e.g. Figure 2.6), which bring executive and non-executive board members into one board. In some countries (e.g. France), both types of board structure are allowed and the companies have the right to decide which model to adopt.

As reflection of institutions and environments in a transition economy, board structure of Chinese listed firms has its own puzzling characteristics. Belonging to a civil law system, China's 1993 company law formally introduced a board structure that more similar to the two-tier structure and mandated that joint-stock companies and limited liability companies should set up supervisory boards. In Figure 2.7, the Chinese-style internal corporate governance structure, which consists of shareholders' meeting, board of directors and board of supervisors, is seemingly a unique combination of a two-tier board and a one-tier board. In detail, the shareholders' meeting is the supreme corporate authority for decision making. The board of directors is the executive agency of the shareholders' meeting. Management is responsible for daily operation and management. The supervisory board, encompassing representatives of shareholders and employees (at least 1/3), has the same legal status as the board of directors and is mandated to supervise the behaviors of the board of directors and the management.

**Figure 2.7: Board Structure of Chinese Listed Firms**
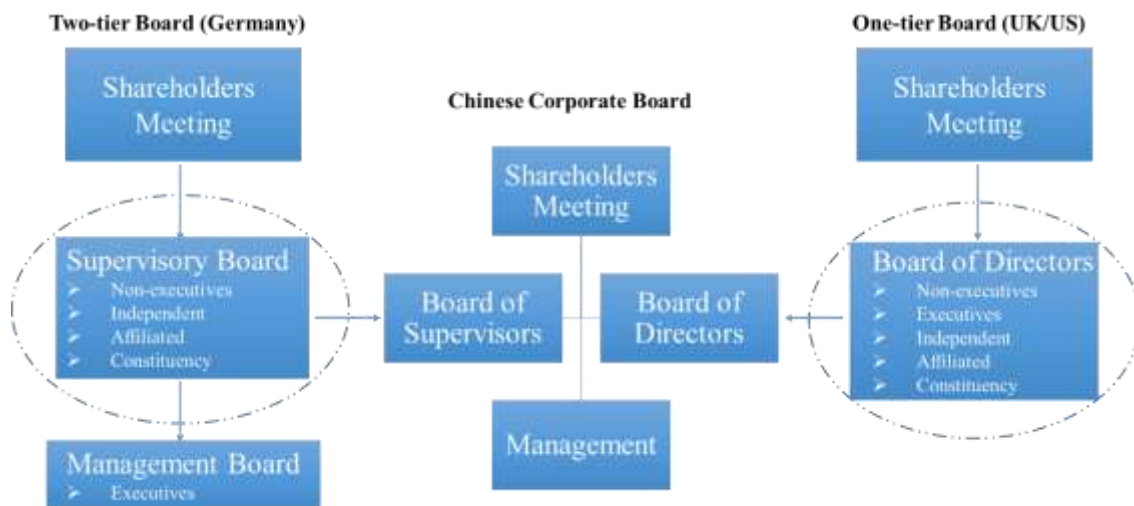


*Source*: Aluchna (2013b)          *Source:* own design          *Source:* Aluchna (2013a)

Since then, the activities of the board of directors were relatively standardized, while the functioning of the board of supervisors was generally conceived to be relatively poor. The board of supervisors in China is a unique mixture of China's communist concept of employees as masters of enterprises and the German-style supervisory board. But the Chinese company law does not stipulate that board of directors and management have to regularly report to the board of supervisors. Boards of supervisors tend to meet less often than the boards of directors, and their activities are less structured (Tenev, Zhang, & Brefort, 2002, p. 36). In addition, supervisors are not involved in the selection of directors and managers and have no means to discipline them. As a result, key decision-making powers

tend to be vested in informal mechanisms, and some institutions such as boards of supervisors have assumed largely decorative functions (Tenev et al., 2002).

In 2001, in order to strengthen board independence and thus enhance board effectiveness, the CSRC promulgated a guide to introduce independent directors to corporate boards in listed companies, in which the legal regulations require over one third of board members to be independent before 30. June 2003. Independent directors are required to provide their independent opinions on relevant issues to the board of directors and shareholders' meeting. Since December 2004, Chinese listed companies are required to disclose independent directors' concrete opinions on proposals from the board of directors, including the board's voting results, the names of independent directors who cast opposing votes or abstained from voting, and their reasons for doing so.

Independent directors are expected to alleviate two typical types of agency problems in Chinese listed companies. Firstly, to reduce conflict of interests between shareholders and management, independent directors are authorized by general shareholders to supervise the behaviors of management. Secondly, when large shareholders (e.g., the state) own a majority of shares, independent directors are responsible for supervising the behaviors of those large shareholders and thus protect the interests of minority shareholders. However, as shown in Figure 2.7, a collusion against shareholders is possible since independent directors are always nominated and appointed by large shareholders or management who also informally decide on their remuneration. Normally, independent directors are elected for a term of three years and a maximum of six years. Before the expiration of a term, they have the right to resign.

In fact, concerning the nature of selecting independent directors in China, independent directors, who are recommended or nominated by large shareholders and management, are able to receive more inside information in order to perform better. But due to their close relationships to insiders and their willingness to maintain current positions on the board, these independent directors may be no longer independent and prefer to make decisions that favoring large shareholders and the management. Under these circumstances, they are unlikely to carry out their designed supervisory duties and protect the interest of minority shareholders.

In reality, as the controlling shareholders usually want to have only the minimum number of independent directors on the board, Chinese boards do not have a majority of independent directors. The median fraction of firms' directors that are independent is about one-third,

which is exactly the legal requirement (Jiang & Kim, 2015). Moreover, the introduction of independent directors, which originates from the one-tier board system may generate additional supervisory competence. However, it may also trigger conflicts with the existing board of supervisors that adopted from the two-tier board system. The coexistence of supervisory board and independent directors may cause unintentional overlaps and even conflicts, which may frustrate the firm's ability to pursue monitoring objective. Effective enforcement also demands that the allocation of responsibilities for supervision is clearly defined so that the competencies of complementary bodies and agencies are respected and used most efficiently.

## 2.3  State Ownership and Political Connections

On the surface, board structure in Chinese listed firms seems to be complete now. But a fundamental dilemma of Chinese corporate governance stems from the state's mandate to maintain a full or controlling ownership interest in enterprises (e.g., listed SOEs) in several sectors (Clarke, 2003). As state is an abstract concept, it needs agents to execute its control power as a controlling shareholder in SOEs. Multilayer agency problems are likely to occur, for example, from the complex relationships of government agencies, holding companies of SOEs and listed SOEs. Moreover, before 2003, the control of SOEs were scattered in a variety of government agencies, which gave rise to overlapped control and inefficient supervision. Since 2003, on behalf of the state council (i.e., the central government), the SASAC starts to represent the state as the largest shareholder in non-financial SOEs. In addition to overseeing, regulating, and managing the assets of SOEs, SASAC is also responsible for appointing and removing top executives at SOEs, setting executive compensation at SOEs, reforming and restructuring SOEs, setting SOEs' operating budgets and undertaking other tasks assigned by the State Council (Jiang & Kim, 2015).

### 2.3.1  Insider Control

The reform of SOEs in China since 1978 has been struggling with the balance between increasing enterprise/management autonomy and sustaining state control. On one hand, the market-oriented reform appeals for more enterprise and management autonomy, but on the other hand, increased autonomy but inefficient supervision might lead to the problem of insider control, which was first coined by Aoki Tsuyoshi (1995) when examining transition economies.

Over time, China's SOE reforms have also resulted in a relative degree of insider control, as SOE managers have been gradually authorized considerable discretion over the use of state assets. In the vast majority of cases, the privatization of small and medium SOEs has resulted in the allocation of ownership rights to insiders such as managers and employees. The primary challenge becomes safeguarding the interests of minority shareholders, especially workers, against possible expropriation by managers who are also controlling shareholders. In other large corporatized SOEs, state remains as the controlling shareholder. The agency costs of increased management autonomy create various incentives for managers to maintain or acquire private benefits of control through on-the-job consumption and other rents related to investment and expansion (Tenev et al., 2002). Among these incentives, the tendency for overinvestment, short-termism and corruption is perhaps the most important from an economic view.

## 2.3.2   Tunneling: Another Agency Problem

Essentially, the most discussed corporate governance problem results from the primary agency problem: separation of ownership and control, an issue regarding the relationship between shareholders and management (Jensen & Meckling, 1976). Some scholars argue that this primary agency problem can be moderated by a large shareholder who has both the means and the incentive to monitor managers (Demsetz, 1983). However, in some countries like China, serious governance issues also arise from the expropriation of minority shareholders by controlling shareholders. Shleifer and Vishny (1986) detect that when the firms are controlled by large stockholders, the main challenge is no longer the conflict of interests between management and shareholders, but preventing controlling shareholders from exploiting minority shareholders. Johnson, La Porta, Lopez-de-Silanes, and Shleifer (2000) coin the term 'tunneling' to describe this kind of asset appropriation by large shareholders, who legally or illegally transfer assets and profits to themselves.

The tunneling problem has been recognized as serious agency problem in China by Chinese regulators. In fact, the ultimate controllers of Chinese listed SOEs are the state or the local government. Jiang and Kim (2015) point out that the Chinese government (both central and local) may not tunnel for private interests but for achieving political objectives such as maintaining surplus labor or overinvesting to sustain GDP growth. When Chinese SOEs go public, they usually only package their high-quality assets with the aim for spinoff listing instead of holistic listing. Accordingly, similar to tunneling behaviors, the related party

transactions between holding (parent) companies of listed SOEs and listed SOEs are not unusual in China.

### 2.3.3 Party Control Personnel

The most important implication of the dominant state ownership in Chinese listed SOEs is perhaps the government's control (i.e., the party's control) over SOEs through the appointments of management and board directors. In addition, China has largely strengthened its efforts on curbing corruption since early 2013, when President Jinping Xi came to power. On 3 January, 2017 and 27 May, 2017, SASAC (in charge of non-financial SOEs) and Ministry of Finance (in charge of financial SOEs) issued a guideline to include party building into SOEs' articles of association. They both emphasize the principle of Party Managing Cadres, while the communist party committee is supposed to have power to decide on nominating and appointing board directors and the management. In accordance with the guideline, when a SOE's board of directors makes decisions on important issues, it should first consult the firm's communist party committee. In principle, the chairman of the board and the secretary of the party committee should be the same person.

In addition, according to the existing regulations, i.e. Article 19 of the *Chinese Company Law* (revised 2018) and Article 5 of the *Code of Corporate Governance for Listed Firms* (revised 2018), Chinese companies, including listed firms, both SOEs and non-SOEs, are required to set up Communist Party committee in their organization, which means the state will continue its grip on enterprises, allegedly in non-SOEs and foreign enterprises as well.

The story of firms building political ties is not new. In some other countries, the number of public firms that hiring government officials on the board has also increased remarkably in recent years (Lester, Hillman, Zardkoohi, & Cannella, 2008). Although political ties that potentially increase rent-seeking opportunities are dangerous for the economy as a whole, it's hard to say whether they will benefit or harm the value of individual firms. The result may depend on whether the firm's short-term interests or long-term competitiveness is in focus. But from what we understand, political connections has played and will still play an important role in Chinese corporate governance, either informally or formally.

# 3. Board Capital

When shareholders select board directors, they have to know what kind of resources (e.g., skills, knowledge, experience or social networks) the board members will bring in and how this happens. On one hand, board diversity becomes the tendency in reality. Due to globalization, nowadays boards of directors are becoming more international in their makeup. In some countries, more female directors will seat on the board. On the other hand, regarding the complexity of the decisions taken by the board of directors, board diversity is increasingly in demand towards a fast-changing business world.

In fact, diversity is the phenomenon or the process, but inclusion is the ultimate aim. Having the right balance of human resources on the board is perhaps the most important for board effectiveness. Additional difficulty emerges when the optimal combination of human resources for various tasks of board decision-making is different, but frequent renewal of board directors is limited by regulations and also huge costs of time and money. It's almost impossible to build specific board for each type of decision-making. So, what and how can board of directors, especially a diversified board, contribute to firm performance?

## 3.1 Board of Directors and Firm Performance

In general, researchers explore the relationship between board of directors and firm performance in two ways: either focusing on the monitoring function or the resources provision function (Hillman & Dalziel, 2003). The first and most frequently used path is the agency theory which argues that the important mission of boards is monitoring firm's management on behalf of shareholders due to an information asymmetry between them. Effective monitoring activities could reduce agency costs and then increase firm performance. In this perspective, the issue why boards would like to monitor, or in other words, board incentives, play a key role. It relates to board independence, the concentration of shareholding and CEO duality. Among them, the most studied measure of board independence is the ratio of outsiders/independent directors (Zahra & Pearce, 1989).

The second and less investigated perspective is resource dependence theory (Pfeffer & Salancik, 1978), which demonstrates that board members are providers of business resources, including legitimacy, advice and connections to other partners or strategically relevant organisations (Hillman & Dalziel, 2003). Researchers consider the board capital as the

essential point, which contains personal characteristics of board members such as experience, expertise, education and social network.

Both theoretical perspectives are important and should not be isolated, because agency cost theory ignores the effects of human capital with the implicit assumption that independent directors are knowledgeable and competent, while resource dependence theory excludes interconnections, more precisely, agency costs caused by asymmetric information. Since many researchers obtain controversial arguments with agency cost theory and resource dependence theory, it seems that both of them have reached a bottleneck and could not reflect the relationship between board of directors and firm performance precisely (Shen, Zhou, & Lau, 2016).

New theoretical approaches are needed for future research. Resource dependence theory assumes that board members perform the two mentioned board functions individually instead of forming a collective. But in practice, board decision-making is a collective action, which may give rise to conflicts and needs cooperation, especially on a more diversified board. In this sense, the transaction cost theory (Choi, Park, & Hong, 2012) and institutional theory (Wright, Filatotchev, Hoskisson, & Peng, 2005) might be another ways to understand this issue. Some scholars (Lee & O'neill, 2003) believe that the applicability of agency theory should be reconsidered in different countries and cultural backgrounds. With regard to China, based on the discussion in Section 2, the distinct characteristics of state control and political ties (e.g., party control personnel in SOEs or hiring former political officials) in Chinese listed firms should not be neglected.

Thus, based on Hillman and Dalziel's (2003) conceptualizations, combining institutional theory, agency theory and resource dependency theory, Figure 3.1 develops a general structure to analyze the relationship between board of directors and firm performance. At the beginning, the institutional and historical backgrounds (e.g., legal system, political institutions, social and corporate culture) shape to some extent the board composition, which lays a foundation for further analysis on the relationship among board incentives, board capital, board functions and firm performance.

Firstly, due to agency theory and incentive theory, stronger incentives (e.g., promotion-based, compensation-based, reputation-based incentives and etc.) will motivate board directors to better fulfil their duties in monitoring management and perform better in providing resources to the firm, thus enhance firm performance. Consequently, we hypothesize:

*H1: Board incentive is positively associated with firm performance.*

Secondly, boards have heterogeneous board capital and vary in their ability to perform their due functions (Hillman & Dalziel, 2003). To perform their roles in monitoring and resources provision, board directors have to use their human and social capital (i.e., board capital). We argue that boards with higher level of board capital will have better access to qualified (wide and in-depth) information and more effective information processing for fulfilling their roles, which will improve firm performance. Accordingly, we hypothesize that:

*H2: Board capital is positively associated with firm performance.*

So, what pertains to board capital?

Generally, board capital is defined as the sum of individual directors' human and social capital, which represents the ability of board of directors to monitor the activities of management and provide resources (e.g., advice and counsel) to the firm (Hillman & Dalziel, 2003). The majority of literature examines board capital from two perspectives: human capital that refers to an individual's expertise, experience, knowledge, reputation and skills (Becker, 1964) and social capital, which is "the sum of the actual and potential resources embedded within, available through and derived from, the network of relationships possessed by an individual or social unit" (Nahapiet & Ghoshal, 1998).

**Figure 3.1: Model of Board Capital, Board Functions, and Firm Performance**
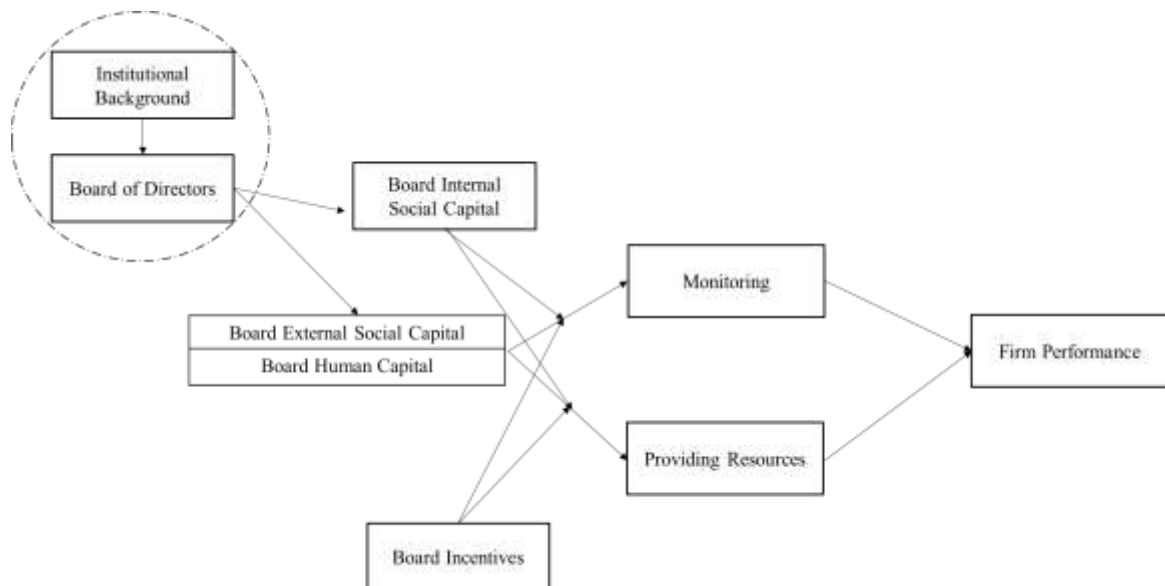


*Source*: own design based on Hillman and Dalziel (2003)

When it comes to board social capital, the majority of previous studies focus on board directors' external social network. Concerning the distinction between external and internal networks owned by board directors (Kor & Sundaramurthy, 2009; Pérez-Calero, Villegas, & Barroso, 2016), we further break down board social capital into two categories: board

external social capital (e.g., directors' industry ties through interlocks or political ties) and board internal social capital (e.g., generated from directors' co-working experience).

In the remainder of this chapter, to better understand how board capital affects firm performance, we summarize a conceptual framework for board capital. Three types of board capital: board human capital, board external social capital and board internal social capital are illustrated in detail. We also discuss each type of board capital with feasible quantitative measures in general and in the context of China. Furthermore, in Section 3.4, considering the interdependence of these three types of board capital, we discuss through which paths board diversity can transform board capital.

## 3.2 Board Human Capital

Human capital has been defined as the resources that are embedded within people from their investments in education and experience (Becker, 1962). Even though board directors individually may not possess a full set of skills and knowledge to meet a firm's demand in monitoring and resources provision, board of directors as a collective can group multiple perspectives together and pool directors' knowledge, skills and experience to reach the aim (Kor & Sundaramurthy, 2009). Accordingly, we define board human capital as a set of skills, knowledge and expertise that board directors collectively bring to the board (Kor & Sundaramurthy, 2009; Pérez-Calero et al., 2016) and hypothesize that:

*H2a: Board human capital is positively associated with firm performance.*

However, measuring board capital is far more complicated than individually measuring the human and social capital of board directors. Haynes and Hillman (2010) argue that board capital construct is composed of two dimensions: breadth and depth. Conceptually, building on the literature of group diversity, breadth of board capital is defined as the range or the scope of directors' educational, professional, social, cultural experiences and captures the diversity of directors' human and social capital. But different from Haynes and Hillman (2010) that define board capital depth as the embeddedness of directors in the firm's primary industry through interlocking directorships or other relationships, we define depth of board capital as how experienced are board directors in terms of specific types of board capital. It can be measured by the time board directors use to accumulate human and social capital, for example the schooling time, the tenure on the board and the length of service. We also distinguish board capital in stock from board capital in use. Figure 3.2 shows the board capital in use as a cube by adding the time dimension. The reason to do so is: in practice it

is the board capital in use that ultimately determines the extent to which board directors fulfill their board functions and thus contribute to firm performance. It's then important to take the time dimension into account, which refers to the time directors contribute to the firm (i.e., how often directors attend board meetings).

**Figure 3.2: Board Capital in Use as a Cube**
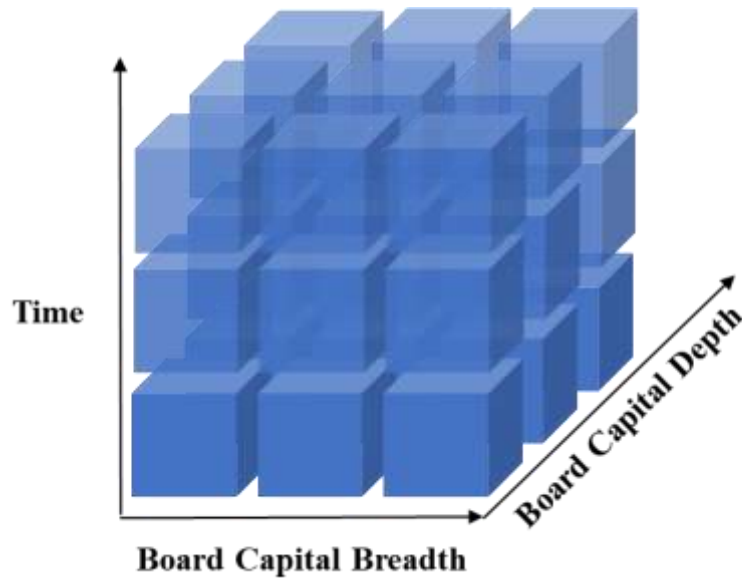


We hereby define board human capital in stock as a composite of board human capital breadth and depth (BHC breath, BHC depth). In mathematical language:

Board human capital in stock=f (BHC breadth, BHC depth), and

Board human capital in use=f (BHC breadth, BHC depth, time)

Next, we break down the types of board human capital according to its two main sources: education and experience.

### 3.2.1 Education

Education is often regarded as a factor related to general human capital. Higher level of formal education will promote board directors' ability to process complex information quickly and their participation in the firms' strategic decision-making (Carpenter & Westphal, 2001). A quite impressive body of literature has identified that more highly educated people are better able to find creative solutions to help the firm they represent (Wincent, Anokhin, & Örtqvist, 2010). Accordingly, to measure the education level of board directors, researchers frequently use the number of years of schooling (Carpenter & Westphal, 2001) and the ultimate academic degree attainted by directors through

schooling, college education or advanced education, for example, a university degree (Wincent et al., 2010) or a doctoral-degree (Dalziel, Gentry, & Bowerman, 2011).

### 3.2.2 Experience

As well as examining the education level of board directors, the previous research focuses on the experience of directors as well. In general, age can be an indicator of experience, career expectation and risk attitude (Golden & Zajac, 2001; Platt & Platt, 2012). Concerning the experience perspective, older directors have employed longer time to acquire experience than younger directors.

More specifically, some other studies focus on the specific human capital that derive from directors' certain experience, such as functional, professional, industry-specific, firm-specific and cultural experience. Carpenter and Westphal (2001) find that if boards have experience for a particular task facing the firm (e.g., an acquisition bid) or specific expertise (e.g., management experience or professional experience) that allowed them to better understand the inner workings of the firm, monitoring is improved. We summarize the types of experience that important for board directors to fulfill their roles as follows:

*Functional Experience.* Experience with performing a certain function/task provides directors the opportunities to improve their task-related expertise, which enables them to better supervise management or provide advices in similar situations (e.g., hiring a CEO). Board directors' functional experience includes for example, managerial/CEO experience (i.e., experience of being CEOs at other firms), director experience (i.e., experience of being board directors at other firms) and entrepreneur experience (i.e., experience of being entrepreneurs).

*Professional/Occupational Experience.* Board directors acquire different knowledge and skills from their professional experience. Diversity of professional backgrounds, which refers to a board with directors from different professional backgrounds (business, finance, law, engineering, science etc.) or a board with certain directors that have worked in different professional areas, will contribute to the breadth of board human capital. A diversified and complementary knowledge set helps the firm to deal with the uncertainty both in external or internal environment and may prevent some fatal events from coming.

*International Experience.* The internationalization of firms has led boards of directors becoming more international as well, which is particularly prominent since the early 2000s (Estélyi & Nisar, 2016). Board internationalization has two main sources: the presence of

foreign directors and national directors with experience of studying or working abroad (Oxelheim, Gregorič, Randøy, & Thomsen, 2013). Accordingly, the international experience on the board can be measured as the ratio of foreign directors or the ratio of directors (including both domestic and foreign directors) who have been educated or worked abroad. The firm with increased board internationalization may have benefit from enriched international experience but suffer from culture shocks as well. In the context of international expansion, adding foreign directors or national directors with experience of studying or working abroad to the board contributes to the breadth of board human capital. However, having foreign directors may hinder board meetings due to the difficulties of communications (e.g., languages), the distance of values and foreign directors' insufficient knowledge of local rules and institutions (Hooghiemstra, Hermes, Oxelheim, & Randøy, 2019). This poses challenges for building board internal social capital (will be discussed in Section 3.3.2) and thus hampers board effectiveness.

*Industry-specific Experience.* Board directors acquire kinds of knowledge, skills and expertise from their current and previous professional experience. In terms of industry-specific experience, board directors who previously or currently work in the industry in which the firm operates will have accumulated some solid knowledge structures and tacit knowledge to better understand how the industry works (e.g., technological trends, business opportunities, regulations). They can thus better evaluate the management's performance and bring critical resources to the focal firm, which is likely to improve the depth of board human capital. In addition, by working in the industry, directors may develop reputation and connections to industry players (suppliers, distributors and customers), through which the firm's board external social capital will be enriched as well.

*Firm-specific Experience.* The length of the directors' tenure on the board is an important indicator of accumulating firm-specific experience. As firms differ in the set of resources they need and how they manage, directors' firm-specific knowledge acquired through their experience of seating on the board is a key factor for making right decisions (Pérez-Calero et al., 2016). During their tenure on the board, directors will develop specific skills and tacit knowledge about how the board and the firm operate, which enhances their ability to perform their roles (Kor & Sundaramurthy, 2009).

## 3.3 Board Social Capital

Social capital, also known as relational capital, refers to an individual's ability to access resources through a network of relationships (Burt, 1992). In the context of board social capital, it refers to directors' ties to other strategically important parties or individuals that may help the board obtain and mobilize critical resources. Depending on the distinct functioning mechanisms of board directors' external and internal (i.e., intraboard-level) ties, we examine board social capital from two dimensions: board external social capital and board internal social capital

### 3.3.1 Board External Social Capital

Board external social capital can be defined as the degree to which board directors have contacts with the external environment (Kim, 2005). Firms are not closed systems and their success depends largely on their ability to respond to external environment and extract valuable resources from it (Pfeffer & Salancik, 1978; Wincent et al., 2010). In this sense, the primary function of board external social capital is to link the firm to the external institutional environment for pursuing valuable information, financial resources and other critical resources, which could be a source of firm's competitive advantage (Pérez-Calero et al., 2016). Consequently, we hypothesize:

*H2b: Board external social capital is positively associated with firm performance.*

Similar to the approach used by board human capital, we define board external social capital (BESC) in stock as: board external social capital in stock=f (BESC breadth, BESC depth), and board external social capital in use=f (BESC breadth, BESC depth, time).

In the literature, the most studied types of board directors' external ties include:

***Interlocking Directorates Ties.*** Used as a proxy for board external social capital, interlocking directorates ties refer to board's directorship ties to other corporate boards through interlocking, which can be calculated as the total number of board directorships hold at other firms divided by the board size (Ortiz-de-Mandojana, Aragón-Correa, Delgado-Ceballos, & Ferrón-Vílchez, 2012).

The knowledge and expertise (e.g., familiarity with board's decision-making and management issues) that directors acquire by serving on other corporate boards are valuable for them to fulfill their roles more effectively (Hillman & Dalziel, 2003; Tian, Haleblian, & Rajagopalan, 2011). Being better connected to other corporate boards will enrich the board's timely information about environmental events, technological trends and business

opportunities, which may help disperse or decrease the uncertainty in front of the firm. In other words, the influence of interlocking directors varies, depending on the type of resources that director interlocks transfer to the firm. Thus, the selection of specific director interlocks become very important to reach the firm's strategic goals (Ortiz-de-Mandojana et al., 2012).

***Political Ties.*** Government is a critical source of external interdependency and uncertainty for business that may affect firm's decision-making (Hillman, 2005). Given the uncertainty government regulation creates and firms' dependency on government, many firms have sought to establish links with government through their boards, for example, appointing former or current government officials to the board of directors (Hillman, 2005; Lester et al., 2008). The intention of having current officials is somehow direct. It may reduce regulatory risk and facilitate access to financial resources like bank loans and government subsidiaries. Moreover, having former government officials as "government insiders" on the board can have better access to information about political decisions and potentially provide superior access and/or influence with current government officials (Lester et al., 2008).

### 3.3.2   Board Internal Social Capital

In addition to board directors' ties to external environment, networks of ties within the board can facilitate the social negotiation and cooperation on the board, allowing the board to function and lead to trust through interaction. Board internal social capital is thus generated through directors' co-working experience (e.g., the tenure on the board), which also allows board directors to develop firm-specific knowledge.

In his seminal book, Fukuyama (1996) notes that trust is the most important factor behind human and economic development. Based on the work of Adler and Kwon (2002), board internal social capital involves a bonding form of social capital that derives from the linkages of board directors, especially those bringing internal cohesiveness to the board and facilitating the pursuit of collective goals. When board directors function as a cohesive group, within close ties, they are able to exchange, combine and make use of the knowledge, experience and external resources that acquires through the human and social capital of each director to a greater degree (Hillman & Dalziel, 2003). Accordingly, we hypothesize that:

***H2c:*** *Board internal social capital is positively associated with firm performance.*

It's therefore valuable to understand how internal social capital is developed on the board and how it influences cooperation on the board. We attempt to merge these ideas by arguing

that board's decision-making is a common good of the board or the firm – or more precisely: a club good – generated by employing resources under conditions of asymmetric information that has to be overcome by trust. For the matter of simplicity, it is assumed that board members possess different qualities that they may either signal or not. If these signals are accepted as trustworthy, a cooperative strategy emerges, otherwise non-cooperation is the outcome. It may, however, be so inefficient that board members may learn and build-up trust over time, thus taking up the idea of indefinitely repeated games.

In case of a prisoner's dilemma, the two-sided non-cooperation would be the Nash equilibrium which would be socially and, in terms of Pareto-efficiency, inferior. In case of a chicken game, one-sided non-cooperation may result. Only if an assurance game is played, the optimal value of efficiently exploiting human and physical capital can be obtained.

In this game, the question arises, what are the factors that drive cooperation and what factors may result in inefficient outcomes? Following Heckathorn (1989) and Blum and Dudley (2001), four cases are especially important to assess:

- The prisoner's dilemma: in this case of two-sided non-cooperation, the outcome is a Nash equilibrium, which is socially and in terms of Pareto-efficiency inferior;

- The chicken game: in this case of a one-sided non-cooperation, the result, however, is to no avail. Differences arise because of levels of signaling effort invested by one party and not by the other party;

- The assurance game: if it is played, the optimal value of efficiently exploiting human capital can be obtained, which is also true;

- The social optimum.

A more detailed discussion will be elaborated in Chapter 6, where the issue of how board internal board capital impacts board decision-making regarding innovation strategies is empirically examined.

## 3.4 The Issue of Board Diversity

In addition to the intense discussion on board independence, board diversity becomes recently a hot issue. While the stereotypical corporate board is male, pale and stale, gender quota on corporate boards, starting from Norway in 2008, is now on the agenda of some

western European countries. Though gender diversity is important, it may be not the only dimension of board diversity that deserves attention.

Indeed, diversity of thought on the board is crucial for long-term success of the businesses, but individuals who bring diversity into the board are by nature different from each other in terms of age, gender, religion, ethnicity, disability, education, national origin and social networks. Accordingly, board diversity is a double-edged sword, while trust and respect among board directors are necessary for instilling inclusion, resilience and flexibility on the board. The key question about board diversity is to understand in which paths board diversity can influence the makeup of board capital. Whether board diversity improves board effectiveness depends on to what extent diversified types of board capital can be coordinated efficiently.

With the help of the framework for board capital, I develop a conceptual model in Figure 3.3 to explain how board diversity can influence the forming of board capital. As diversified boards have kinds of knowledge, skills, experience, industry ties and ties to other strategically important entities to reach valuable resources outside the firm, board diversity will increase the breadth of board human capital or board external social capital or both, depending on the sources of diversity. On the other hand, according to our analysis on board internal social capital, increased board diversity leads to a larger portfolio of diversified opinions on the board, which may create conflicts. If the existing board internal social capital is not enough to overcome those conflicts, the cooperation on the board may fail, which will further decrease board internal social capital.

**Figure 3.3: Model of Board Diversity and Board Capital**
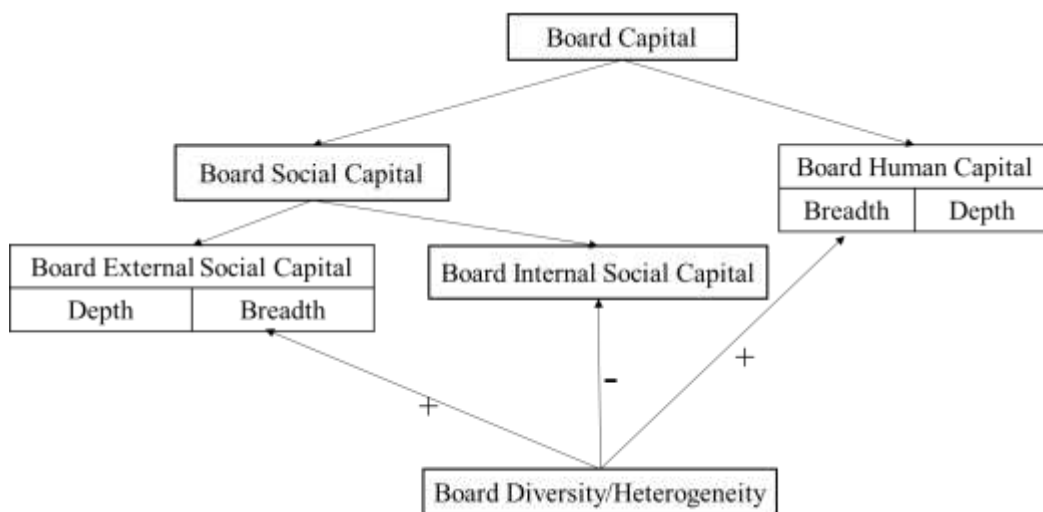
# 4. Board Capital and Firm Growth

## 4.1 Introduction

In Chapter 1, we have reviewed China's economic growth in the last 40 years. With respect to Deng Xiaoping's proclaimed convergence with the industrial world, we will assess China's potentials for future economic development. Three perspectives are usually followed, two that are primarily spatial and one that is structural:

- At the national level: in our case, China against the rest of the world.
- At the regional level: in our case, the convergence among provinces.

In their seminal paper from 1992, Barro and Sala-i-Martin initiated research following this trajectory.

- At the firm level: i.e. their convergence and, thus, contribution to the two overarching levels of growth analysis.

So far, this level of research has played a minor role and in this chapter we will inquire as to whether it has a theoretical basis and examine what factors drive firm growth.

As an organizational phenomenon, firm growth is shaped by strategic decisions that are formulated and implemented by managers as they interact with the firm's resources (Penrose, 1959; Pettus, 2001). Departing from the different perception and handling of risk by individual management, we turn to a Chinese perspective and find that one of the major factors in differentiated firm growth is the supervisory structures which are meant to reduce information asymmetry. Specifically, in Chinese listed firms, environmental uncertainty is positively related to investment deviation (Shen, Yu, & Wu, 2012). If this coincides with changing external conditions, i.e. states of nature or external shocks, management is prone to ascribe its failure to unfavorable and incontrollable circumstances. Under this veil of opaqueness, it may pursue private interests rather than the interests of its shareholders. Management, powerful supervisory boards, and controls by shareholders, outside financial institutions and stakeholders, can only partly alleviate this. In addition, as Li, Qian, and Wang (2005) and Jiang, Lee, and Yue (2010) observe, a major problem of Chinese listed companies is tunneling, in which large shareholders erode the interests of small shareholders (Lemmon & Lins, 2003).

Improved external supervision, such as split-share reform, legal regulation and media-enforced transparency, will increase the erosion cost so that the possibility of interest collusion goes down (Li & Shen, 2010). In the meantime, an efficient board of directors plays a significant role in internal supervision. Recent research mainly discusses static board attributes, such as gender diversity (Adams & Ferreira, 2009; Farrell & Hersch, 2005), educational and professional background (Fich, 2005; Rosenstein & Wyatt, 1990), CEO duality (Carpenter & Westphal, 2001; Shivdasani, 1993), and tenure (Johnson, Hoskisson, & Hitt, 1993; Singh & Harianto, 1989; Westphal & Zajac, 1995). However, based on Chinese listed firms, Ye, Zhu, Lu, and Zhang (2011) find that independent directors are more likely to vote against management proposals when firms perform poorly, and firms with dissenting directors enjoy a higher market value. This underpins the significance of outside directors in supervising management's behaviors.

In addition, Chen and Feng (2000) find that state ownership has negative impact on firm performance. As international openness matters with respect to participation in international trade, education and, most importantly, market entry (especially foreign direct investment) (Brandt, van Biesebroeck, & Zhang, 2012; Chen & Feng, 2000), this may partly explain the disadvantage of state ownership. Jefferson, Rawski, and Zhang (2008) see a large share of the productivity development of firms reflected in entries and exits. This reinforces the theory that a large part of economic development in Asia relates to the transition of employment from lower to higher productivity industries. Wang and You (2012) shed another light on private-state differences in China: under conditions of underdeveloped financial markets, corruption may be positive for growth, especially if, as Guariglia, Liu, and Song (2011) observe, private firms face stronger constraints than SOEs that can directly access supportive institutions.

Boards of directors are expected to play an active role by supervising the management and providing advices towards strategic decisions, but in the context of China, where informal institutions interact closely with formal institutions, the functioning of institutions that similar to advanced countries may be distorted. Conducting an empirical analysis of convergence model in this chapter, we try to understand how boards of directors involve in strategic decision-making that relevant to firm growth in Chinese listed firms.

## 4.2  Survey of Literature

We first look at papers that explain growth disparities at the level of the firm, industry, cluster and overall economy. We proceed by inquiring about what corporate analysis can learn from economic analysis. Our survey excludes all papers that become specific components of the theoretical arguments put forth in Section 4.3.

### 4.2.1  Explanation of Divergent Growth

There is a large body of analyses on the determination of growth and regional disparities in economic literature. Recently, interest in institutional factors has increased, especially with regard to the factors that have changed the long-term mentalities of groups of populations, which can be found in the work of Acemoglu and Robinson (2012). In fact, the institutional factor started moving to the forefront of discussion with the seminal work by Friedrich List (1841) on the institutional factors that determine the wealth of national economies – to a certain extent an antithesis to Adam Smith's Classic *Wealth of Nations* (1776). In an environment of high economic development, a common set of institutions and a homogeneity in production factors, savings rates (Solow, 1956) and stock of human capital (Romer, 1990) are the most important drivers of wealth. In fact, the law of diminished returns suggests that convergence among regions is reinforced when the productivity of investment eliminates interregional differences (Ramsey, 1928).

On the path of development, flexible labor markets and the necessary institutional framework guarantee a steady flow of workers from low-productivity to high-productivity sectors (Lewis, 1954). This, however, may be retarded by the adaptability of the workforce, which would need to acquire new skills in new industries. Thus, Lucas (1988) saw the challenge of encouraging this transfer and providing the appropriate signs of productivity in order to form credible signals. In many cases, this shift from low- to high-productivity sectors is regarded as being what initially propelled developing countries along their path of becoming emerging countries, especially in Asia, but also during the Soviet era. However, simply multiplying existing higher-productivity sectors limits growth and ultimately leads to stagnation, as the Soviet Empire was forced to realize. In fact, as Lucas (1990) points out, heterogeneity of human capital may be a decisive factor in explaining non-convergence between rich and poor countries. Thus, countries may converge to form their own steady states (Quah, 1996) or diverging convergence clubs. Policy intervention may have a limited impact if investments or transfers are confronted by the economy's limited absorptive

capacity, thus mostly generating inflation and a revaluation of the currency instead of income. This is known as "Dutch Disease", an effect of natural gas revenues that leads to an endogenous de-industrialization which is well documented for Eastern Germany (Blum & Scharfe, 2002). Kornai (1980), Easterly and Fischer (1994), Stiglitz (1994) and Blum (1997) show that it also points to the problem of information efficiency (Hayek, 1945).

Coming back to the institutional issue, the question arises as to the extent to which institutions can promote growth and the extent to which mentalities and cultural backgrounds matter. The work by North (1981)clearly shows that social institutions matter and the way social groups are able to suck resources are of utmost importance (Olson, 1982).

In fact, given proper institutions, convergence can be fast, as in the case of Germany after World War II or, historically, at the end of the 19$^{th}$ century. The new institutional arrangements following the Meiji-restauration in Japan in the 19$^{th}$ century laid the groundwork for economic and industrial expansion. Research by Knack (1996) suggests that the way property rights are guaranteed and the way laws are implemented is one of the most important drivers in emerging and developed countries. Assuming a neoclassic economic environment, Barro and Sala-i-Martin (1992) develop a standard convergence model and show that average convergence rates for most economies are around 2 % per year. They can be fed with institutional factors to turn them into so-called conditional convergence models, thus capturing heterogeneities that can also be included as fixed effects using an econometric approach. In fact, these factors can relate to culture and religion, such as the Confucian creed and ascetic Protestantism; geographic opportunities, such as access to trade, especially to waterways and exposure to the sea; or, by contrast, sharp limitations to transportation as a result of mountain ranges.

Blum and Dudley (2001; 2003) show that the ability to reduce costs in contractual relationships, following the transaction-cost approach established by Coase (1937) and expanded by Greif (2000), is an important driver of economic growth. This relates to the market as a credence good and the overcoming of dilemma structures (Heckathorn, 1996).

### 4.2.2 From Growth Theory to Corporate Analysis

*Limits to Firm Growth.* In order to understand heterogeneity, we have to divide national growth into its industry components or, even further, into the growth of individual firms. The phenomena mentioned above, such as innovation, i.e. entrepreneurial quality (Penrose, 1959; Schumpeter, 1949), are the main underpinnings of the individual or the milieu. Institutions, culture and mentality (North, 1981) also matter as the efficient management of

transaction costs does, especially the management of risk and uncertainty (Blum & Leibbrand, 2001; Knight, 1921).

Given an institutional (regional, political) environment, the most important question following the above-mentioned Coase program (Coase, 1937) is: how much can firms grow? The limit is reached, as Williamson (1985) has shown, once (marginal) transaction and production costs of internal coordination exceed those of external coordination – the classic "make or buy" issue. After formalization within a principal-agent context and its application by Blum and Dudley (1999) to the collapse of hierarchical socialist combines in the 1980s, three types of institutional arrangements were identified based on a trade-off between external economies and control costs (information asymmetries): vertical, horizontal (as two types of hierarchy) and atomistic (as pure market orientation). Once information systems and, thus, transaction costs drastically change, institutions may collapse.

***Location and Clusters.*** Spatial economics have shown that even under conditions of homogeneous space and entrepreneurial qualities, firm growth will be heterogeneous if agglomeration economies exist. These can be divided into external economies stemming from scale effects, scope effects (mix and match), network effects, and other effects that encourage the clustering of firms. In addition, transportation costs matter, and they are an important link between innovation theory and trade theory, and the dissemination of knowledge in space. As a consequence, clustering and location matter. This is the decisive message that was put forward as early as 200 years ago by Thünen and Heinrich (1826), later by Christaller (1933), and Lösch (1948), who founded the theory of imperfect competition. Recently, Krugman (1990), Helpman (1998) and Porter (2000) have added to this. Blum (2013b) has classified four types of spatial concentrations that matter:

- Vertical clusters, i.e. a concentration of industries that rely on a system's head, usually an OME such as the plant of a car manufacturer.
- Horizontal clusters, i.e. economic activities which rely on a narrow span of technological competences and produce goods where competition among firms is low because many of these products are complementary. Here, we find the notion of general purpose technologies from Helpman (1998), i.e. technologies that have a wide range of applications.
- Lateral clusters, i.e. clusters that have already developed a long time ago, have exploited their technological basis and now, very often through public incentives, start to

rejuvenate based on a new technological basis that boosts and reinforces their economic development, i.e. provides a new technological paradigm.

- Non-clusters, i.e. economic activities that have a large depth of value added, often producing final goods from raw materials such as laminate floors or tiles, in other words products that are very often from the construction and manufacturing industry.

The resulting external economies are important for firm structure as their strength may increase average size because of advantageous externalities. Hence, location in an environment with externalities matters.

China's industry is mostly concentrated in large vertical clusters that dominate value chains and, in certain research-rich regions, have the initial signs of horizontal clusters – some following old traditions.[3] Based on the growth census, by 2014, 377,888 industrial enterprises above a designated size (industrial enterprises with annual revenues above RMB 20 million – roughly US$ 2.8 million) account for about 60% -70% of industrial employment (NBSC, 2016).

Cluster structure relates to two concepts of convergence: the concept of beta-convergence, which relates to the question of whether convergence turns into a common steady state in the long run, and sigma convergence. The latter is based on Gibrat's Law (1931) which states that over time, the variance of a given indicator of firm performance diminishes. For American firms, this could not be maintained (Evans, 1987). Geroski and Gugler (2004) show that, in a survey of fourteen European countries and firms with more than 100 employees, this is only true for mature firms. Pfaffermayr (2007) confirms this in a sample of Austrian firms. Macpherson and Holt (2007) consider that small firms only grow heterogeneously. Catching up in technology, i.e. lagging behind the existing technological frontier, implies that combining research and development with international trade may be an important driver for catching up, as Cameron, Proudman, and Redding (2005) observe for an English dataset. Helpman, Melitz, and Yeaple (2004) confirm this when they provide evidence about the extent to which productivity increases as the spatial distance between economic activity rises. Delgado, Porter, and Stern (2014) identify the complementarity of activities in clusters as the main driving force i.e. horizontal and lateral structures. Dittmar and Duchin (2016) place emphasis on the individual executive and find that a bad

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[3] The rejuvenation of the Chinese porcelain industry in the Jingdezhen region.

management experience also increases risk adversity if the manager has moved to a new firm.

*Corporate Financial Performance.* The performance of enterprises is usually analyzed within the context of risk management and rating systems. Economic value is the most important long-term performance indicator and depends on the cost of capital, profitability and the growth of assets as shown by Novy-Marx (2013) who also documents that profitability and growth are better explanatory factors for stock returns than the beta of the Capital Asset Price Model. Wolfrum and Gleißner (2009) relate cost of capital to corporate diversification potential and thus provide a link to risk analysis. The probability of defaulting – which relates to rating – is another value driver affecting firm performance that is comparable to a negative growth effect (Campbell, Hilscher, & Szilagyi, 2008). Thus, the following variables were selected:

- Firm capital growth: one important indicator of firm robustness.
- Return on assets: another important indicator of firm robustness, especially the ability to generate surplus for future economic value.
- Leverage ratio: links equity to debt and provides information on the optimal structure of capital.
- Standard deviation of sales: shows risk in terms of competitiveness and provides a strong link to cash flow.

*Corporate Governance.* Governance structures reflect the interaction of the firm's internal system with the outside world. We theorize the aspects of board size – also in relation to total firm size – and the board structure and ownership structure.

Board size: are larger boards of directors better? The maximum size of a board may be established by law or by corporate statute. The larger the board, the better and the more specific the task of control can be, especially in complex firms (Adams & Mehran, 2012). The board will be more efficient in making investment decisions, especially when non-executive directors invoke their human and social capital to provide professional guidance on investment strategies from various perspectives. Thus, a larger board has more opportunities to gain useful information about investment projects and put in place appropriate investment strategies. Based on the standard principal-agent reasoning (Blum & Dudley, 1999), external, independent directors who function as management supervisors may reduce moral hazard and protect the interests of shareholders. However, Jensen (1993) argues that board size is negatively associated with the board's ability to engage in long-

term strategic planning due to the difficulties in organizing and coordinating a larger board, i.e. increased transaction costs. Furthermore, when the scale of the board increases, the issue of free riding among directors becomes more severe. According to the group thinking theory and the theory of powerful CEOs (Adams, Almeida, & Ferreira, 2005), directors on a larger board are more likely to follow a powerful CEO. Concerning reputation and tenure, directors are inclined to conceal what they precisely know about the profits and risks of investment projects. Thus, without efficient supervision and advice it is easier for a powerful CEO to make biased investment decisions, thus affecting firm growth.

Board independence: what about the independence of board directors? Usually the proportion of external, independent directors on the board indicates the level of board independence. In 2001, the China Securities Regulatory Commission (CSRC) promulgated a guide to introduce independent directors to corporate boards. The legal regulations call for over one third of board members to be independent. In reality, the average ratio of independent directors in Chinese listed firms have been kept just around the legal requirement of one third. Unlike the USA, most of Chinese corporate boards don't have a majority of independent directors on the board. Whether board independence helps reduce agency problems in strategic decision-making of Chinese listed firms depends on the institutional conditions in reality.

Monocratic or dual leadership: should an executive board be controlled by a supervisory board and should the CEO be the head of the supervisory body? At the core of this issue is the importance of overcoming multiple agency problems, i.e. from shareholders via supervisors to management. According to agency theory, managers will not always act in a way that maximizes shareholder returns without effective supervision. Therefore, CEO duality may lead to a powerful CEO. CEOs should have the best knowledge of how to cope with the challenges and opportunities facing firms (Jensen & Heckling, 1995). According to the stewardship theory and efficiency theory, the main argument in favor of CEO duality states that, confronted with environmental uncertainty, a CEO who is also in charge of the board becomes more responsible and eligible to accurately coordinate board activities under realistic conditions and can make suitable decisions quickly. Moreover, dual leadership potentially results in a large cost savings in information acquisition, transmission, and processing that is associated with a non-CEO chairman. On one hand, this may produce effective and timely leadership decisions; on the other hand, moral hazard problems may arise and the interests of shareholders may not be protected (Williamson, 1985).

Board age: Is it beneficial to have a board that is comprised of people of mixed age? Schneider (2007, 2011) shows that the mix between crystalline intelligence and the fluid intelligence of younger board members who exhibit a higher capacity for innovation and willingness to take advantage of new investment opportunities makes firms successful. According to Prendergast and Stole (1996), young directors are faster learners who are more eager than old directors to advise management on investment strategies by collecting new comprehensive information. It appears that composition counts.

Board gender diversity: does a mix of genders make better decisions? Adams and Ferreira (2009) empirically demonstrate that female directors have better attendance records than male directors, and that male directors on a more gender-diverse board have fewer attendance problems. Prendergast and Stole (1996) find that female participation in boards is being increasingly perceived as valuable. Female directors may take a more active part in board issues. In reality, women hold few board positions and boards around the world are currently under pressure to choose more female directors. Confronted with rare opportunities to become directors, women are supposed to be more responsible for monitoring management's behaviors and human resources. They are more likely to raise questions when they are successfully elected and may be more risk-averse than men (Byrnes, Miller, & Schafer, 1999). In terms of investment decisions, female directors are more likely to raise conservative opinions towards new investment opportunities which may offset the aggressive opinions of men. This balancing mechanism in decision making can lead to both a more civilized culture and better governance of the board.

Ownership structure: The market paradigm assumes that privately founded property rights are superior to public ownership, especially as the private market – i.e. the financial market – is better able to accumulate information for efficient decision making (Hayek, 1945). However, government ownership under the conditions of deep pockets and preferential handing out of loans could positively influence firm growth. Following State Council of China (2014), 60 million of the mostly privately owned small and medium-size enterprises (SMEs) account for 99 % of enterprises in China. They contribute 60 % to the GDP, 50 % to tax revenue, 70 % to patents and 80 % to employment. However, the financial conditions of SMEs in China are unbalanced. By the end of March 2016, the loan balance of SMEs was 24.30 trillion RMB, which only accounts for 23.69 % of the overall loan balance (CBRC, 2016.)

## 4.3　Determinants of Firm Growth

### 4.3.1　Measuring Firm Size

Below we establish the general framework for our subsequent quantitative analysis. We start by asking what the appropriate indicator of firm size is. Ideally, this would be value added as a flow, or capital stock. The former is somewhat vague as firms can manipulate profit; the latter because of depreciation strategies. In fact, both are not easy to obtain based on comparable data. Two alternatives are reliably accessible: sales (revenues) and employment. However, these also pose certain problems. Sales vary according to production depth. Employment may incorporate slack, especially in specific sectors. In the convergence model, we use the sales per employee, which cancels out most of these problems.

### 4.3.2　Determinants of Heterogeneous Firm Dynamics

The ability of a firm or its leadership to successfully steer the enterprise rests on individual, group and environmental factors. Determinants may relate to external economies, corporate governance and financial performance. They also may be internal and mostly endogenous, i.e. the firm is able to directly influence them, or external and mostly exogenous. This relates to transaction cost theory and to the discussion on the optimal structure and size of the firm on these two levels through contracts, some being explicit, others implicit, some being formal, others informal.

Below we use the first type of categorization and relate the internal to the external factors to show the type of influence that can be expected. In fact, the feature of an individual firm that defines the internal efficiency of its performance and properties is its efficient response to outside factors, i.e. location, other firms in the cluster, the regulatory environment, etc.

### 4.3.3　Location

Location is an important factor in firm dynamics; the "complementary" region (Lösch, 1948) supplies resources, generates regional demand, provides transport infrastructure and, thus, enables international division of labor and the inclusion in the global value chain. In addition, location also defines the political and regulatory environment. All of these things taken together with the location of other industries and enterprises generate advantages of agglomeration and clusters. In the Chinese case, location often defines the phase of economic development in which the company was founded or had its most notable expansion phases.

These are reflected in the regional organization of China whereby the northeast is an historical industrial powerhouse that is today threatened to become a rustbelt, and the east is an area of modernization where economic reform began under Deng Xiaoping in the early 1990s. Most Chinese headquarters are located here. In an attempt to bring more prosperity to the central regions and to the west, the Chinese government has initiated programs to specifically support these areas financially. Thus, the effect on growth (not on income levels, where the east leads the west) which we modelled with the dummy (EAST = 1) if the location is east of this line, is ambiguous. We hypothesize:[4]

*H1a: A location in the east should positively influence corporate development because of headquarter density, a tighter cluster structure, and a broader capital base.*

*H1b: A location in the west should positively influence corporate performance because of stronger industrial dynamics as a result of newer investments.*

### 4.3.4   Firm Financial Performance

The stock of capital and its profitability are important bases for the robustness of firms and, thus, their ability to overcome internal or external crises and to attract equity or loans. We selected three indicators from the data set: capital growth (CG), [5] return on assets (ROA),[6] and leverage ratio (LEV)[7]. We hypothesize as follows:

(1)   Firm robustness: The ability of a firm to withstand external shocks is important for its growth perspectives and is reflected in its ability to attract new investment, i.e. benefit from capital growth (CG), and generate profit from assets (ROA). Both of these variables are important indicators for financial rating. We hypothesize as follows:

  *H2: Capital growth should positively influence corporate development.*

  *H3: Return on assets should positively influence corporate development.*

(2)   Leverage effect: As loans are usually less costly for firms than equity, an optimal level of indebtedness exists, i.e. a rising debt burden or leverage ratio (LEV) is positive for

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[4]   In fact, four out of the five most dynamic regions of China over the last years are located in western economic regions, the fifth being the eastern tourist island of Hainan. Of the five provinces most lagging behind, three are in the northeast, one is in a central region and one is in the east – Hebei, which surrounds Beijing and also suffers from a heavy-industry past (STATISTICAL OFFICE OF THE PRC 2016).

[5]   The variable is defined as follows: [capital (including acquisitions) expenses] + (research and development expenses) – (receipts from the sales of property, plants and equipment) – (depreciation cost of fixed assets) – (amortization cost of intangible assets)].

[6]   Return on assets is calculated as follows: net profit / the balance of total assets.

[7]   Firm leverage ratio is given as follows: (the book value of liability) / (the book value of total assets).

small ratios at the beginning as it improves profitability for owners. However, it becomes negative once a threshold is passed, after which markets penalize the firm.

*H4: Leverage should positively influence corporate performance only up to a certain threshold.*

(3)  Corporate risk: Future uncertainty is best reflected in firm sales. We calculated the variable risk (RISK) as the average standard deviation of sales per employee over the period and over the two preceding periods if these data were available.[8] Risk, however, also includes a positive element, as good firms are better prepared to manage it. Thus, small risk that is not existential can be positive.

*H5a: Risk should negatively influence corporate performance.*

*H5b: Risk should positively influence corporate performance.*

### 4.3.5  Firm Characteristics and Board Structure

Important firm characteristics, board attributes and governance aspects are the headquarter capabilities, the average age of the decision-making bodies, their gender structure and voting behavior, and ownership structure. Let us discuss these in turn.

(1)  Headquarter capabilities: Company headquarters are at the core of the leadership abilities of firms and their strategic competences. They are measured by the management ratio (MA-RATIO). Firms with very low values are often extended workbenches owned by large enterprises. The fact that they are listed does not necessarily mean that much independent decision making is occurring in the market place. A very large management is a sign of slack and of the firm's bureaucratization which may generate adverse effects. Thus we hypothesize:

*H6a: An increasing proportion of management should positively influence corporate performance.*

*H6b: An increasing proportion of management should positively influence corporate performance only up to a certain threshold after which the impact declines.*

(2)  Board age: Age usually relates to professional experience and competence. Following reputation theory, the older directors are, the more willing they become to provide effective supervision of management's investment behaviors due to their accumulated

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[8]  As the data set starts in 1999 and our estimations in 2005, including the standard deviation of the sales risk indicator posed no problem in most cases. In cases where data was missing, we used the first available observation as a proxy.

experience, their desire to maintain their reputation on the human resource market, and their independence as they approach the end of their career. However, innovativeness and willingness to attack risk declines. We define board age as the average age of directors on the board (M-AGE); the testable hypothesis being:

**H7a**: *A rising average age on the board should negatively influence corporate performance*

**H7b**: *A rising average age on the board should positively influence corporate performance up to a certain threshold after which the impact becomes negative.*

(3)  Board gender diversity: Gender diversity may also add multiple facets to the supervisory lens of management's behavior. In this paper, the proportion of female directors on the board measures gender diversity – better termed: female gender uniformity (FG-UNI). Accordingly, the higher the proportion of female directors, the higher the gender diversity. Based on the analysis above, we hypothesize as follows:

**H8a**: *Gender diversity is positively associated with corporate performance.*

There is a certain probability that the relatively recent ascent of women onto boards has resulted in two interacting developments: one relates to the experience aspect and the other to the innovation aspect of diversity. Thus, the relationship should not be monotonic and we hypothesize:

**H8b/c**: *Gender uniformity is positively (negatively) associated with corporate performance up to a threshold after which the impact becomes negative (positive).*

(4)  Board CEO duality: CEO duality refers to the identity of the CEO on the executive board (management) and the director of the supervisory board, i.e. the issue of monocratic vs. dual leadership that relates to problems of information asymmetry. We depart from the reference of a monocratic board (MON = 1). Based on our former discussion, it is impossible to know which of the opposing effects prevails and to formulate any a-priori hypothesis.

**H9**: *CEO duality has an unknown effect on corporate performance.*

(5)  State ownership: The market paradigm assumes that private property rights are at the core of economic efficiency. However, public ownership may reduce risk as it often implies preferential treatment with respect to regulations or the handing-out of loans.

We measure state ownership with a dummy (STATE = 1) if final corporate decisions rest with the state. We thus hypothesize:

*H10: Private ownership should positively influence corporate performance.*

(6) <u>Board independence</u>: If more external, independent directors on the board actually help mitigate the information asymmetries between shareholders and management in making investment decisions, the opportunities for management to make biased decisions will be lower. We measure the proportion of independent directors (I-SHARE). The testable hypothesis thus becomes:

*H11: The more independence the board has, the better the firm performs.*

(7) <u>Board dissenting vote</u>: Chinese regulations require listed companies to disclose how independent directors voted on management proposals. In this sense, dissenting opinions from external, independent directors indicate that they are more active and responsible in supervising and advising management investment behavior than their board colleagues. This may lead to a more efficient board. We use a dummy to measure whether at least one director dissented (D-VOTE = 1) and hypothesize:

*H12: The higher the dissenting vote, the better the firm performs.*

## 4.4 Methodology

### 4.4.1 Model

Let $x_{jt}$ be the economic output in firm[9] $j$ at period $t$, $t=1,2,3,...,T$, in our case: sales. Following Barro and Sala-i-Martin (1992, p. 230), we assume that the transition of these variables to their steady-state value as a long-term equilibrium is as follows:

$$\frac{1}{t} \cdot \log\left(\frac{x_{jt}}{x_{j0}}\right) = B - \left(\frac{1-e^{-\beta \cdot t}}{t}\right) \cdot \log(x_{j0}) + \sum_{i=1}^{n} \gamma_i \cdot z_{ijt} + u_{jt}, \ t=1,2,,,,T. \qquad 4.1$$

The term on the left-hand side represents the average growth rate of output $x$ from firm $j$ between periods 0 and $t$. The formula thus links the starting value, i.e. the value in period $0$, and the value in period $t$, which is the growth over this span of time. Usually a negative relationship is assumed as larger firms are expected to expand at a slower pace than smaller ones. The average (period-adjusted) convergence rate over the total span of time $T$ is $\beta$. In

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[9] Historically, these were regions or countries.

addition, $z_{jit}$ represents structural variables that allow for the adjustment of heterogeneities. Some may be quantitative and some qualitative, as discussed in the previous section. In addition, $z_{jit}$ includes fixed effects, for instance sectoral dummies. In addition, the constant $B$ represents long-term equilibrium growth as

$$\lim_{t \to \infty} \left( \frac{1 - e^{-\beta \cdot t}}{t} \right) = 0 \qquad\qquad 4.2$$

i.e. $B$ corresponds to the average growth rate over the time span. Please note that on the left-hand side, if $t$ goes to infinity, the term will be the average growth rate over the period.

An important question relates to differences between national, regional and corporate growth processes. Is it economically sound to transfer a methodology that is well established in regional research to firm data? We argue that it is for the following reasons:

- Aggregation: Regional or national economic output is an aggregation of firm output. Of course the aggregation problem is well known with respect to non-linear transformations as applied in neoclassic theory. But this holds true for all levels of analysis to which neoclassic growth models were and are still applied: urban – local – regional - national.

- Steady state: Firms continuously reinvent themselves to stay on growth paths – and sometimes they fail – but this is also typical for nations where divergence – and even collapse - have been observed which then trigger rescue programs, as the European example has demonstrated in recent years.

- Longevity: Regions or nations live forever; corporations do not! Thus, a convergence model faces entries and exits that may bias results. This is no longer true, as the 1990s have shown in Europe. In our sample, there are no exits, and the entry value $x_{jo}$ starts with the first positive value. As the convergence $\beta$ does not vary with time, this is feasible.

### 4.4.2  Data and Sample

Accounting and financial datasets used in this paper were obtained from the China Stock Market and Accounting Research Database developed by the Shenzhen GTA Information Technology Company. Listed companies in China have been required to disclose information on individual board directors since 1999. According to the CSRC's guide on industrial classifications, we classify listed companies in our sample into 18 industries. Our

final sample consists of firms with annual observations from 2005 to 2014 which equal 13,844 observations.

We exclude financial companies in our sample because their investment patterns differ significantly from industrial companies. We also exclude firms with missing annual reports and observations. In addition, to avoid the impact of extreme observations, all the relevant variables are winsorized by recoding observations greater (less) than the 99th (1st) percentile to the 99th (1st) percentile.

## 4.5 Results

We applied a nonlinear least squares estimation using the program package *Stata*. We present the results in three subsections: The first only looks into statistical qualities, the second shows results of the standard unconditional and conditional models, and the third interprets a breakdown of the sample by industry. Table 4.1 shows the descriptive statistics of variables used.

**Table 4.1: Descriptive Statistics**

| Variable | Mean | Std. | Min | Max |
|---|---|---|---|---|
| S | 0.07 | 0.31 | -6.59 | 8.15 |
| SPE(t=0) | 13.30 | 1.17 | -0.44 | 19.47 |
| EAST=1 | 0.60 | 0.49 | 0.00 | 1.00 |
| CG | 0.06 | 0.38 | -10.79 | 4.23 |
| ROA | 0.04 | 0.06 | -0.21 | 0.21 |
| LEV | 0.49 | 0.25 | 0.05 | 1.72 |
| RISK | 0.49 | 2.75 | 0.00 | 312.90 |
| MA-RATIO | 0.01 | 0.02 | 0.00 | 0.44 |
| M-AGE | 50.04 | 3.84 | 36.54 | 65.43 |
| MG-UNI | 0.12 | 0.11 | 0.00 | 0.83 |
| MON=1 | 0.19 | 0.39 | 0.00 | 1.00 |
| STATE=1 | 0.26 | 0.44 | 0.00 | 1.00 |
| I_RATIO | 0.37 | 0.05 | 0.09 | 0.80 |
| D-VOTE=1 | 0.03 | 0.18 | 0.00 | 1.00 |

Note: number of observations=13,844; S refers to average growth of log of sales (the dependent variable of the regression model); SPE (t=0) represents the logarithm of Sales per Employee at year 0 (for the βcoefficient)

### 4.5.1 Standard Model

Table 4.2 contains the estimation results of the unconditional model and, in addition, the extension of this model with individual conditional variables. The reference model (1) has a highly significant ß-convergence. Four conditional variables are insignificant: gender (FG-UNI), board duality (MON = 1), the share of independent directors (I-RATIO) and location (EAST = 1).

When all variables are regressed into one equation in Table 4.3, the results are very similar. This implies a high orthogonality of the variables; the variables found to be insignificant in the individual equations are also insignificant in this aggregate representation.

If industry dummies are included as fixed effects, the results remain stable. Table 4.4 shows the originally estimated values and the values taken to the exponent, while the growth rates on the left-hand side of the regression function were taken as logs.

All $R^2$ are low which is typical for this type of analysis – in fact, conditional variables double the significance of the equation whereas fixed effects are only slightly significant.

Table 4.5 shows the results of the final models (Models 1, 14 and 15). In the latter model, only statistically significant variables were included. Let us first start by looking at the unconditional convergence $\beta$. The value of 5.63% (SPE= ß) is rather high and reflects the underlying high growth rates of about 9% over the estimation period. We see that ß-convergence increases to a value of 6.6%, when more variables are added. This points to either divergent developments (quantitative variables) or different starting conditions (dummy variables) that are compensated for by an increased convergence rate.[10] We will expand on this later.

Let us turn to the (conditional) variables one by one:

***Location***

(1)  Location (EAST = 1): the variable is insignificant; none of the two opposing hypotheses *H1a* and *H1b* can be supported. Seemingly, both effects intervene and give an opaque result.

***Firm Financial Performance***

(2) Firm robustness (CG; ROA): capital growth and return on assets are both highly significant and positive drivers of corporate growth. Thus, hypotheses *H2* and *H3* are supported.

(3) Debt structure (LEV): Leverage is positive for firm performance, which supports hypothesis *H4*. We will expand on this later by adding a quadratic term in order to capture a potential turning point.

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[10] The difference in the convergence rates is statistically significant at a level of 95 %.

*Corporate Governance*

(4) <u>Corporate risk</u> (RISK): It has a clear and highly significant negative impact which supports hypothesis *H5*. Here again we will inquire into potential benefits of low but well-managed risks later.

(5) <u>Headquarter capabilities</u> (MA-SHARE): Management overheads are positive which supports hypothesis *H6a*; we will inquire into potential turning points later.

(6) <u>Board age</u> (M-AGE): It seems that board age has already surpassed the optimum, leading to more procrustean-type behavior which supports hypothesis *H7a*. Again, we will check whether we can find an optimal point by including a quadratic term later, as hypothesis *H7b* suggests.

(7) <u>Gender</u> (FG-UNI): The results of the estimation are statistically insignificant; none of the two opposing hypotheses *H8a* or *H8b* are supported by the data.

(8) <u>CEO duality</u> (MON = 1): The results of the estimation are statistically insignificant; hypothesis *H9* can neither be supported nor rejected by the data.

(9) <u>Firm ownership</u>: SOEs have a clear advantage in terms of their growth perspectives. It has been well reported (Lardy, 2019) that financial conditions for SMEs in China are unsatisfactory, but this seems to extend, to a certain degree, to private firms in general; this contradicts hypothesis *H10*.

(10) <u>Board independence</u> (I-RATIO): The results of the estimation are statistically insignificant; hypothesis *H11* can neither be supported nor rejected by the data.

(11) <u>Board dissenting vote</u> (D-VOTE = 1): It has no impact, contrary to hypothesis *H12*.

We further included fixed industry effects in our equation which, as Table 4.3 shows, did not produce any significant changes in the economic interpretation. Only the location variable EAST becomes weakly significant with a negative impact on growth.

**Table 4.2: Non-conditional Convergence Models**

| Model | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant (B) | 0.742*** | 0.744*** | 0.736*** | 0.731*** | 0.721*** | 0.772*** | 0.746*** | 0.897*** | 0.747*** | 0.743*** | 0.766*** | 0.740*** | 0.741*** |
| SPE (=ß) | 0.0563*** | 0.0560*** | 0.0565*** | 0.0579*** | 0.0558*** | 0.0569*** | 0.0584*** | 0.0570*** | 0.0563*** | 0.0562*** | 0.0604*** | 0.0563*** | 0.0562*** |
| EAST=1 | | -0.00736 | | | | | | | | | | | |
| CG | | | 0.137*** | | | | | | | | | | |
| ROA | | | | 0.687*** | | | | | | | | | |
| LEV | | | | | 0.0333*** | | | | | | | | |
| RISK | | | | | | -0.0512*** | | | | | | | |
| MA-RATIO | | | | | | | 2.148*** | | | | | | |
| M-AGE | | | | | | | | -0.0029*** | | | | | |
| MG-UNI | | | | | | | | | -0.0459** | | | | |
| MON=1 | | | | | | | | | | -0.0065 | | | |
| STATE=1 | | | | | | | | | | | 0.0846*** | | |
| I_RATIO | | | | | | | | | | | | 0.0054 | |
| D-VOTE=1 | | | | | | | | | | | | | -0.0166 |
| No. of obs. | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 |
| Adj.R2 | 0.0916 | 0.0917 | 0.1206 | 0.1106 | 0.0923 | 0.1214 | 0.1181 | 0.0928 | 0.0918 | 0.0916 | 0.104 | 0.0915 | 0.0916 |

*** $p<0.01$, ** $p<0.05$, * $p<0$.

## Table 4.3: Final Convergence Models

| Model | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|
| Constant (B) | 0.853*** | 0.852*** | 0.689*** | 0.789*** | 0.786*** |
| SPE (=ß) | 0.0658*** | 0.0660*** | 0.0571*** | 0.0667*** | 0.0671*** |
| EAST=1 | -0.0026 | | | -0.0068 | |
| CG | 0.148*** | 0.148*** | | 0.154*** | 0.154*** |
| ROA | 0.900*** | 0.900*** | | 0.893*** | 0.892*** |
| LEV | 0.125*** | 0.124*** | | 0.0942*** | 0.0939*** |
| RISK | -0.0614*** | -0.0615*** | | -0.0625*** | -0.0626*** |
| MA-RATIO | 2.732*** | 2.729*** | | 2.610*** | 2.614*** |
| M-AGE | 0.0028*** | 0.0027*** | | 0.0025*** | 0.0025*** |
| MG-UNI | -0.0207 | | | -0.0387* | -0.0373* |
| MON=1 | 0.00108 | | | 0.00492 | |
| STATE=1 | 0.0993*** | 0.0996*** | | 0.100*** | 0.101*** |
| I_RATIO | 0.0174 | | | -0.0088 | |
| D-VOTE=1 | -0.0225 | | | -0.0187 | |
| Industry Dummies | | | | Controlled | |
| No. of obs. | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 |
| R2 | 0.2356 | 0.2356 | 0.106 | 0.2486 | 0.2486 |

*** p<0.01, ** p<0.05, * p<0.1

## Table 4.4: Dummy Structure of Models 16 and 18

| Industry | Share | Coefficient | | Exponent | |
|---|---|---|---|---|---|
| | | 16 | 18 | 16 | 18 |
| Agriculture, Forestry, Animal Husbandry and Fishing | 1.58% | -0.0101 | 0.0339 | 0.990 | 1.034 |
| Mining | 3.09% | 0.0474* | 0.0392 | 1.049 | 1.040 |
| Manufacturing | 61.27% | 0.0495** | 0.0863*** | 1.051 | 1.090 |
| Production and Supply of Electric,Gas and Water | 4.33% | 0.111*** | 0.113*** | 1.117 | 1.120 |
| Construction | 2.51% | 0.0889*** | 0.119*** | 1.093 | 1.126 |
| Wholesale Trade and Retail Trade | 7.11% | 0.116*** | 0.138*** | 1.123 | 1.148 |
| Transportation,Warehousing and Post | 3.70% | 0.0559** | 0.0518** | 1.057 | 1.053 |
| Hotel and Catering | 0.61% | -0.0648* | -0.0256 | 0.937 | 0.975 |
| Information Transmission and IT Services | 3.80% | 0.0267 | 0.0456* | 1.027 | 1.047 |
| Real Estate | 6.94% | 0.163*** | 0.190*** | 1.177 | 1.209 |
| Renting and Commercial Services | 1.00% | 0.0728** | 0.105*** | 1.076 | 1.111 |
| Scientific Research and Technology Services | 0.33% | 0.0871* | 0.0739* | 1.091 | 1.077 |
| Water, Environment and Public Facilities Management | 1.14% | 0.0316 | 0.0779*** | 1.032 | 1.081 |
| Education | 0.04% | -0.184 | -0.136 | 0.832 | 0.873 |
| Culture, Sports and Entertainment | 0.12% | 0.206*** | 0.109 | 1.229 | 1.115 |
| Sanitary and Social Services | 1.14% | 0.00593 | 0.0188 | 1.006 | 1.019 |
| Nonclassifiable and Integrated | 1.28% | reference (constant) | | | |

*** p<0.01, ** p<0.05, * p<0.1

**Table 4.5: Convergence Estimations, 2005 – 2014**

| Model | SPE(1) | SPE(14) | SPE(15) |
|---|---|---|---|
| Constant (B) | 0.742*** | 0.853*** | 0.852*** |
| SPE (=ß) | 0.0563*** | 0.0658*** | 0.0660*** |
| EAST=1 | | -0.00256 | |
| CG | | 0.148*** | 0.148*** |
| ROA | | 0.900*** | 0.900*** |
| LEV | | 0.125*** | 0.124*** |
| RISK | | -0.0614*** | -0.0615*** |
| MA-RATIO | | 2.732*** | 2.729*** |
| M-AGE | | 0.0028*** | 0.0027*** |
| MG-UNI | | -0.0207 | |
| MON=1 | | 0.00108 | |
| STATE=1 | | 0.0993*** | 0.0996*** |
| I_RATIO | | 0.0174 | |
| D-VOTE=1 | | -0.0225 | |
| No. of obs. | 13,844 | 13,844 | 13,844 |
| R2 | 0.0916 | 0.2356 | 0.2356 |

*** p<0.01, ** p<0.05, * p<0.1

## 4.5.2 Extended Model

Table 4.6 shows the results of the models in which we tested single conditional variables and in which we have included quadratic terms. We see that significance in terms of $R^2$ increases in all cases – and in all cases, the linear and the quadratic terms are both statistically significant. Under the table, we find the loci for maxima and minima.

**Table 4.6: Non-conditional Convergence Models with Quadratic Terms**

| Model | 5 | 5a | 6 | 6a | 7 | 7a | 8 | 8a |
|---|---|---|---|---|---|---|---|---|
| Constant (B) | 0.721*** | 0.636*** | 0.772*** | 0.755*** | 0.746*** | 0.745*** | 0.897*** | 2.201*** |
| SPE (=ß) | 0.0558*** | 0.0550*** | 0.0569*** | 0.0565*** | 0.0584*** | 0.0582*** | 0.0570*** | 0.0572*** |
| LEV | 0.0333*** | 0.349*** | | | | | | |
| LEV2 | | -0.255*** | | | | | | |
| RISK | | | -0.0512*** | -0.0203*** | | | | |
| RISK2 | | | | -0.0006*** | | | | |
| MA-RATIO | | | | | 2.148*** | 1.825*** | | |
| MA-RATIO2 | | | | | | 1.564 | | |
| M-AGE | | | | | | | -0.0029*** | -0.0549*** |
| M-AGE2 | | | | | | | | 0.0005*** |
| No. of obs. | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 |
| R2 | 0.0923 | 0.1049 | 0.1214 | 0.1244 | 0.1181 | 0.1182 | 0.0928 | 0.0939 |
| | | | | | | | | |
| Maxima | | 0.68 | | -15.98 | | 0.58 | | |
| Minima | | | | | | | | 53.30 |

*** p<0.01, ** p<0.05, * p<0.1

**Table 4.7**: **Final Convergence Models with Quadratic Terms**

| Model | 14 | 15 | 14a | 14b | 15a | 15b | 16 | 17 | 18 | 17a | 17b | 18a | 18b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant (B) | 0.853*** | 0.852*** | 2.180*** | 2.148*** | 2.177*** | 2.146*** | 0.689*** | 0.789*** | 0.786*** | 2.261*** | 2.226*** | 2.230*** | 2.196*** |
| SPE (=ß) | 0.0658*** | 0.0660*** | 0.0651*** | 0.0648*** | 0.0653*** | 0.0649*** | 0.0571*** | 0.0667*** | 0.0671*** | 0.0658*** | 0.0660*** | 0.0655*** | 0.0657*** |
| EAST=1 | -0.0026 | | -0.0004 | -0.0002 | | | | -0.0068 | | -0.0042 | | -0.0041 | |
| CG | 0.148*** | 0.148*** | 0.147*** | 0.149*** | 0.147*** | 0.149*** | | 0.154*** | 0.154*** | 0.152*** | 0.152*** | 0.154*** | 0.154*** |
| ROA | 0.900*** | 0.900*** | 0.919*** | 0.931*** | 0.919*** | 0.931*** | | 0.893*** | 0.892*** | 0.908*** | 0.907*** | 0.919*** | 0.919*** |
| LEV | 0.125*** | 0.124*** | 0.520*** | 0.519*** | 0.520*** | 0.520*** | | 0.0942*** | 0.0939*** | 0.450*** | 0.454*** | 0.451*** | 0.454*** |
| LEV2 | | | -0.320*** | -0.321*** | -0.321*** | -0.322*** | | | | -0.284*** | -0.286*** | -0.286*** | -0.288*** |
| RISK | 0.0614*** | 0.0615*** | -0.0574*** | -0.0375*** | -0.0575*** | -0.0374*** | | 0.0625*** | 0.0626*** | -0.0587*** | -0.0587*** | -0.0411*** | -0.0409*** |
| RISK2 | | | | -0.0004*** | | -0.0004*** | | | | | | -0.0004*** | -0.0004*** |
| MA-RATIO | 2.732*** | 2.729*** | 3.239*** | 3.087*** | 3.236*** | 3.083*** | | 2.610*** | 2.614*** | 2.670*** | 2.670*** | 2.554*** | 2.553*** |
| MA-RATIO2 | | | -0.556 | -0.312 | -0.545 | -0.3 | | | | 1.505* | 1.505* | 1.659* | 1.662* |
| M-AGE | -0.0028*** | -0.0027*** | -0.0594*** | -0.0587*** | -0.0593*** | -0.0586*** | | -0.0025*** | -0.0025*** | -0.0649*** | -0.0640*** | -0.0642*** | -0.0634*** |
| M-AGE2 | | | 0.0006*** | 0.0005*** | 0.0006*** | 0.0005*** | | | | 0.0006*** | 0.0006*** | 0.0006*** | 0.0006*** |
| MG-UNI | -0.0207 | | -0.0126 | -0.0116 | | | | -0.0387* | -0.0373* | -0.028 | | -0.0272 | |
| MON=1 | 0.0011 | | 0.0103* | 0.0107* | 0.0103* | 0.0106* | | 0.00492 | | 0.0124** | 0.0116** | 0.0127** | 0.0119** |
| STATE=1 | 0.0993*** | 0.0996*** | 0.0909*** | 0.0911*** | 0.0909*** | 0.0911*** | | 0.100*** | 0.101*** | 0.0933*** | 0.0944*** | 0.0934*** | 0.0946*** |
| I_RATIO | 0.0174 | | 0.0109 | 0.0106 | | | | -0.0088 | | -0.012 | | -0.012 | |
| D-VOTE=1 | -0.0225 | | -0.0162 | -0.0143 | | | | -0.0187 | | -0.0134 | | -0.0118 | |
| Industry Dummies | | | | | | | | | | controlled | | | |
| No. of obs. | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 | 13,844 |
| R2 | 0.2356 | 0.2356 | 0.2543 | 0.2553 | 0.2544 | 0.2554 | 0.106 | 0.2486 | 0.2486 | 0.2635 | 0.2635 | 0.2643 | 0.2643 |

| Exteme values at | 14 | 15 | 14a | 14b | 15a | 15b | 16 | 17 | 18 | 17a | 17b | 18a | 18b |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LEV | | | 0.81 | 0.81 | 0.81 | 0.81 | | | | 0.79 | 0.79 | 0.79 | 0.79 |
| RISK | | | | -47.35 | | -46.87 | | | | | | -58.71 | -57.77 |
| MA-RATIO | | | 2.91 | 4.95 | 2.97 | 5.14 | | | | 0.89 | 0.89 | 0.77 | 0.77 |
| M-AGE | | | 53.51 | 53.46 | 53.42 | 53.37 | | | | 52.94 | 52.98 | 52.88 | 52.92 |

*** p<0.01, ** p<0.05, * p<0.1

If we aggregate all variables to a single model in Table 4.7, we see a considerable increase in significance against the model without the quadratic specifications. Insignificant variables in Table 4.2 remain insignificant in Table 4.6, and the same holds true when comparing results in Table 4.7, which contains complete models with and without quadratic terms.

Table 4.8 provides results of models that include quadratic terms following the alternative hypotheses formulated in subsections 4.3.3 – 4.3.5. We have tested possible non-linearities for four variables: Leverage (LEV), risk (RISK), the ratio between those employed in management and total employment (MA-RATIO) and the mean age of board members (M-AGE). The inclusion of the quadratic term improves overall significance and, in three out of four cases, both the linear and the quadratic term are highly significant. The quadratic term is only marginally significant in the case of the management-to-employment ratio (MA-RATIO) (at a level of 10 %) when fixed industry effects are accounted for.

Now let us discuss the results of model 18b:

- Firm leverage ratio (LEV): the linear term increases from 0.124 to 0.454 as it is now "pulled down" by the negative quadratic term of -0.288. The combined result implies that a maximum is reached at LEV = 0.79. Given a mean value of 0.488 (between a low value of 0.0482 and a high value of 1.729), we conclude that most of the firms have not yet reached their optimum leverage ratios. Following the definition, this implies that the optimal equity of the firm's capital should be roughly 20 % of total assets, which sounds very reasonable.

- Firm risk (RISK): The linear term increases from -0.0615 to -0.0409 and is supported by a negative quadratic term of -0.0004. The average three-year standard deviation in the sample is 0.488. The combined result implies that a maximum is reached at RISK = -57.77, which is outside the feasible risk scope.[11] Clearly, for the relevant first quadrant of positive values, the more risk increases, the more – and over-proportionally – a firm's growth is reduced.

- Ratio of management to total employment (MA-RATIO): the linear term falls from 2.729 to 2.553 as a strong positive quadratic term is added. The combined result implies that a minimum is reached at MA-RATIO = 0.77. This is beyond the maximum value of MA-RATIO = 0.44 and a mean value of 0.009. However, it implies that the function is strictly concave, i.e. adding more headquarter functions has a positive but decreasing

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[11] In fact, negative risks are not explained as the lowest value of RISK = 0. The extension to negative values only makes sense in order to capture the proper nonlinear curvature.

return on growth. As most headquarters are in the eastern provinces, this points to a locational advantage not identified by the geographic variable.

- Mean age of board members (M-AGE): The linear term decreases from -0.0027 to -0.0634 and is accelerated by a positive quadratic term of 0.0006. The combined result implies that a minimum is reached at M-AGE = 52.92. This is slightly above the average age of board members of 50.04 years, which spans between 36.54 and 65.43 years. This implies that experience on boards outweighs innovative capacity and that higher age is productive.

**Table 4.8: Convergence Estimations with Quadratic Terms, 2005 – 2014**

| Model | SPE (14b) | SPE(15b) | SPE(18a) | SPE(18b) |
|---|---|---|---|---|
| Constant (B) | 2.148*** | 2.146*** | 2.230*** | 2.196*** |
| SPE (=ß) | 0.0648*** | 0.0649*** | 0.0655*** | 0.0657*** |
| EAST=1 | -0.0002 | | -0.0041 | |
| CG | 0.149*** | 0.149*** | 0.154*** | 0.154*** |
| ROA | 0.931*** | 0.931*** | 0.919*** | 0.919*** |
| LEV | 0.519*** | 0.520*** | 0.451*** | 0.454*** |
| LEV2 | -0.321*** | -0.322*** | -0.286*** | -0.288*** |
| RISK | -0.0375*** | -0.0374*** | -0.0411*** | -0.0409*** |
| RISK2 | -0.0004*** | -0.0004*** | -0.0004*** | -0.0004*** |
| MA-RATIO | 3.087*** | 3.083*** | 2.554*** | 2.553*** |
| MA-RATIO2 | -0.312 | -0.3 | 1.659* | 1.662* |
| M-AGE | -0.0587*** | -0.0586*** | -0.0642*** | -0.0634*** |
| M-AGE2 | 0.0005*** | 0.0005*** | 0.0006*** | 0.0006*** |
| MG-UNI | -0.0116 | | -0.0272 | |
| MON=1 | 0.0107* | 0.0106* | 0.0127** | 0.0119** |
| STATE=1 | 0.0911*** | 0.0911*** | 0.0934*** | 0.0946*** |
| I_RATIO | 0.0106 | | -0.0120 | |
| D-VOTE=1 | -0.0143 | | -0.0118 | |
| Industry Dummies | | | controlled | |
| No. of obs. | 13,844 | 13,844 | 13,844 | 13,844 |
| R2 | 0.2553 | 0.2554 | 0.2643 | 0.2643 |

| Maxima/Minima at | 14b | 15b | 18a | 18b |
|---|---|---|---|---|
| LEV | 0.81 | 0.81 | 0.79 | 0.79 |
| RISK | -47.35 | -46.87 | -58.71 | -57.77 |
| MA-RATIO | 4.95 | 5.14 | 0.77 | 0.77 |
| M-AGE | 53.46 | 53.37 | 52.88 | 52.92 |

*** p<0.01, ** p<0.05, * p<0.1

### 4.5.3 Breakdown by Industry

Finally, as shown in Table 4.9, we conducted separate regressions for manufacturing, which makes up some 60 % of the sample, and services, which comprises some 25% of the sample.

**Table 4.9: Convergence Estimations, Manufacturing and Services**

| Model | Manufacturing | Service |
|---|---|---|
| Constant (B) | 0.987*** | 3.295*** |
| SPE (=ß) | 0.0541*** | 0.0751*** |
| EAST=1 | | -0.0556*** |
| CG | 0.166*** | 0.0714*** |
| ROA | 0.649*** | 1.363*** |
| LEV | 0.354*** | 0.650*** |
| LEV2 | -0.195*** | -0.295*** |
| RISK | -0.160*** | -0.113*** |
| RISK2 | 0.0108*** | 0.0003 |
| MA-RATIO | 3.812*** | 4.007*** |
| MA-RATIO2 | -11.30*** | 0.0772 |
| M-AGE | -0.0153 | -0.0968*** |
| M-AGE2 | 0.0001 | 0.0009*** |
| MG-UNI | -0.0928*** | 0.135** |
| MON=1 | | 0.0485*** |
| STATE=1 | 0.0796*** | 0.101*** |
| D-VOTE=1 | 0.0265** | -0.0689* |
| No. of obs. | 8,536 | 3,168 |
| R2 | 0.263 | 0.3217 |
| | | |
| Maxima/Minima at | 14b | 15b |
| LEV | 0.91 | 1.10 |
| RISK | -7.41 | -225.10 |
| MA-RATIO | 0.17 | 25.95 |
| M-AGE | 51.69 | 55.06 |

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

We find considerable changes in the quadratic terms for age and risk:

- The differences in constants may point to higher growth rates in the service sector – accompanied by higher ß-convergence

- Being located in the east implies higher growth for service firms.

- Capital growth is higher in manufacturing than in services which may be a result of an increased capital intensity in the former sector. Conversely, return on assets is higher in the service industry than in manufacturing.

- Leverage ratios in services are higher than their optimal values.

- Risk only seems to strongly impact growth in manufacturing.

- The results for management ratios support the importance of an optimal level of overheads in manufacturing. This seems to be rather spurious in services.

- Age demonstrates the importance of experience in services – in manufacturing, innovation ability seemingly dominates.

- Gender diversity is negative in manufacturing and positive in services. These opposing effects may explain the insignificance in the aggregate sample.

- State ownership is positive for growth in both sectors.
- Dissenting votes are positive in manufacturing but negative in services. This ties in to the results found for age. Innovativeness and open discussion appear to be important for success in manufacturing industries. In addition, the opposing effects explain why the aggregate result is insignificant.

## 4.6 Summary

In general, the model has great explanatory power for firm growth in China. The analysis provides evidence of the sound applicability of the standard convergence model as a tool for analyzing firm growth and convergence processes in Chinese listed firms. The estimated ß-rates suggest a convergence rate of between 5 % and 6 % per year, which is compatible with the high growth rates observed during this period. Most of the results are compatible with theoretical reasoning, especially with respect to the effects of financial indicators and governance structures: robustness of firms, in the sense of capital procurement, is positive for growth; financial leverage is positive to a certain degree that is consistent with capital market theory; rising risk reduces growth over-proportionately; headquarter functions do matter – but too much management bureaucracy is negative; the interplay between the innovation of younger managers and the experience of older managers matters, and in the end, experience is a driving force on boards; information asymmetry matters as firms with monocratic boards perform better than those with dual leadership structures.

Especially striking are those results that are counter-intuitive and require additional contemplation, especially the adverse effect of private ownership on growth, which we explained by the risk-absorption policies of the public that allow state-owned enterprises (SOEs) to benefit and to have easier access to the capital market in which interest rates, allocated to individual firms, follow industrial incentive programs.

Certain factors that many consider to be important turned out to be insignificant, for instance the independence of directors. Location was also found not to matter despite the general conviction that eastern China is economically advantaged. This result, however, cannot be maintained for services, where location in the east produces an important growth effect. Gender diversity is not important in the general framework but does matter – with opposing effects in manufacturing and services, which may explain the aggregate result. The same type of opposing effect can be found for dissenting votes that cancel out in the aggregate. It

seems that the way innovative drive and experience matter – and how both are voiced – are very different in these two industries.

# 5. Board Diversity and Corporate Social Responsibility Disclosure[12]

## 5.1 Introduction

In Chapter 3.4, the issue of board diversity has been elaborated through a theoretical framework discussing how board diversity may impact different dimensions or sorts of board capital and thus firm performance. Beyond that, in this chapter, the relationship between board diversity and corporate social responsibility disclosure is empirically examined in the context of China.

### 5.1.1 Board Diversity Research Revisited in a CSR Context

Recently, board diversity has become a central issue in the field of corporate governance research. At the same time, reporting on Corporate Social Responsibility (CSR) has emerged as a complement to financial accounting with diversity indicators being a central part of CSR reporting, e.g. by drawing on environmental, social and governance (ESG) indicators of the Global Reporting initiative (Labucay, 2015; Velte, 2017).

Board diversity has only recently come into focus as most former studies have concentrated on the impact of work group diversity on firm performance (Horwitz & Horwitz, 2007) and a subset thereof, top management team diversity. Although it can be argued that boards are faced with similar dynamic bargaining situations as top management teams do, the peculiarities of boards call for a more targeted research. Whereas studies on board diversity have centered on board members' demographic group representation regarding gender, age, ethnicity, etc. (diversity-in-boards), we approach board diversity as structural phenomenon as well by including CEO duality (CEO and chairman of the board are the same person) and board independence, i.e., the proportion of independent/outside directors (diversity-of-boards), in line with the prior work by Hoang, Abeysekera, and Ma (2018).

It can be argued that board diversity influences the complex bargaining processes among firms' stakeholders, which makes it worthwhile to investigate its interrelation with CSR disclosure. The aggregate of personal characteristics of board members (e.g., board human and social capital) shape how the board deals with the external relationships and, moreover,

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[12] by Xinyi XIAO & Inéz Labucay

how board structure impacts on the level of corporate social and environmental commitment, eventually, on the effectiveness and quality of CSR reporting (Liao, Lin, & Zhang, 2018).

As opposed to the majority of former studies on board diversity, instead of measuring financial performance or financial disclosure, we focus on firms' non-financial disclosure, the compliance with CSR, which will be denoted CSR disclosure or CSR reporting henceforth. We are thus interested in whether and how corporate governance structures, particularly diversity-in-boards and diversity-of-boards, influence the incidence and the quality of firm's public CSR disclosure. One salient gap in both corporate governance and CSR literature has been the paucity of such research in the context of emerging economies (Khan, Muttakin, & Siddiqui, 2013). Although a number of studies since then has investigated CSR in this particular setting (Velte, 2017), China is clearly underrepresented. According to a literature survey of Chang, Oh, Park, and Jang (2017), between 1990 and 2014 only six out of 36 studies dealt with the linkage between board characteristics and CSR in an Asian context and only one study was conducted in the context of China. Although China is becoming increasingly involved in global supply chains, its corporate governance structures and CSR practices still differ from the West. In particular, the impact of board diversity from a comprehensive perspective (demographic and structural board diversity) on mandatory and voluntary CSR disclosure in China has not been researched so far. An in-depth literature review motivating our hypotheses is presented in Chapter 5.2.1. Next, in Chapter 5.1.2, a short overview of the distinct evolution of board diversity and CSR reporting in China shall first prepare the ground for our study.

## 5.1.2 Characteristics of the Chinese Case

Chinese boards of directors have gradually become more diverse, also as a result of the inclusion of a growing number of young, female and independent directors on boards. Gender representation on boards in Asia (6%) is still considerably lower though compared to Norway (39%), Germany (28%) and the US (18.7%) (McKinsey&Company, 2016, p. 4). At the same time, voluntary CSR reporting of Chinese firms has grown significantly, signifying the budding of institutional convergence to Western CSR reporting systems. China has been mandating listed companies to ensure that at least one third of their boards be filled by independent directors in an effort to align Chinese corporate governance policies to international standards in the wake of China's entrance into the WTO in 2001 (Xiao & Yuan, 2007). The comparatively low level of CSR reporting in Asian countries (with China ranking last in both reporting quantity and quality) has been traced back to cultural traits

with corporate governance playing a moderating role in reducing the established negative effect of power distance on CSR reporting (Mohamed Adnan, Hay, & van Staden, 2018). Furthermore, a deeply rooted collectivist orientation in Asia, manifesting itself in the principles of harmony and unification may clash with the concept of board diversity more fiercely than in Western management cultures (for a similar argumentation on Korean boards: Chang et al. (2017)).

Moon and Shen (2010) posit a growing interest of Chinese regulators in CSR reporting. In 2008, the Shenzhen and Shanghai Stock Exchange issued guidelines for listed companies to release independent CSR reports. This is consistent with the notion that CSR reporting implies means to "ensure that society's resources are distributed in a reasonable, balanced, and sustainable way" (Noronha, Tou, Cynthia, & Guan, 2013). The theoretical background (Chapter 5.2.2) will therefore include sustainability theory as a general backdrop. Until now, only less than 1/3 of Chinese listed firms release CSR reports, either mandatorily or voluntarily. It is therefore of interest, what type of companies engages in disclosing CSR reports and what drives the quality of these CSR reports.

In short, the central research question of this paper is how corporate governance structures, particularly diversity-in-boards (gender, education, national origin, age, tenure) and diversity-of-boards (independent/non-independent directors) influence companies' CSR disclosure in Chinese listed firms while controlling for CEO duality. Specifically, we explore how board diversity influences the incidence of voluntary CSR disclosure and the quality of CSR disclosure. In contrast to Hoang et al. (2018), we employ an objective measure of CSR disclosure quality.

## 5.2 Literature Review and Hypotheses

### 5.2.1 Research Gaps Derived from the Literature Review

Even though the existing literature shows that boards of directors play an important role in promoting CSR performance, a limited amount of research examines whether board diversity has any influence on CSR performance not to mention its potential effect on CSR disclosure. We summarize the results of existing studies on the impact of board diversity on a number of dependent variables (see headings) as follows:

*Board Diversity and Financial Performance.* A major strand of management literature has revolved around the impact of board diversity on financial performance. It is briefly reported here as it sheds light on relevant board characteristics for CSR reporting. There is no

conclusive evidence so far that a higher representation of women on corporate boards will lead to a better firm performance. In their rigorous meta-analysis of 20 studies, Pletzer, Nikolova, Kedzior, and Voelpel (2015) find a small positive but insignificant effect of an increased female board representation on corporate financial performance. They suggest that other factors (e. g. the board diversity of independent/non-independent directors) might be more important in explaining firm performance. Likewise, according to Marinova, Plantenga, and Remery (2016), no relationship between board diversity and firm performance (Tobin's Q) could be established for Dutch and Danish companies. Carter, D'Souza, Simkins, and Simpson (2010) use a sample of US companies listed in the S&P 500 index for the period 1998-2002 and find a positive and significant relationship between the number of women on the board and ROA but no relationship with Tobin's Q.

There has been little focus to date on Asia when it comes to the consequences of a higher female board representation with a few recent noteworthy exceptions: The panel regression of Liu, Wei, and Xie (2014) for China and the two-stage least squares approach of Low, Roberts, and Whiting (2015) for other Asian countries are confined to gender diversity and independent/non-independent diversity of boards of directors and investigate firm's financial performance instead of CSR disclosure. Both Liu et al. (2014) and Low et al. (2015) find a small significant effect of female directors on firm's financial performance (ROE, among others). Liu et al. (2014) find the effect of female directors on performance to be stronger for executive than for independent directors.

In summary, the majority of empirical studies focus on the impact of board diversity on firm's financial performance or financial disclosure with an emphasis on gender diversity but without addressing its impact on CSR performance or CSR disclosure.

***Board Diversity and CSR (Performance).*** Overall, both positive and neutral results of gender diverse boards on CSR performance have been obtained. Kramer, Konrad, and Erkut (2016) suggest that the neutral results could be explained by critical mass theory, which argues that women directors are typically minority directors and tend to become mere tokens for their group (Brewer & Kramer, 1985). Harjoto, Laksmana, and Lee (2015) find that gender, tenure and expertise diversity impact positively on CSR performance of US boards, measured as higher ability to serve different stakeholders and mirrored by reduced conflict levels. Bear, Rahman, and Post (2010) find a positive relationship between the number of

female directors on the board and CSR performance (confined to CSR strengths and concerns[13] and not involving CSR disclosure).

Jain and Jamali (2016) conduct a meta-analysis on the effect of corporate governance (including board size, board independence, CEO duality and managerial compensation) on CSR outcomes. As a result, they strongly recommend that studies look into the effect of board expertise or the diversity of national origin which according to them is rarely done and to include more board composition variables, including board tenure. Accordingly, among other diversity variables, we include tenure and as well as diversity regarding education and nationality with the latter serving as proxies for the international experience of directors.

In summary, a limited number of studies (Bear et al., 2010; Post, Rahman, & Rubow, 2011) indicate that board diversity can have an effect on some aspect of CSR or CSR performance. Fewer studies still address CSR disclosure.

***Board Diversity and CSR Disclosure.*** For US listed companies, Giannarakis, Konteos, and Sariannidis (2014) investigate the impact of CEO duality and women on the board on the quantitative instead of qualitative perspective of CSR reporting for the period of 2009-2012. Contrasting with empirical corporate governance research, the majority of studies on CSR reporting (including its relationship with board diversity) between 2005 and 2016 focus on the quantity of voluntary reporting in developing countries, e. g. Malaysia and Bangladesh, with the exception of China (Velte, 2017), see however Xiao and Yuan (2007). Khan et al. (2013) examine the effect of corporate governance structure on CSR disclosure in Bangladesh during the period 2005–2009 and find that ownership structure and CEO duality play a vital role in ensuring organizational legitimacy through CSR disclosure. Hoang et al. (2018) study corporate boards in Vietnam and do not include a longitudinal dataset.

Within the narrow range of studies on the relationship between corporate board structure and CSR disclosure, countries other than China dominate (e. g. Bangladesh in Khan et al. (2013), Vietnam in Hoang et al. (2018) and Saudi-Arabia in Omair Alotaibi and Hussainey (2016) ). Based on a panel regression, Chang et al. (2017) find a U-shaped relationship between educational diversity of board members and CSR reporting in Korea, but they only use a measure of CSR reporting quality and did not measure the incidence of CSR reporting. For

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[13] Bear et al. (2010) use the natural environment ratings data from Kinder Lydenberg Domini (KLD) Inc. It consists of 14 dichotomous environmental "strength" and "concern" variables, which are indicators of CSR performance instead of CSR disclosure.

a mixed sample from Asian countries, Amran, Lee, and Devi (2014) screen sustainability reports of a specific year and find CSR reporting quality to be unrelated to the size, independence and gender diversity of the board.

***Board Diversity and CSR Disclosure in China.*** Referring to China, Xiao and Yuan (2007) find that the presence of independent directors increases voluntary CSR reporting while CEO duality decreases voluntary disclosure of Chinese listed firms. Their definition of corporate voluntary disclosure is broad, however, and does not address CSR disclosure in particular nor do they conduct a longitudinal study. The longitudinal study by Liu and Zhang (2017) finds board independence to be unrelated and board size (counter to their hypothesis) to be positively related to CSR reporting quality with their sample restricted to listed Chinese companies in heavy-pollution industries. Our own sample is not restricted to heavy polluting companies and the results should therefore provide a more general picture on how board characteristics impact on CSR reporting in Chinese listed companies.

Huang and Zhou (2015) focus on voluntarily released CSR reports only and especially test the influence of female executives (rather than female directors) on CSR voluntary disclosure. McGuinness, Vieito, and Wang (2017) restrict their investigation to gender and foreign ownership's board representation in Chinese listed companies and also do not differentiate between voluntary and mandatory CSR disclosure.

Liao et al. (2018) investigate how the board structure, e. g. the number of female directors and CEO duality, impact the board's decision to obtain external assurance for their CSR report in Chinese companies. However, this external audit of the CSR report does not coincide with the decision to draw up a CSR report in the first place which is in the interest of our paper. Although Li, Zhang, and Foo (2013) are also investigating the factors influencing the quality of CSR reports, they concentrate on the bearing of financial indicators on reporting quality, except for the presence of independent directors which they find to negatively affect CSR reporting quality. Mohamed Adnan et al. (2018) also investigate a potential relationship between corporate governance and CSR disclosure quantity and quality (including Chinese companies) but concentrate on the existence of CSR committees and government ownership which cover aspects confined to the company level unrelated to the diversity-in-boards (individual level) that we are interested in.

In the nearest paper to our research, McGuinness et al. (2017) restrict their investigation to gender and foreign ownership's board representation in Chinese listed companies and do not differentiate between voluntary and mandatory CSR disclosure. For our study, it is therefore

considered essential to employ a more comprehensive measure of diversity and to address both voluntary and mandatory CSR disclosure. As outlined above, the majority of existing studies have investigated only a limited set of board characteristics, most often CEO duality and board independence (with mixed results) and board size (where results are more equivocal pointing towards a positive impact of board size on CSR reporting).

We employ a comprehensive set of demographic and structural board diversity variables. We also add to the sparse literature on Chinese listed companies' CSR disclosure and the even sparser literature on CSR disclosure quality, which we measure by an external, objective measure. In addition, our study employs a longitudinal dataset that only few studies do.

## 5.2.2    Theoretical Background of the Present Study

Our study has roots both in diversity research and the CSR literature. As a unified theory on diversity and CSR disclosure is lacking, we bind together theoretical resources as varied as comparative institutional theory, management science (similarity-attraction theory, resource-dependence theory and agency theory) and the evolving research field of corporate sustainability studies. In order to avoid the pitfalls of an uncritical "institutional transplantation" of Western corporate structures (Kang, 2014) when discussing diversity of boards of directors and their impact on CSR reporting, the corporate sustainability literature shall serve as an overarching conceptual background and guideline for this article.

In the longer standing literature on corporate governance, studies on how corporate governance affects economic outcomes (Carter et al., 2010; Liu et al., 2014) have dominated the field at the expense of environmental and social outcomes, which is why a reorientation of the research field towards corporate sustainability is called for (Hahn, Figge, Aragón-Correa, & Sharma, 2017). Sustainability studies are not limited to technological transitions but also include institutional changes driven by a holistic instead of just shareholder-driven perspective (Markard, 2017). In line with this and in contrast to the majority of existing studies, while analyzing the implications of a higher board diversity on the quality of CSR, we address the societal rather than the financial implications of board diversity. Comparative institutional theory (Schmidt, 2009) can in principle explain the drivers behind convergence (e.g., adaptation of the two-tier board system in China) on the one hand and on the other hand divergence (e.g., need for adaptation of CSR reporting systems) of national management systems approaches in general and of CSR practices in particular. From the viewpoint of comparative institutional theory, drivers of institutional changes are regulations

and anti-discrimination ordinances, which may lead to the inclusion of a higher ratio of women and older board members in boards, whereas divergent national management systems may be maintained due to path-dependency of business systems, welfare regimes and industrial relations (Flynn & Schröder, 2018).

In addition to institutionalism, we draw on theories confounding a hypothesized link between (board) diversity and performance. In this sense, most diversity studies draw on similarity-attraction theory, resource-dependence theory and agency theory.

Similarity-attraction theory posits a negative relationship of diversity with performance, as group communication frictions impede cooperation (Klein & Harrison, 2007). By contrast, resource-dependence theory (Pfeffer & Salancik, 1978) and agency theory (Jensen & Meckling, 1976) project a positive relationship because additional problem-solving capacity may open up and the quality of monitoring is expected to improve. Although the task environment of boards of directors differs from work groups, it can be posited based on similarity-attraction theory that diversity impedes strategic consensus (Knight et al., 1999), for example, when directors have undergone different socialization processes and have formed different mind sets regarding social responsibility and legitimacy towards the environment. Specifically, diversity in age and tenure might lead to generational clashes that hamper a unified response towards reporting issues. Handajani, Subroto, Sutrisno, and Saraswati (2014) , for instance, report a decline in the quality of CSR disclosure with longer tenure.

Resource-dependence theory is in line with the advisory perspective of governance, which purports that boards provide the company with critical resources and legitimacy (Hillman & Dalziel, 2003). Mobilizing resources and providing legitimacy, however, may be facilitated best through a close match with the environment that the board is entitled to serve (Isidro & Sobral, 2015).

The link between corporate governance and firms' public disclosure emerges from agency theory (Jensen & Meckling, 1976), following the fiduciary perspective of governance, which argues that management (agent) may exploit informational asymmetries thereby eroding the interests of shareholders (principal). As a consequence, control may be more effectively exerted by diverse boards (Carter et al. 2010). A good governance structure will increase transparency and accountability through a higher quality of disclosure. Given that boards of directors are major players in corporate governance, board structure is likely to have some bearing on financial and non-financial, mandatory and voluntary disclosure as part of CSR.

Based on their literature survey, McGuinness et al. (2017) argue that Chinese firms with a higher gender representation on the board are less likely to trade off social and community needs against quantifiable financial outcomes and will therefore be more likely to have a high degree of CSR disclosure.

What differentiates Chinese companies from their counterparts in European and US companies is their idiosyncratic corporate governance structure, e. g. their high proportion of SOEs or companies in which state ownership is substantial. In addition, with the exception of Malaysia, Asian governments refrain from intervening by means of target quotas (Low et al., 2015), which also makes closer investigation of the role of board structure in Asian countries particularly interesting. As the majority of directors in Chinese listed companies are non-independent directors, the views of independent directors can have a significant impact on CSR disclosure, e.g. by improving the quality of reports (Carter et al., 2010; Liu et al., 2014). We therefore include independent/non-independent directors as a diversity variable as well. Based on the abovementioned theories, our hypotheses are as follows:

### 5.2.3 Hypotheses

*Incidence of Voluntary CSR Disclosure.* In accordance with resource-dependence theory (regarding diversity-in-boards) and agency theory (regarding diversity-of-boards), we hypothesize as follows:

*H1: There is a positive relationship between board diversity (H1a: gender, H1b: nationality, H1c: independent/non-independent directors, H1d: education) and CSR disclosure (incidence).*

In addition, in line with similarity-attraction theory (regarding diversity-in-boards), we hypothesize:

*H2: There is a negative relationship between board diversity (H2a: age, H2b: tenure) and CSR disclosure (incidence).*

*Quality of CSR Reports.* Based on the same theoretical reasoning, we hypothesize:

*H3: There is a positive relationship between board diversity (H3a: gender, H3b: nationality, H3c: independent/non-independent directors, H3d: education) and CSR disclosure (quality).*

*H4: There is a negative relationship between board diversity (H4a: age, H4b: tenure) and CSR disclosure (quality).*

The aim of the present paper is thus to extend existing research on how board diversity impacts on CSR disclosure incidence and quality in Chinese companies, which may eventually lead to a better CSR performance. In this vein, the proposed link between corporate governance and CSR performance is investigated further. This adds to the sparse literature in the field, especially as regards the hypothesized link between board diversity (including both demographic and structural diversity variables) and CSR disclosure (incidence and quality) in emerging countries, in this case China.

## 5.3 Methodology

The present paper investigates whether board diversity in Chinese companies has a significant influence on CSR disclosure. We measure CSR disclosure by two indicators: the incidence of voluntary CSR disclosure and the quality of CSR reports, including both of mandatory and voluntary disclosure.

We employ a comprehensive measure of board diversity, which includes the six dimensions of gender diversity, age diversity, nationality diversity, tenure diversity, education diversity (diversity-in-boards) and independent/non-independent diversity of board directors (diversity-of-boards) and control for CEO duality. In particular, for diversity-in-boards, we use the "Blau index" (see Appendix A1), which has reached a key relevance in empirical diversity research, but not yet in CSR disclosure research (Velte, 2017); for diversity-of-boards, we employ a dissimilarity measure in line with Hoang et al. (2018) (see Appendix A2).

### 5.3.1 Data

The data used to measure CSR disclosure is drawn from the CSR reports ratings database of RKS, a third-party rating company that evaluates and rates CSR reports issued by Chinese listed companies since 2009. Referring to ISO 26000, an international standard of guidance on social responsibility, RKS adopts a system of MCTi to evaluate the CSR reports from the four perspectives of Macrocosm, Content, Technique and Industry (see Appendix B). On 16th of December 2016, the database has last been expanded by adding the evaluations of firms' 2015 CSR reports which were released in 2016. Therefore, our observation period lasts 6 years in total, starting from 2009 and ending in 2015.

Accounting and financial datasets used in this chapter are obtained from the China Stock Market and Accounting Research (CSMAR) Database developed by the Shenzhen GTA Information Technology Company. Information about corporate governance structure and

ownership structure are available in the CSMAR Database as well. The demographic information of individual board directors is collected from Wind Financial Database (WIND), which is the leading provider of financial and economic information in China. Some missing data are manually collected from the internet or by individually checking the firms' annual financial reports.

### 5.3.2 Sample

Since 2008, the Shenzhen Stock Exchange (SZSE) and Shanghai Stock Exchange (SSE) have issued guidelines for listed companies to release independent CSR reports beside their annual financial reports. For companies listed on the SZSE and included in the Shenzhen Component Index, it is mandatory to disclose CSR reports. In addition, financial companies listed in SSE, companies included in the SSE Corporate Governance Index and companies listed both domestically and overseas are also mandated to release CSR reports.

We base our study on a sample of all the companies listed in SZSE and SSE from 2009 to 2015, excluding firms with missing annual reports and observations and financial companies as they have unique business models. Finally, the whole sample consists of 16,184 annual observations from 2009 to 2015. Among these observations, there are 3,988 CSR reports in a given year during this period, where 2,402 are mandatorily reported and 1,586 are voluntarily released.

### 5.3.3 Model

We measure the impact of board diversity on CSR disclosure from two perspectives, the incidence of voluntary CSR disclosure and the quality of CSR reports.

***Logit Model on the Incidence of Voluntary CSR Disclosure.*** Firstly, we exclude 2,402 mandatory CSR disclosure observations from the whole sample. Based on the rest of 13,782 observations, including 1,600 voluntary disclosure and 12,182 non-disclosure observations, we investigate the impact of board diversity on a firm's intention to disclose a voluntary CSR report by means of a logit model. The dependent variable is $CSR_{disclosure\ incidence}$，which is defined as dummy=1, if the company discloses its CSR report voluntarily in year t and 0 otherwise. Independent variables are the six dimensions of board diversity as mentioned before. We control for firm fundamentals such as firm size[14], firm's financial performance (ROA) and leverage ratio[15]; and other variables related to corporate governance

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[14] Firm size is measured by natural logarithm of the number of employees.

[15] Leverage Ratio is calculated as the ratio of liabilities to assets.

structure, for example state ownership[16], board size[17] and CEO duality[18]. To control for regional differences, based on the marketization index of China's provinces (Wang, Fan, & Hu, 2018), firms are classified into higher and lower marketization groups, depending on their locations[19] Furthermore, year and industry effects are controlled.

$$CSR_{\text{disclosure incidence}} = \alpha + \beta_1 \text{Div}_{\text{gender}} + \beta_2 \text{Div}_{\text{age}} + \beta_3 \text{Div}_{nation} + \beta_4 \text{Div}_{edu} +$$
$$\beta_5 \text{Div}_{\text{ind/non-ind}} + \beta_6 \text{Div}_{\text{tenure}} + Control\ Variables + \varepsilon \qquad 5.1$$

***Panel Regression on the Quality of CSR Reports***. Secondly, a panel regression is executed to explore what factors influence the quality of CSR reports. The research sample is therefore 3,988 annual observations that either voluntarily or mandatorily release CSR reports during the period of 2009-2015. The dependent variable $CSR_{disclosure\ quality}$ is taken from RKS's rating scores of CSR reports. The independent variables and control variables are mainly adopted from the logit model above. In addition, we add a regulation variable to control for the potential impact from the partial mandatory CSR disclosure regulation in China.

$$CSR_{disclosure\ quality} = \alpha + \beta_1 \text{Div}_{\text{gender}} + \beta_2 \text{Div}_{\text{age}} + \beta_3 \text{Div}_{nation}$$
$$+\beta_4 \text{Div}_{edu} + \beta_5 \text{Div}_{\text{ind/non-ind}} + \beta_6 \text{Div}_{\text{tenure}} + Control\ Variables + \varepsilon \qquad 5.2$$

## 5.4   Empirical findings

### 5.4.1   The Incidence of Voluntary CSR Disclosure

Table 5.1 presents summary statistics for variables used for Model 5.1. The results in Table 5.2 indicate that companies with a higher board diversity regarding national origin, independent/non-independent directors and education are more likely to issue voluntary CSR reports. In detail, firms with more foreign directors are more likely to disclose their CSR reports. Independent directors will impel the firms to release CSR reports. A corporate board that consists of directors from different educational backgrounds is more likely to issue CSR reports. In addition, a larger corporate board increases the likelihood of CSR disclosure, while CEO duality has the opposite effect. Gender diversity appears to be unrelated to CSR

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[16] Two dummy variables are used to distinguish the nature of state ownership in Chinese listed firms. State_national variable states whether the firm is controlled by the central government, while State_local variable indicates whether the firm is controlled by provincial-level or municipal-level government (all the possibilities under central-level government).

[17] Board Size is described as the number of board directors.

[18] CEO Duality is a dummy variable, which takes on the value 1 if CEO and chairman of the board is the same person, otherwise 0.

[19] We rank the 31 provincial-level administrative regions in mainland China from top to bottom by year according to the scores obtained from the provincial marketization index. Then for every year, the region which owns a score higher than the median is allocated into the high-marketization group and to the low-marketization group otherwise. Therefore, regarding the dummy variable of high-marketization in the model, firms located in the high marketization regions obtain 1, otherwise 0.

disclosure. Therefore, *H1a* is rejected. *H1b* (nationality), *H1c* (independent/non-independent directors) and *H1d* (education) however cannot be rejected. Tenure and age showed to be unrelated to CSR disclosure, therefore *H2* is rejected.

In terms of firm's fundamentals, firm size and firm's financial performance matter for voluntary CSR disclosure. Large firms are more likely to publish CSR reports than small firms. Firms with better financial performance tend to engage more heavily in CSR disclosure. Moreover, central SOEs are more often to disclose their CSR performance. Institutions matter as evidenced that business environment with a higher level of marketization may promote firms' CSR disclosure in the region.

**Table 5.1: Descriptive Statistics for Model 5.1**

| Variable | Mean | Std | Min | Max |
|---|---|---|---|---|
| CSRre | 0.116 | 0.320 | 0 | 1 |
| Size | 7.272 | 1.219 | 3.638 | 10.200 |
| ROA | 0.043 | 0.067 | -0.282 | 0.233 |
| LEV | 0.434 | 0.247 | 0.050 | 1.514 |
| State_central | 0.108 | 0.311 | 0 | 1 |
| State_local | 0.241 | 0.428 | 0 | 1 |
| Markethigh | 0.823 | 0.382 | 0 | 1 |
| Bdsize | 8.654 | 1.647 | 4.000 | 18.000 |
| Ceoduality | 0.267 | 0.443 | 0 | 1 |
| Div_gender | 0.410 | 0.318 | 0 | 1 |
| Div_nationality | 0.057 | 0.182 | 0 | 1 |
| Div_age | 0.716 | 0.156 | 0 | 1 |
| Div_ind/non-ind | 0.097 | 0.055 | 0.053 | 0.741 |
| Div_education | 0.786 | 0.148 | 0 | 1 |
| Div_tenure | 0.588 | 0.330 | 0 | 1 |

Observations=13782

**Table 5.2: Logit Regression on the Incidence of Voluntary CSR Disclosure**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Size | 0.357*** | 0.357*** | 0.351*** | 0.357*** | 0.351*** | 0.358*** | 0.354*** | 0.347*** |
| ROA | 1.518*** | 1.519*** | 1.487*** | 1.518*** | 1.529*** | 1.509*** | 1.581*** | 1.489*** |
| LEV | -0.225 | -0.226 | -0.211 | -0.225 | -0.223 | -0.226 | -0.234 | -0.209 |
| State_central | 0.671*** | 0.670*** | 0.693*** | 0.670*** | 0.667*** | 0.689*** | 0.667*** | 0.708*** |
| State_local | 0.0623 | 0.0617 | 0.0845 | 0.0619 | 0.0577 | 0.075 | 0.0548 | 0.093 |
| Markethigh | 0.590*** | 0.590*** | 0.584*** | 0.590*** | 0.597*** | 0.586*** | 0.588*** | 0.587*** |
| Boardsize | 0.0332** | 0.0332** | 0.0325* | 0.0333* | 0.0485*** | 0.0281 | 0.0320* | 0.0427** |
| Ceoduality | -0.161** | -0.160** | -0.162** | -0.161** | -0.169** | -0.164** | -0.156** | -0.174** |
| Div_gender | | -0.0121 | | | | | | |
| Div_nationality | | | 0.325** | | | | | 0.329** |
| Div_age | | | | -0.00908 | | | | |
| Div_ind/non-ind | | | | | 1.353*** | | | 1.376*** |
| Div_education | | | | | | 0.387** | | 0.393** |
| Div_tenure | | | | | | | 0.0975 | |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 13,782 | 13,782 | 13,782 | 13,782 | 13,781 | 13,782 | 13,782 | 13,781 |
| Pseudo R-squared | 0.0509 | 0.0509 | 0.0514 | 0.0509 | 0.0516 | 0.0513 | 0.051 | 0.0525 |

*** p<0.01, ** p<0.05, * p<0.1

## 5.4.2 The Quality of CSR Reports

Table 5.3 presents summary statistics for Model 5.2. As shown in Table 5.4, the panel regression delivers mixed results. Diversity regarding gender, independent/non-independent directors and education do not impact CSR disclosure quality, which is why *H3a*, *H3c* and *H3d* are rejected. By contrast, diversity regarding the national origin of directors has a positive effect on the quality of CSR reports (*H3b* is not rejected), while higher tenure diversity (but not age diversity) of board directors is associated with a worse quality of CSR reports. Therefore, *H4a* (age diversity) is rejected but *H4b* (tenure) cannot be rejected.

In addition, the quality of mandatory CSR reports is better than that of voluntary ones und CSR reports from local SOEs are significantly better than others.

**Table 5.3: Descriptive Statistics for Model 5.2**

| Variable | Mean | Std. | Min | Max |
|---|---|---|---|---|
| CSRScore | 37.960 | 11.990 | 11.690 | 87.950 |
| Size | 8.335 | 1.380 | 4.970 | 12.010 |
| ROA | 0.049 | 0.057 | -0.282 | 0.233 |
| LEV | 0.495 | 0.204 | 0.050 | 1.513 |
| Regulation | 0.602 | 0.489 | 0 | 1 |
| State_central | 0.250 | 0.433 | 0 | 1 |
| State_local | 0.368 | 0.482 | 0 | 1 |
| Bdsize | 9.338 | 2.004 | 4.000 | 18.000 |
| Ceoduality | 0.160 | 0.367 | 0 | 1 |
| Div_gender | 0.332 | 0.310 | 0 | 1 |
| Div_nationality | 0.071 | 0.196 | 0 | 1 |
| Div_age | 0.707 | 0.154 | 0 | 1 |
| Div_ind/non-ind | 0.102 | 0.068 | 0.053 | 0.706 |
| Div_education | 0.785 | 0.142 | 0 | 1 |
| Div_tenure | 0.699 | 0.271 | 0 | 1 |

Observations=3988

**Table 5.4: Panel Regression on the Quality of CSR Reports**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Size | 0.364 | 0.362 | 0.352 | 0.358 | 0.367 | 0.364 | 0.37 | 0.359 |
| ROA | 2.291 | 2.284 | 2.364 | 2.204 | 2.301 | 2.291 | 2.302 | 2.369 |
| LEV | 0.434 | 0.436 | 0.477 | 0.431 | 0.432 | 0.436 | 0.546 | 0.575 |
| Regulation | 1.283*** | 1.280*** | 1.258** | 1.266** | 1.284*** | 1.283*** | 1.359*** | 1.329*** |
| Boardsize | 0.208** | 0.208** | 0.200* | 0.203** | 0.201* | 0.209** | 0.210** | 0.202* |
| Ceoduality | -0.339 | -0.341 | -0.322 | -0.338 | -0.338 | -0.34 | -0.343 | -0.326 |
| State_national | 0.0163 | 0.0129 | 0.055 | 0.0344 | 0.00972 | 0.0136 | 0.0613 | 0.0933 |
| State_local | 1.815* | 1.801* | 1.842* | 1.836* | 1.800* | 1.816* | 1.887* | 1.906* |
| Div_gender | | -0.0864 | | | | | | |
| Div_nationality | | | 2.303** | | | | | 2.149** |
| Div_age | | | | 0.643 | | | | |
| Div_ind/non-ind | | | | | -0.514 | | | |
| Div_education | | | | | | -0.0495 | | |
| Div_tenure | | | | | | | -0.763* | -0.692* |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 3,988 | 3,988 | 3,988 | 3,988 | 3,988 | 3,988 | 3,988 | 3,988 |
| R-squared | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.39 | 0.391 |
| Number of stkcd | 793 | 793 | 793 | 793 | 793 | 793 | 793 | 793 |
| Adj R-squared | 0.232 | 0.232 | 0.233 | 0.232 | 0.232 | 0.232 | 0.233 | 0.233 |

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

## 5.5   Summary

### 5.5.1   Main Findings

The interpretation on most of the results is straightforward and in line with part of our hypotheses. The results on the **incidence of voluntary CSR disclosure** indicate that the

presence of foreign and independent directors as well as of directors with different educational backgrounds makes firms more likely to disclose CSR reports. This can be explained by increased legitimacy and a better compliance with the fiduciary perspective of governance hypothesized by resource-dependence theory and agency theory respectively. In addition, firms with larger corporate boards and financially more successful firms have an increased likelihood of CSR disclosure. These results are in line with our hypotheses that posit positive impact of these diversity variables on CSR disclosure. While the size and performance link appears in prior studies and can be well explained by the bigger funds available to successful companies to be invested in CSR disclosure, the presence of foreign and independent directors may exert an effect of heightened transparency and accountability towards the environment. Marketization of regions may serve as a similar accountability and transparency enhancing function. CEO duality appears to lower the incidence of CSR disclosure, which can be explained by the lower quality of monitoring when the board chairman and the CEO are the same person.

The results on the **quality of CSR disclosure** based on a panel regression show that *H3* must be rejected for all variables (gender, independent/non-independent directors, education), as they are unrelated to CSR disclosure quality, except for nationality. *H3b* cannot be rejected, diversity in national origin among directors appears to positively influence the quality of CSR disclosure. *H4* has to be rejected for age, but cannot be rejected for tenure. The result that a higher tenure diversity of board directors is associated with a worse quality of CSR reports is consistent with our hypothesis. This is also in line with the result of Handajani et al. (2014), who report a decline in the quality of CSR disclosure with longer tenure[20]. They trace back to the long-standing relationships of board members with management, which may weaken their monitoring incentives. A similar effect may be at work when boards are mixed as regards tenure, whereas an additional friction may come in due to the conflicts between directors of longer and shorter tenure. The lower quality of CSR disclosure might be explained by the lack of strategic consensus, when directors with different socialization histories are confronted with each other, assuming that a longer tenure is associated with a more traditional upbringing (firm-specific experience) in the same company.

It is somewhat counterintuitive that the quality of mandatory CSR reports is better than voluntary ones and CSR reports from local SOEs are significantly better than the others. The higher quality of mandatory reporting may be related to the fact that in our dataset the

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[20] They measure tenure as average tenure of directors on the board.

mandatorily reporting companies are meanwhile predominantly bigger and located in regions with higher marketization, which results in a better financial standing. Those mandatorily reporting firms could spend larger amount of time and financial funds on drawing up CSR reports, which will improve the reporting quality. Moreover, voluntarily reporting firms, instead of further improving the reporting quality which is hard to be recognized by the market under current loose regulation of CSR reporting in China, may view "conducting CSR reporting" as a good enough signal to distinguish themselves on the market from other non-reporting firms. A further qualitative study by survey or interview could help to identify this assumption.

The better quality of CSR reports from local SOEs than the ones from non-SOEs might also trace back to the better financial situation of SOEs. This is compatible with the results of Chen, Hung, and Wang (2018) on the lower profitability levels of SOEs following their entry into the CSR disclosure mandate (in force in China since 2008). They interpret it in the light of SOEs' lower efficiency of spending on CSR. Furthermore, industry structure may also enter into explaining the higher CSR reporting quality in local SOEs within the group of SOEs. Whereas central SOEs are more involved in monopolized primary sectors, such as mining, electricity or petrochemical industry, local SOEs exist mostly in more competitive and export-oriented markets. Therefore, local SOEs could consider better quality of CSR reporting as a good signal to the capital market, their investors and clients (especially international ones). Meanwhile, better quality of CSR reporting could be in favor of local SOEs' rent seeking behaviors towards larger scale of financing from the central government. Moreover, considering the promotion systems of party officials in China, party officials in local SOEs who face more fierce fellow competition than those in central SOEs are more likely to urge the local SOEs to improve their CSR performance and provide better CSR reporting beyond that with the aim for their own promotion.

In conclusion, our study is comparable with prior studies as regards both methodology and the target population of Asian companies, although Chinese listed companies have been under researched in the past. We depart from the existing literature in several respects and include a wide set of diversity variables (gender, age, tenure, national origin, education, independent/non-independent directors) by conducting a longitudinal study on both the incidence and quality of CSR reports for the time span of 2009-2015. CSR disclosure is investigated by employing objective rather than subjective measures for CSR disclosure quality. While investigating overall reporting could cloud the differential effects of

mandatory and voluntary reporting, we are able to isolate the effects of the two types of reporting.

Our study thereby contributes to a better understanding of the relationship between various types of demographic and structural diversity and the decision of Chinese companies to voluntarily disclose CSR reports as well as their quality. It appears that an increased openness of boards (higher marketization, higher diversity in directors' educational background and more independent directors of different nationalities) contribute to the incidence of voluntary CSR disclosure and the quality of CSR reports (diversity in nationality only) in Chinese listed firms.

### 5.5.2 Limitations

Admittedly, our study has some limitations. Due to the idiosyncrasy of the governance structures in Asian companies, the results can hardly be assumed to be directly transferrable to Western-type governed organizations. Meanwhile, the vast majority of Chinese companies are small and medium-sized, often family-owned businesses, which are not present in the data of listed companies that we based our analysis on.

Further, specifically ecological determinants of CSR reporting could have been included like in Giannarakis et al. (2014) who investigate, among other factors, the relationship between greenhouse gas emissions and CSR reporting. Liao, Le Luo, and Tang (2015) investigate the board's impact on greenhouse gas disclosure as a particular type of CSR reporting. The choice of more independent variables in our study might have gone at the expense of including a more comprehensive set of board characteristics, which have hitherto been only incompletely investigated, especially in relation to CSR disclosure quality. In addition, the MCTi System of RKS covers a wider range of disclosure areas (Economic performance, Labor and human rights, Environment, Fair operation, Consumer, etc.) and the results should therefore not be confined to environmental reporting alone.

CSR disclosure quality could have been measured through content analysis of CSR reports like, e.g., in Amran et al. (2014) and El-Bassiouny and El-Bassiouny (2019). Employing an independent multi-dimensional rating measure of quality may have been added to the objectivity of our results. The quality of rating could be enhanced further in order to assess the relevance of the reported indicators according to industries' main field of operation, for example, reporting on environmental impact would then be particularly highly weighted in

the final quality score for companies from the chemicals industry or product quality and safety for the food and beverage industry (Noronha et al., 2013).

As in Mohamed Adnan et al. (2018), moderating variables could have been included, thus enabling us to cover the influence of cultural factors (e.g., uncertainty avoidance, power distance, traditional values, business environment) on CSR reporting. The cultural setting of Asian countries might have been better mirrored by assuming non-linear relationships between board characteristics and CSR as established by Chang et al. (2017) for Korea.

Further (preferably, qualitative and case-related) studies could look into the mechanisms leading to board decisions in diversified boards, whereas we treated the decision-making on the board as a black box. Building on our results, social ties, e.g. of CEOs or directors to the external environment, which impact on decision-making, could also be included in a future study to help understand how far the cultural specificities of China (board social ties or *guanxi*) also shape CSR strategies (Chang et al., 2017). Examining board's decision-making processes with regard to CSR through qualitative or case study research would provide more insight into the mechanisms, through which board diversity relates to the incidence and quality of CSR reporting.

# 6. Board Capital and Corporate Innovation[21]

## 6.1 Introduction

Board structure and its impact on corporate innovation has been a topic of much attention in recent years. Based on the theoretical framework for analysis of board capital in Chapter 3, in this chapter, a detailed empirical study investigating how board capital impacts corporate innovation is conducted for a sample of Chinese listed firms in the period of 2002-2015.

In the empirical field, most of the previous studies concentrate on the relationship between board structure and corporate innovation in advanced economies, while the evidence from transition countries is lacking (Choi, Lee, & Williams, 2011). China is experiencing huge economic transition from a centrally planned economy to a market-oriented economy. As shown in Chapter 2, the Chinese corporate governance does not align with either Anglo-American or European-continental corporate governance model, but it has achieved a surge in both economic growth and innovation performance. Accordingly, China becomes a particularly interesting context to investigate the relationship between board structure and corporate innovation.

Due to the essential role of corporations in economic activities, the cost of their agency problems is extremely relevant (Adams, Hermalin, & Weisbach, 2010). In theoretical field, most corporate governance studies depend on agency theory (Fama & Jensen, 1983; Jensen & Meckling, 1976) and resource dependence theory (Pfeffer & Salancik, 1978). As discussed in Chapter 3, board directors serve at least two important functions through contributing board capital to firms: monitoring management on behalf of shareholders and providing resources and advices for firm operations (Hillman & Dalziel, 2003). Thus, board of directors plays an important role in corporate governance, while an efficient board structure can reduce agency (transaction) costs that arise from the separation of control and ownership (Balsmeier, Fleming, & Manso, 2017) and enrich critical resources for corporate strategic development.

With regard to corporate innovation, previous corporate governance research mainly focuses on the principal-agent problems arising between managers and owners as a whole, while the cooperation and conflicts among board directors are often ignored. For instance, based on these two theories, Guldiken and Darendeli (2016) find an inverted U-shaped relationship

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between board monitoring and R&D intensity. Dalziel et al. (2011) establish an integrated agency-resource dependence approach and demonstrate the effects of directors' human and relational capital on R&D spending. However, the application of agency theory and resource dependence theory in corporate governance research seems to have reached a bottleneck, as agency theory excludes the role of board human capital and resource dependence theory does not consider the influence of interconnections among board directors, which is directly related to board internal social capital.

In detail, there are important economies of specialization especially once firms have differentiated operative functions and a wide scope of products. The more specialized the background of individuals on the board is, the more important becomes trust in the competence of others, namely the board internal social capital. Thus, there exists some sort of balance between board diversity (i.e. heterogeneity), which allows advantages of differentiated competences, and homogeneity, which reduces contract, i.e., transaction costs. Board diversity, from an economic perspective, may thus increase the overall board capital as long as the advantages of board diversity (the increase of board capital breadth) are allowed to compensate for costs of coordination (the consumption of board internal social capital). This establishes the fundamental hypothesis of the empirical research in this chapter: diversities per se have a negative impact on board efficiency and, thus, innovation unless (over-) compensated by trust-enhancing elements such as reason and rationality assumed to correlate with academic education and willingness to share knowledge represented by patent generation. Furthermore, age should have an ambiguous impact (Schneider, 2011): fluid knowledge of young personnel should spread innovation – but at the potential costs of cooperation; through crystalline knowledge of elder personnel, the company should benefit from experience – but at the cost of innovation.

As Fukuyama (1996) notes in his seminal book that trust is the most important factor behind human and economic development, we establish a game theory model combining with institutional and transaction cost factors in this chapter as the basis to investigate how board's strategic decision-making on corporate innovation works, in particular the functioning of board internal social capital when board directors interact with each other in the context of collective decision-making.

## 6.2 Survey of Literature

### 6.2.1 Board Independence and Corporate Innovation

In the research field of board structure, the effect of outside or independent directors on firm performance is probably the most widely discussed (Hermalin & Weisbach, 2001). Hoskisson, Hitt, Johnson, and Grossman (2002) classify innovation activities into two types: 1) internal innovation, such as R&D and producing new products, and 2) external innovation, for instance, obtaining new products and new processes or building new markets through acquisition. They argue that inside directors emphasize internal innovation, while outside directors focus more on external innovation. And outside directors from innovative firms could increase especially the number of patents in the firms they serve for as board directors.

In most American listed companies, the board of directors is dominated by independent directors (outside directors without affiliations). A number of studies have found that independent directors are more effective in reducing agency costs and improving firm performance (Balsmeier et al., 2017). Firms with independent boards focus more on patenting activities and their patents receive more citations, indicating the relatively higher quality of innovation output, while independent directors who compared to inside directors provide more diversified opinions and ideas from an outside perspective can enhance exploration of new technologies. (Balsmeier et al., 2017). With respect to China, Shapiro, Tang, Wang, and Zhang (2015) demonstrate that having independent directors and the presence of an external CEO promote the number of granted invention patents, while board size has no impact. Dong and Gou (2010) confirm that the increased number of independent/outside directors could improve firms' innovation capabilities, while the great discretionary power of CEOs would lead to low investment in R&D activities.

However, some studies demonstrate that there is no evidence that greater board independence results in improved firm performance (Bhagat & Black, 2000; Hermalin & Weisbach, 2001). Hermalin and Weisbach (1991) find that board composition tends to have no influences on economic performance and inside and outside directors are similar in terms of representing the shareholders' interests. Moreover, there is evidence that a larger independent board, or the so-called "monitoring board", could impair firm performance. One explanation is that inside directors are often better informed about how the firm operates, for example the current status and future demand of corporate innovation activities, comparing to independent directors who are relatively weaker in obtaining firm specific information of

good quality (Bhagat & Black, 2002), which is necessary for enhancing efficiency in corporate strategic decision-making.

### 6.2.2 Board Diversity and Corporate Innovation

Besides board independence, board diversity especially gender diversity and their effects on firm's financial performance have been widely tested in empirical research, but are rarely examined in terms of corporate innovation. Board diversity of gender, racial and cultural composition, is believed to influence a firm's short-term and long-term economic performance in several ways (Carter, Simkins, & Simpson, 2003). These propositions could bring a lot of advantages to firms, such as improving market understanding, increasing creativity and innovation capacity, facilitating better problem-solving, enhancing leadership effectiveness, and building broad international relationships (Robinson & Dechant, 1997). Using a sample of Norwegian firms, Torchia, Calabrò, and Huse (2011) find that firms could benefit from the board gender diversity in value, perspectives, skills and backgrounds of directors. But appointing only a small minority of women directors (one or two) seems to be unworkable, because they will be stereotyped and ignored by the majority group of male members. The "threshold" (or "the critical mass") is confirmed to be three: firm's innovation performance would increase if there are at least three women on the board.

### 6.2.3 Ownership Structure and Corporate Innovation

*Ownership Concentration.* Minetti, Murro, and Paiella (2015) find that ownership concentration has negative effects on R&D effort as conflicts between large and minority shareholders play an essential role, while Chen, Li, Shapiro, and Zhang (2014) argue that diversity of ownership types is more important in explaining innovation performance than ownership concentration. Some other studies regard ownership as an institutional factor for driving corporate innovation activities and illustrate that it could moderate the relationship between board structure and firm's innovation performance (Jiang, Waller, & Cai, 2013; Le, Walters, & Kroll, 2006; Song, Wei, & Wang, 2015). However, Lee and O'neill (2003) demonstrate that ownership concentration can strengthen firms' motivation to invest in R&D in the US, but in Japan, increasing ownership concentration does not affect R&D expenditures. In Spanish manufacturing industries, ownership concentration also does not positively influence the increase in R&D expenditures (Ortega-Argiles, Moreno, & Caralt, 2005). Choi et al. (2012) give empirical evidence from Korea with a dataset of 301 firms and find that ownership concentration has no significant effects on corporate innovation

performance, while the presence of certain ownership types (like institutional and foreign ownership) present a positive influence. Furthermore, Li, Guo, Yi, and Liu (2010) find an inverted-U relationship between ownership concentration and product innovation in China. Similarly, using a unique sample of small and medium-sized enterprises in Zhejiang, Shapiro et al. (2015) find the marginal effect of ownership concentration decreases when concentration reaches a high level.

***Ownership Types and Institutional Ownership.*** In order to realise technological catch-up, an appropriate ownership structure is required for firms in emerging countries. Establishing a dataset of 548 Chinese firms, Choi et al. (2011) find that patenting activities of firms are influenced by ownership types and foreign ownership leads to higher innovation output, while inside ownership has a negative effect on innovation performance. Aghion, van Reenen, and Zingales (2013) argue that greater institutional ownership leads to higher innovation output. Stockholdings and sophistication of institutional investors could help managers focus on long-term value oriented activities such as enhancing R&D input rather than earning short-term profit (Bushee, 1998). Further, when the proportion of institutional ownership is higher, CEOs are less likely to be fired in the situation of profit downturns.

### 6.2.4  Institutions and Corporate Innovation.

Different institutional frameworks lead to a variety of board structures and its effects on corporate innovation vary from country to country (Choi et al., 2011). Board structure, including the diversity dimension, shapes board capital and board incentives, which decides the board's capacity and willingness to engage in the decision-making regarding corporate innovation strategies. In general, radical innovations tend to appear more often with Anglo-Saxon models of corporate governance, while incremental technological progress may be more encouraged by German patterns (Miozzo & Dewick, 2002).

The survey of literature shows that researchers in the field of corporate governance and corporate innovation have obtained so far controversial results. To understand more precisely about how corporate innovation emerges from the very start, it may be above all valuable to open up the door of the boardroom for investigating its decision-making process regarding innovation. Therefore, the following game theoretic model describing how board directors cooperate on strategic decision-making of corporate innovation strategies with emphasis on the functioning of board internal social capital could be helpful.

## 6.3  A Model of Cooperation on the Corporate Board[22]

### 6.3.1  A Game Theoretic Model for Firm-level Innovation Output

For the sake of simplicity, let as assume that board diversity is limited to two persons or groups. Let innovation output, $Q$, be given by the use of human capital, $H$, physical capital, $K$, and cooperation, $l$:

$$Q = A \cdot H^{\alpha} \cdot K^{\beta} \cdot l^{\delta},$$

$$0 \leq l \leq 1; \quad \alpha + \beta \leq 1; \alpha > 0; \quad \beta > 0; \delta > 0. \qquad\qquad 6.1$$

Let total factor productivity, $A$, depend on network size, which is compatible with new growth theory (Romer, 1990). This network could be represented by research involvement, i.e. the degree to which a firm participated in the system of publicized knowledge production; patent production could be a good indicator.

$$A = n^{\gamma}, \quad \gamma > 0. \qquad\qquad 6.2$$

Let the efficiency of human capital depend on unit productivity, $h$. This variable could be represented by the qualification of board members. In addition, their cooperation, $l$, matters that can be measured, for instance by experience[23].

$$H = l \cdot h \qquad\qquad 6.3$$

Whereby $l=0$ for non-cooperation, $l=1/2$ for one-sided cooperation and $l=1$ for two-sided cooperation. The performance of unit physical capital, $k$, and on innovation cluster embedment, $n$,

$$K = n \cdot k. \qquad\qquad 6.4$$

Then the innovation output, $Q$, is given by

$$Q = n^{\gamma} \cdot (l \cdot h)^{\alpha} \cdot (n \cdot k)^{\beta} \cdot l^{\delta},$$

$$0 \leq l \leq 1; \quad \alpha + \beta + \delta \leq 1; \quad \alpha > 0; \quad \beta > 0; \delta > 0; \quad \gamma > 0. \qquad\qquad 6.5$$

We may subtract a factor c for signaling effort, i.e. communicating with other board members. Trustworthy signals will improve cooperation over time in a learning process.

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[22] The following model is adapted from Heckathorn (1996) following Blum/Dudley (2001).

[23] The repeated prisoners' dilemma game would suggest a learning process that would lead to efficient outcomes.

Let us concentrate on innovation output from the perspective of management (the firm); then the reward will be the result of two-sides cooperation as shown in Figure 1, the sucker will stem from the signaling effort of one board member vis-à-vis the reluctance to signal of the other. In the reverse case, one board member tries to suck the competences of the other. If both do not signal, their reduced income is equivalent to a reservation wage.

**Figure 6.1: Pay-Off-Matrix of the Firm**

board member 2

| | cooperation | non cooperation |
|---|---|---|
| **cooperation** | reward $h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} - c$ | reluctance $2^{-(\alpha+\delta)} \cdot h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} - c$ |
| **non cooperation** | sucker $2^{-(\alpha+\delta)} \cdot h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma}$ | penalty $w$ |

board member 1

(A C / B D)

The five parameters of economic interest are paired as follows:

- Cooperation productivity, $\delta$, against capital (human and physical, $h$ and $k$).

- Network (patent cluster) size, $n$, against capital (human and physical, $h$ and $k$).

### 6.3.2 Game-Theoretical Outcomes

Here, as shown in Table 6.1, we concentrate on the four types of games that are relevant for our analysis, and provide the relations for pay-offs for the line player, i.e. board member 1.

**Table 6.1: Basic Game Structures**

| Basic Game | Line Player (Player 1) |
|---|---|
| Prisoner's Dilemma: | $B_1 > A_1 > D_1 > C_1$ |
| Chicken Game: | $B_1 > A_1 > C_1 > D_1$ |
| Assurance Game: | $A_1 > D_1 > C_1$ and $A_1 > B_1$ |
| Social Optimum: | $A_1 > C_1 > D_1$ and $A_1 > B_1$ |

Let us first relate to human and physical capital. From the perspective of the firm, the prisoner's dilemma is given by B>A>D>C. Then

- **B>A**:

$$p \cdot 2^{-(\alpha+\delta)} \cdot h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} > p \cdot h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} - c,$$

$$\delta < -\frac{\ln\left(1 - \dfrac{c}{h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma}}\right)}{\ln 2} - \alpha.$$

- **A>D**:

$$h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} - c > w,$$

$$h > \frac{1}{2} \cdot \left[\frac{c+w}{k^\beta \cdot n^{\beta+\gamma}}\right]^{1/\alpha}.$$

- **D>C**:

$$w > 2^{-(\alpha+\delta)} \cdot k^\beta \cdot n^{\beta+\gamma} - c,$$

$$\delta > \frac{\ln\left(\dfrac{h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma}}{w+c}\right)}{\ln 2} - \alpha.$$

From the perspective of the firm, the chicken game is given by B>A>C>D. Thus, an additional comparison is necessary:

- **A>C**:

$$2^{-(\alpha+\delta)} \cdot h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} - c > h^\alpha \cdot k^\beta \cdot n^{\beta+\gamma} - c,$$

- **A>C**: $\alpha + \delta > 0.$

Finally, from the perspective of the firm, the assurance game is given by A>D>C and A>B. The social optimum will be derived later.

Let us now relate to network size. From the perspective of the firm, the prisoner's dilemma is given by B>A>D>C. Then

- **B>A**:

$$n < \left[\frac{c}{h^\alpha \cdot k^\beta \cdot (1 - 2^{-(\alpha+\delta)})}\right]^{\frac{1}{\beta+\gamma}}.$$

- A>D:

$$n < \left[ \frac{w+c}{h^{\alpha} \cdot k^{\beta}} \right]^{\frac{1}{\beta+\gamma}}.$$

- D>C:

$$n < \left[ \frac{w+c}{h^{\alpha} \cdot k^{\beta} \cdot 2^{-(\alpha+\delta)}} \right]^{\frac{1}{\beta+\gamma}}.$$

From the perspective of the firm, the chicken game is given by B>A>C>D. Thus, an additional comparison is necessary:

- A>C: $\alpha + \delta > 0.$

All other cases are included – only the direction of inequality in the relations has to be changed.

### 6.3.3 Visualization

*Productivity vs. Capital.* In the following, the functions computed are used as discriminants to visualize the tipping points of strategic variables where outcomes lead to new equilibria. In the δ - h - world (or the δ - k - world respectively, which produces similar results), we obtain four areas of interest: The area of prisoners' dilemma, of chicken game, of assurance game and – derived formally – of social optimum (A>B and A>C>D) from the following four discriminants:

| | |
|---|---|
| • <u>B>A</u> (prisoners' dilemma and chicken game): $$\delta < -\frac{\ln\left(1 - \frac{c}{h^{\alpha} \cdot k^{\beta} \cdot n^{\beta+\gamma}}\right)}{\ln 2} - \alpha,$$ | • <u>B<A</u> (assurance game and social optimum): $$\delta > -\frac{\ln\left(1 - \frac{c}{h^{\alpha} \cdot k^{\beta} \cdot n^{\beta+\gamma}}\right)}{\ln 2} - \alpha.$$ |
| • <u>A>D</u> (prisoners' dilemma): $$h > \frac{1}{2} \cdot \left[ \frac{c+w}{h^{\alpha} \cdot k^{\beta} \cdot n^{\beta+\gamma}} \right]^{1/\alpha},$$ | • <u>D<A</u> (assurance game): $$h < \frac{1}{2} \cdot \left[ \frac{c+w}{h^{\alpha} \cdot k^{\beta} \cdot n^{\beta+\gamma}} \right]^{1/\alpha}.$$ |
| • <u>D>C</u> (prisoners' dilemma and assurance game): | • <u>D<C</u> (chicken game and social optimum): |

| | |
|---|---|
| $$\delta > -\dfrac{\ln\left(1-\dfrac{w+c}{h^{\alpha}\cdot k^{\beta}\cdot n^{\beta+\gamma}}\right)}{\ln 2}-\alpha-1\,,$$ | $$\delta < -\dfrac{\ln\left(1-\dfrac{w+c}{h^{\alpha}\cdot k^{\beta}\cdot n^{\beta+\gamma}}\right)}{\ln 2}-\alpha-1\,.$$ |

- A>C (chicken game and social optimum): $\alpha+\delta>0$.

Figure 6.2 gives the discriminants of the above relations, i.e. the cases of equality B=A, D=E, A=E. What we clearly see is that with increasing cooperation productivity and human capital (physical capital respectively) the dismal situation of the chicken game and the prisoner's dilemma can be overcome. Thus, from a theoretical point of view, all variables relating to these two determinants of board performance vis-à-vis innovation should be positive in the later econometric model.

**Figure 6.2: Critical Areas in the δ - h - World**
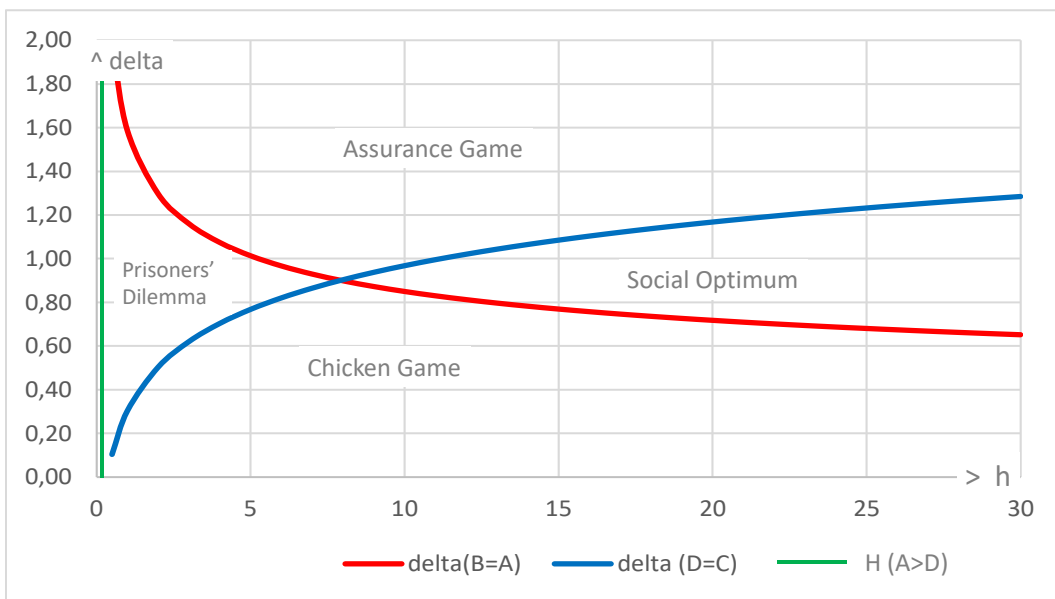


High values of cooperation productivity cannot overcome low human capital endowment and vice versa. This is especially visible in the prisoner's dilemma situation. The chicken game implies a performance where a fraction of the board may dominate the rest – individuals are brainy but do not cooperate.

We follow that both *h* and *δ*, i.e. the productivity of cooperation and the level of human capital, must be large in order to reach high levels of innovation performance. The empirical research will thus focus on this issue.

***Cluster Cooperation vs. Capital.*** As in the visualization above, the functions computed are used as discriminants in a n - h - world (or the δ - k - world respectively, which produces similar results), we obtain four areas of interest: The area of prisoners' dilemma, of chicken

game, of assurance game and – derived formally – of social optimum (A>B and A>C>D) from the following four discriminants:

| | |
|---|---|
| • <u>B>A</u> (prisoners' dilemma and chicken game):<br><br>$$n < \left[ \frac{c}{h^{\alpha} \cdot k^{\beta} \cdot (1 - 2^{-(\alpha+\delta)})} \right]^{\frac{1}{\beta+\gamma}},$$ | • <u>B<A</u> (assurance game and social optimum):<br><br>$$n > \left[ \frac{c}{h^{\alpha} \cdot k^{\beta} \cdot (1 - 2^{-(\alpha+\delta)})} \right]^{\frac{1}{\beta+\gamma}}.$$ |
| • <u>A>D</u> (prisoners' dilemma):<br><br>$$n < \left[ \frac{w+c}{h^{\alpha} \cdot k^{\beta}} \right]^{\frac{1}{\beta+\gamma}},$$ | • <u>D<A</u> (assurance game):<br><br>$$n > \left[ \frac{w+c}{h^{\alpha} \cdot k^{\beta}} \right]^{\frac{1}{\beta+\gamma}}.$$ |
| • <u>D>C</u> (prisoners' dilemma and assurance game):<br><br>$$n < \left[ \frac{w+c}{h^{\alpha} \cdot k^{\beta} \cdot 2^{-(\alpha+\delta)}} \right]^{\frac{1}{\beta+\gamma}},$$ | • <u>D<C</u> (chicken game and social optimum):<br><br>$$n > \left[ \frac{w+c}{h^{\alpha} \cdot k^{\beta} \cdot 2^{-(\alpha+\delta)}} \right]^{\frac{1}{\beta+\gamma}}.$$ |

• <u>A>C</u> (chicken game and social optimum): $\alpha + \delta > 0$.

Again, the discriminants shown in Figure 6.3 show the cases of equality. The results show that high values of human capital and network externalities lead to a social optimum, followed by the assurance game.

**Figure 6.3: Critical Areas in the n - h - World**
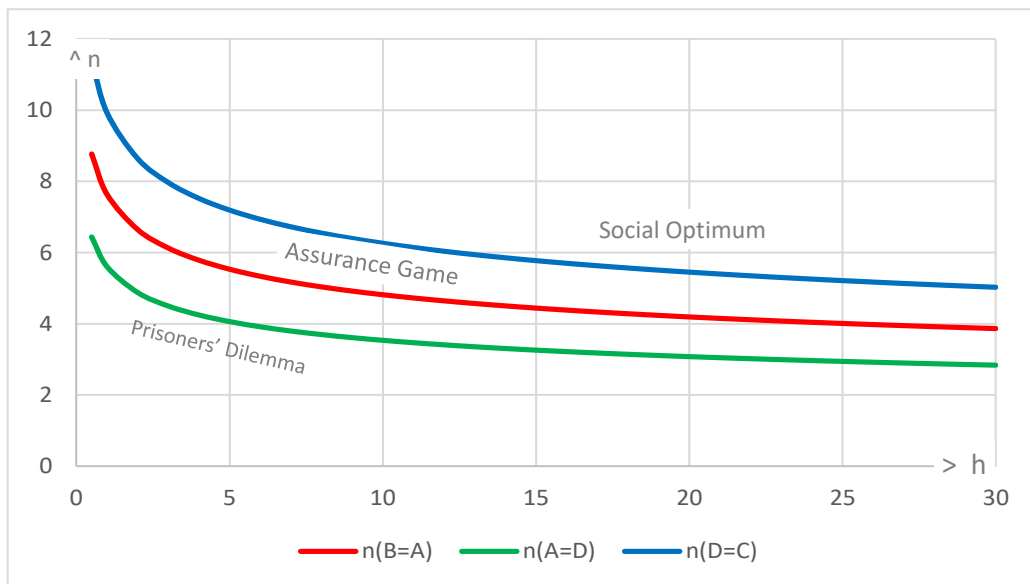
Low levels of both variables are associated with the prisoners' dilemma. Note that the chicken game is missing. Its feasible regions are above the blue line (D<C) and below the red line (B<A) which is obviously contradictory. This means that this type of trust game excludes chicken-type outcomes. If one group of the board defects, there will be no winner.

## 6.4 Methodology

We built up our research on a sample of Chinese firms listed in Shanghai and Shenzhen Stock Exchange from 2002 to 2015. The data set is determined by the joint availability ofdata on basic firm characteristics, the composition of corporate boards and patent data from China Stock Market & Accounting Research (CSMAR) of GTA Information Technology Company, information on individual board directors from Wind Financial Database (WIND) and the yearly provincial growth data from National Bureau of Statistics of China (NBSC). WIND, as the market leader of China's financial information services industry, provides real-time demographic information of board directors and top management, including their gender, age, nationality, education background, independence (whether independent or non-independent directors) and on-duty period. Tenure of directors is then calculated by manually transferring the on-duty period data into a yearly base.

The patent dataset of CSMAR includes listed firms from all industries, but only industrial firms are included in our research, whereas financial and retail industries may possess unique business models und innovation activities, in particular, patenting activities are of limited importance in agricultural and service sectors (Boeing, 2016).

### 6.4.1   Network Effects, Board Capital and Board Diversity

We have grouped the predictor variables according to the game-theoretical model. The key variables of interest in this study are network effects, board capital and board diversity:

*Network and Network Productivity*

- Patent applications: They show the involvement in the technological community as patents make private information public against the assurance of exclusive use for a limited period. It is the endogenous variable and a positive sign suggests positive cooperation.

*Board Capital*

- Levels of university graduation of board members: Human capital is raised through education; graduation on the master and the doctoral level should positively influence

innovation. The coefficient of education background measure should be positive, which means capital productivity positively influence innovation.

- Board age: At lower age, board members should be more individualistic and innovative; however, at higher age, experience should promote cooperation. In this sense, we examine in the estimation which of these two age effects dominates in promoting firm's innovation output.

- Board tenure: the longer a director stays on a certain corporate board, the more specific knowledge he/she will accumulate for the operation of this firm and for the cooperation with other board members as well. Thus, a corporate board with an averagely longer tenure of directors should promote cooperative behavior on decision-making of innovation strategies.

- Board independence: usually the proportion of independent directors on the board indicates the level of board independence. Much research has suggested that independent directors are more effective in reducing agency costs and improving corporate governance. Following Balsmeier et al. (2017), we establish that a higher degree of board independence should increase firm's innovation output.

### *Board Diversity: Transaction Costs of Cooperation*

- Diversities: Gender, nationality, age, tenure, education and independence increase heterogeneity and, thus, transaction costs, once their positive effects are captured in human-capital variables. Especially in 2001, the China Securities Regulatory Commission (CSRC) promulgated a guide to introduce independent (external) directors to corporate boards and called for at least one third of board members to be independent directors. Induced by this regulatory change as a natural experiment, it is interesting to test whether board diversity that caused by this systematic change of board independence has effects on firm's innovation output.

### 6.4.2 Model

In order to identify how network effects, board capital and board diversity impact corporate innovation output, we design the main model as following:

$$\log(1 + \text{patent}_{it}) = \beta_0 + \beta_1 \cdot network_{it} + \delta \cdot board_{it}^{capital}$$

$$+\varphi \cdot board_{it}^{diversity} + \gamma \cdot Z_{it} + \theta_t + \alpha_i + \epsilon_{it} \qquad 6.6$$

Where patent$_{it}$ is the number of eventually granted patents (until 31.12.2016) of firm $i$ applied in year $t$. The main explanatory variables of interest, $\boldsymbol{network_{it}}$ is the network effects of innovation activities measured by the number of patent applications per thousand employees for firm $i$ in year $t$; $\boldsymbol{board_{it}^{capital}}$ represents the set of board capital, including the average age and tenure of board directors, the proportion of independent directors, and the percentage of directors with a master degree or above; $\boldsymbol{board_{it}^{diversity}}$ measures cooperation efficiency on the board by a vector of six board diversity index for gender, nationality, age, tenure, education and independence (see Appendix A). $\boldsymbol{Z_{it}}$ is a vector of control variables containing indicators of firm characteristics and macroeconomic environments.

Two estimation models are widely used in empirical corporate finance research: one refers to the pooled ordinary least square (OLS) regression controlling for industry effects and the other is the panel regression with fixed effects. We estimate the baseline model in OLS for the whole sample and extend to panel regression with firm fixed effects $\alpha_i$ to control for any unobserved firm heterogeneity that is time-invariant and with year fixed effects $\theta_t$ to control for systematic changes in patenting activities over time. Considering the failures to correct for differences in time periods and truncation caused by the lag between application and patent grant in the patent dataset (Lerner & Seru, 2017), we run and compare panel regressions for different groups of observations (sample periods from 2002 to 2013, 2014 and 2015 respectively).

### 6.4.3 Measuring Innovation Output

A variety of indicators are used for measuring innovation output in empirical research, while the number of patents is quite frequently used. In China, there are three categories of patents: invention, utility model and design patents. Compared with the other two types of patent, invention patents are judged by higher standards and often used as an indicator for innovation performance (Kroll & Kou, 2018; Li, 2012). Using a dataset of Chinese small and medium-sized enterprises in Zhejiang province, Shapiro et al. (2015) find that board attributes affect innovation performance more strongly when innovation is measured by invention patents than new product sales. On the one hand, invention patents and new products sales measure different forms of innovation, the former representing relatively radical innovations and the latter incremental technological progress. On the other hand, increase in new product sales requires more input from marketing and sales personnel. It involves more stakeholders at the operational level, which makes it more difficult to unify them to realise the targets.

Accordingly, we use invention patents that are eventually granted as a measure of corporate innovation output in this chapter.

### 6.4.4 Control Variables

*Firm Characteristics*

- Work force of company: The number of employees is a general indicator of firm size and should impact innovation positively.

- Ownership: It is not clear whether state or provincial ownership reduce performance through interference or improve it through privileged access to capital markets and government subsidies.

- Financial stability: A good leverage ratio should positively influence innovation.

*Extern Macroeconomic Conditions*

- Regional income: As a measure of general economic conditions, per capital GDP in the province or the region, in which the firm's headquarter is situated, can be a good indicator to capture macroeconomic conditions and regional differences.

## 6.5 Results

### 6.5.1 Descriptive Statistics

Table 6.2 presents the descriptive statistics on the data set. In Panel A, the patenting activities of the sample firms show skewness with a mean of 6.87 and a median of 1.00 granted patents. Panel B provides information on network effects by patent applications per thousand employees. It reveals similar distributions as granted patents and high concentrations among the most active firms. Panel C and Panel D present the summary statistics for measures of board capital and board diversity respectively. For board diversity measures, mathematical rationales and index constructions are detailed in Appendix A. Control variables for firm characteristics and macroeconomic environments are summarized in Panel E.

Regarding the variables of interest, the average firm in our sample has 51 % of its board directors that own a master or above degree, an average age of directors at 49.26 years old, an average tenure of directors at 3.66 years in observation years, a proportion of independent directors for 36%, lower board diversity in terms of nationality and independence, a firm size of 2,022 employees and a leverage ratio of 43%. 13% and 24 %

of the sample are central SOEs and local SOEs respectively. A correlation matrix of all variables is displayed in Table 6.3.

## 6.5.2 Estimation Results

We run regressions on the number of firms' eventually granted patents that applied for. Table 6.4 contains four specifications of model 6.6: specification (a) is a standard OLS model with industry fixed effects for the period from 2002 to 2015; specification (b) , (c), (d) are standard firm fixed effects models for the period of 2002-2015, 2002-2014 and 2002-2013 respectively. For all models with firm fixed effects, the Adj R-squred (within the group) values refer to the explained within-firm variance. Year fixed effects are controlled for all regression analyses and the reported standard errors are adjusted for potential heteroscedasticity.

The overall results suggest that network effects have a significant and positive impact on the number of firms' granted patents. When the number of patent applications per thousand employees increases by 1, the effect on innovation output ranges an 8%-9% increase in the number of granted patents. Comparing specification (b) with (c) and (d), the variables of interest remain statistically stable when the sample period is changed to adjust the truncation problems. In regard to board capital, the results indicate that board education, board tenure and board independence have significantly positive effects on innovation output, while board age has significantly negative effects. For board diversity, we find that board diversity in terms of independence has significantly negative effects on innovation output, but board diversities of other dimensions remain insignificant. This reveals that the systematic change in board independence since 2001 instead of other sources of board diversity has the most significant and strongest on corporate innovation performance. Consistent with Balsmeier et al. (2017) that independent directors increase both managerial effort and risk aversion by stronger board oversight on innovation-related activities, our results show that independent directors improves innovation performance by strengthened governance as well. But in accordance to our game theory model of cooperation on the board, the involvement of independent directors as outsiders, which has increased the breadth of board capital, also bring potential conflict of interests to the board (Adams & Ferreira, 2007) , which may consume the board internal social capital. Moreover, due to independent directors' less familiarity with the firm's industry specifics, technology and operation, the involvement of independent directors may increase transaction costs for board's decision-making on innovation strategies, and thus negatively influence the firm's innovation performance.

## Table 6.2: Descriptive Statistics

| Variable | Mean | Median | Std. | Min | Max |
|---|---|---|---|---|---|
| *Panel A* | | | | | |
| Patents(granted) | 6.87 | 1.00 | 73.85 | 0.00 | 3665.00 |
| | | | | | |
| *Panel B* | | | | | |
| Network effects: patent applications (per thousand employees) | 3.72 | 0.66 | 13.63 | 0.00 | 800.00 |
| | | | | | |
| *Panel C* | | | | | |
| Board education | 0.51 | 0.55 | 0.23 | 0.00 | 1.00 |
| Board age | 49.26 | 49.22 | 3.85 | 34.44 | 64.86 |
| Board tenure | 3.66 | 3.47 | 1.59 | 1.00 | 12.48 |
| Board independence | 0.36 | 0.33 | 0.07 | 0.00 | 0.67 |
| | | | | | |
| *Panel D* | | | | | |
| Board gender diversity | 0.37 | 0.40 | 0.31 | 0.00 | 1.00 |
| Board nationality diversity | 0.07 | 0.00 | 0.20 | 0.00 | 1.00 |
| Board age diversity | 0.73 | 0.76 | 0.15 | 0.00 | 1.00 |
| Board tenure diversity | 0.61 | 0.73 | 0.32 | 0.00 | 1.00 |
| Board education diversity | 0.80 | 0.82 | 0.14 | 0.00 | 1.00 |
| Board independence diversity | 0.10 | 0.08 | 0.06 | 0.04 | 0.69 |
| | | | | | |
| *Panel E* | | | | | |
| Firm size: log (employee) | 7.61 | 7.58 | 1.14 | 0.00 | 12.19 |
| Leverage | 0.43 | 0.42 | 0.23 | 0.05 | 1.51 |
| Regional Income: log (regional per capita GDP) | 10.54 | 10.63 | 0.67 | 8.47 | 11.55 |
| Central state-owned (dummy) | 0.13 | 0.00 | 0.33 | 0.00 | 1.00 |
| Local state-owned (dummy) | 0.24 | 0.00 | 0.43 | 0.00 | 1.00 |

Number of observations = 13,379.

**Table 6.3: Correlation Matrix**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 Patents(granted) | 1 | | | | | | | | | | | | | | | | |
| 2 Network effects | 0.19* | 1 | | | | | | | | | | | | | | | |
| 3 Board education | 0.06* | 0.06* | 1 | | | | | | | | | | | | | | |
| 4 Board age | 0.04* | 0.01 | -0.07* | 1 | | | | | | | | | | | | | |
| 5 Board tenure | 0.04* | -0.01 | -0.02* | 0.30* | 1 | | | | | | | | | | | | |
| 6 Board independence | 0.02 | 0.06* | 0.17* | 0.13* | 0.04* | 1 | | | | | | | | | | | |
| 7 Board gender diversity | -0.02 | 0.01 | -0.06* | -0.07* | 0.01 | 0.09* | 1 | | | | | | | | | | |
| 8 Board nationality diversity | 0.01 | 0.02 | 0.02 | 0.13* | 0.00 | 0.00 | 0.02 | 1 | | | | | | | | | |
| 9 Board age diversity | 0.01 | -0.03* | -0.19* | 0.18* | 0.00 | -0.04* | 0.02 | 0.06* | 1 | | | | | | | | |
| 10 Board tenure diversity | 0.03* | -0.04* | 0.06* | 0.15* | 0.50* | -0.01 | -0.04* | -0.05* | 0.01 | 1 | | | | | | | |
| 11 Board education diversity | 0.00 | -0.01 | -0.05* | -0.01 | -0.03* | -0.01 | -0.01 | 0.05* | 0.06* | -0.03* | 1 | | | | | | |
| 12 Board independence diversity | 0.00 | 0.02 | 0.03* | 0.06* | 0.00 | 0.38* | 0.01 | -0.02 | -0.01 | -0.04* | -0.04* | 1 | | | | | |
| 13 Firm size | 0.15* | -0.15* | 0.11* | 0.20* | 0.22* | -0.04* | -0.10* | 0.06* | -0.02 | 0.24* | -0.02* | 0.00 | 1 | | | | |
| 14 Leverage | 0.04* | -0.08* | 0.03* | 0.00 | 0.05* | -0.03* | -0.11* | -0.07* | -0.02 | 0.20* | -0.04* | -0.02 | 0.28* | 1 | | | |
| 15 Regional Income | 0.03* | 0.12* | 0.18* | 0.22* | 0.12* | 0.32* | 0.17* | 0.08* | -0.06* | 0.00 | -0.01 | -0.01 | -0.05* | -0.17* | 1 | | |
| 16 Central state-owned (dummy) | 0.01 | 0.01 | 0.18* | 0.12* | -0.01 | 0.01 | -0.11* | -0.05* | -0.08* | 0.08* | -0.05* | -0.06* | 0.13* | 0.10* | 0.01 | 1 | |
| 17 Local state-owned (dummy) | 0.00 | -0.06* | 0.06* | 0.16* | 0.13* | 0.04* | -0.09* | -0.10* | -0.02 | 0.18* | -0.06* | -0.04* | 0.20* | 0.25* | -0.14* | -0.22* | 1 |

**Table 6.4: Board Structure and Granted Patents**

|  | (a) 2002-2015 b/se | (b) 2002-2015 b/se | (c) 2002-2014 b/se | (d) 2002-2013 b/se |
|---|---|---|---|---|
| Network effects | 0.0896*** | 0.0838*** | 0.0896*** | 0.0916*** |
|  | (0.0017) | (0.0022) | (0.0024) | (0.0028) |
| Board education | 0.405*** | 0.180*** | 0.178*** | 0.217*** |
|  | (0.0303) | (0.0480) | (0.0514) | (0.0566) |
| Ln (Board age) | 0.0141 | -0.380*** | -0.471*** | -0.410*** |
|  | (0.0911) | (0.1270) | (0.1370) | (0.1490) |
| Ln (Board tenure) | 0.0609*** | 0.0498*** | 0.0602*** | 0.0649*** |
|  | (0.0179) | (0.0186) | (0.0199) | (0.0216) |
| Board independence | 0.383** | 0.457** | 0.485*** | 0.510*** |
|  | (0.1540) | (0.1800) | (0.1880) | (0.1940) |
| Board gender diversity | 0.0344* | -0.0237 | -0.0244 | -0.0270 |
|  | (0.0207) | (0.0260) | (0.0275) | (0.0296) |
| Board nationality diversity | 0.0256 | 0.0208 | 0.0575 | 0.0467 |
|  | (0.0363) | (0.0562) | (0.0592) | (0.0625) |
| Board age diversity | -0.0400 | -0.0432 | -0.0397 | -0.0474 |
|  | (0.0432) | (0.0458) | (0.0487) | (0.0519) |
| Board tenure diversity | -0.0583** | -0.0050 | 0.0156 | 0.0173 |
|  | (0.0246) | (0.0242) | (0.0248) | (0.0263) |
| Board education diversity | 0.0658 | -0.0655 | -0.153*** | -0.132** |
|  | (0.0443) | (0.0519) | (0.0555) | (0.0602) |
| Board independence diversity | -0.261* | -0.489*** | -0.502*** | -0.311* |
|  | (0.1580) | (0.1670) | (0.1720) | (0.1770) |
| Firm size: log (employee) | 0.368*** | 0.231*** | 0.253*** | 0.253*** |
|  | (0.0081) | (0.0127) | (0.0139) | (0.0150) |
| Leverage | -0.123*** | -0.0816** | -0.0213 | 0.0084 |
|  | (0.0301) | (0.0410) | (0.0440) | (0.0477) |
| Regional Income: log (regional per capita GDP) | 0.0491*** | 0.446*** | 0.454*** | 0.390*** |
|  | (0.0148) | (0.0663) | (0.0702) | (0.0755) |
| Central state-owned (dummy) | 0.0492** | 0.125*** | 0.138*** | 0.129*** |
|  | (0.0238) | (0.0380) | (0.0395) | (0.0408) |
| Local state-owned (dummy) | -0.0630*** | 0.102*** | 0.0990*** | 0.0824*** |
|  | (0.0182) | (0.0298) | (0.0300) | (0.0305) |
| Observations | 13,379 | 13,379 | 11,710 | 10,170 |
| Adj R-squared | 0.51 | 0.71 | 0.74 | 0.75 |
| Adj R-squared (within group) |  | 0.39 | 0.40 | 0.41 |
| Year fixed effects | Yes | Yes | Yes | Yes |
| Firm fixed effects | No | Yes | Yes | Yes |

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

In detail, we interpret the results further by taking Specification (b) as a prototype. Consistent with our hypothesis on education level of board directors, if the number of board directors with a master or above degree increases by 1%, the number of granted patents will increase by 18%. A corporate board with a 10% higher average age of board directors is associated with a 3.8% decrease of innovation output in this firm. This proves our assumption on age that younger directors are more innovative and can make better advices on firms' innovation activities. In terms of trust and experience, if the board directors has worked on the board for 10% longer on average, the reduced transaction costs by accumulating experience and trust in cooperation with other board members will help increase corporate innovation output by 0.5%.

As we research on a sample of industrial firms, indicated by Table 6.2, the number of SOEs amounts to 37% of the whole sample. Interestingly, for ownership structure and innovation output, we find that a non-SOE owns on average 12% -14% less granted patents than a central SOE and 8%-10% less than a local SOE. The reason might be that SOEs could be more productive and innovative in some specific sectors and regions, which is consistent with some previous findings arguing that the state ownership for innovation performance could also play an essential role in certain economic and political context (Bozec, Breton, & Cote, 2002; Kroll & Kou, 2018). Secondly, SOEs can more easily access to capital markets and government subsidies especially in an institutional context of Chinese market, which could enable them to invest more on R&D. Further, SOEs may have different patenting strategies than private firms who prefer to keep know-how inside the firm and avoid the cost of patent litigations, which is also evidenced in small and medium-sized German firms. The number of patents as a measure of corporate innovation may also become part of the promotion system for party officials who are in charge of the SOEs. Moreover, SOEs usually have closer relationship to the patent office as governmental agency, which may bring SOEs priorities in obtaining granted patents after filing the patents.

## 6.6 Summary

This study extends the existing research on how board structure influences firm's innovation performance by setting up a game theory model of cooperation on the corporate board. From a game-theoretical point of view, we propose that all factors related to two main determinants of board performance vis-à-vis innovation, board capital and cooperation productivity, should have positive effects on firm's innovation performance as this helps not to fall into the prisoners-dilemma or chicken-game trap. The board human capital is deepening through

the overall education and experience of board directors and widening by the diversification of expertise among board directors. The cooperation productivity of the board depends on the level of board diversity and the trust and experience that board directors accumulate as board internal social capital by repeatedly cooperating with others against their diversities. Both the productivity of cooperation and the level of board human capital must be large in order to reach high levels of innovation performance.

Moreover, our results show that board diversity in terms of board independence accounts to the most significant and strongest effects on firm's innovation performance comparing to other dimensions of board diversity in China. Supporting evidence comes from the regulatory change: CSRC's call for board independence in 2001. Indicated by the positive coefficient of board independence measure, on one hand independent directors do improve corporate innovation performance by reducing agency costs and enriching resources and advices on innovation activities. But on the other hand, according to our game theoretical model, the introduction of independent directors to the board will increase transaction costs for board's decision-making on innovation strategies due to the inducing conflict of interests among independent directors and executive directors or managers. Therefore, the overall effect of board independence on innovation output diversifies in different institutional contexts and lacks sufficient arguments for a universal case. That's why the empirical results on board independence and corporate innovation are decidedly controversial.

# 7. Summary

## 7.1 Main Findings

China is experiencing huge economic transition from a centrally planned economy into a market-oriented economy in the last 40 years. However, China's high-speed growth is seemingly coming into an end. Looking into the future, an old but intriguing question comes to us: how can China further catch up with the industrial world? Our answer refers to institutions, especially institutions that promote and reward human capital building, either at individual or organization level. This becomes increasingly relevant now as China's demographic dividend is diminishing at an accelerated speed due to the previous one-child policy. The transformation into a sustainable model of high-quality development remains huge challenges for China in order to realize its modernization and catch-up with the West.

During China's market-oriented reform in the last 40 years, new institutions representing rule of law, market mechanisms and modern enterprise system, including the board of directors, have broken into the old institutional system and developed some puzzling features in it. For example, we view a coexistence of two-tier board structure and independent directors on the boards of Chinese listed firms. It's clear that not all efficient institutions in other market economies will work effectively and efficiently in China. Consequently, based on theories in the field of corporate governance, human resources management and institutional economics, I set out to conduct an empirical analysis by inquiring how boards of directors contribute to firm performance in China. Instead of focusing on firm's financial performance, I empirically test the relationship between board structure and firm growth, corporate CSR disclosure and corporate innovation, as they are more directly attributed to board's strategic decision-making. In detail, Table 7.1 presents a summary of the empirical findings on the main explanatory variables regarding board capital, board diversity and state ownership from the 3 empirical studies in this thesis. By comparison, we find that:

As Qian (2002) suggests to find out both efficiency enhancing and interest compatible institutions, by generally examining the institutional environment for Chinese firms, we point out that even though private firms contribute greatly to China's economic growth for decades as presented in Figure 2.2, SOEs still play an important role especially in certain sectors and enjoy disproportionate advantages in accessing to financing funds, which may pump up their performance. It's a bit surprising that in the sample period Chinese listed SOEs grow faster than non-SOEs in terms of sales per employee, they tend to have better

innovation performance measured by the number of granted patents, central SOEs are more likely to voluntarily release CSR reports, and CSR reports from local SOEs are significantly better than others.

**Table 7.1: Comparison of the 3 Empirical Studies**

| | Independent variables | 1 Firm growth | 2 Incidence of voluntary CSR disclosure | Quality of CSR disclosure | 3 Innovation output (granted patents) |
|---|---|---|---|---|---|
| **Board Capital** | Board size | — | + ** | + * | — |
| | Board age | (U shape) | — | — | - *** |
| | Board tenure | — | — | — | + *** |
| | Board independence | insignificant | — | — | + *** |
| | Board education | — | — | — | + *** |
| **Board Diversity** | Board-gender diversity | insignificant | insignificant | insignificant | insignificant |
| | Board-age diversity | — | insignificant | insignificant | insignificant |
| | Board-tenure diversity | — | insignificant | - * | insignificant |
| | Board-independence diversity | — | + *** | insignificant | - * |
| | Board-education diversity | — | + ** | insignificant | - ** |
| | Board-nationality diversity | — | + ** | + ** | insignificant |
| **State Ownership** | SOEs | + *** | — | — | — |
| | Central SOEs | — | + *** | insignificant | + *** |
| | Local SOEs | — | insignificant | + * | + *** |

*Note*: *** p<0.1, ** p<0.05, * p<0.1

In particular, board age tends to be a U shape when explaining firm growth, but it is negatively related to corporate innovation output. The inclusive results could be explained by the mix/interaction of different types of board capital that age is indicating, e.g. experience and innovative capacity. It's evident that for firm growth, experience on boards outweighs innovative capacity when it surpasses certain point but innovative capacity is more decisive towards corporate innovation.

Contrary to expectations, board gender diversity, which is currently in hot debate, has no significant effects in all 3 empirical cases. This might be due to the tokenism effects of female directors on Chinese corporate board, as the average percentage of female board directors is only around 10% and the Chinese regulation has no agenda on the quota of women directors until now. If the regulation on quota of women directors comes someday, there could be a better opportunity to identify the potential causal effects of board gender diversity on firm performance.

Further, the average level of board education and board tenure have positive effects on corporate innovation, which corresponds to the hypothesis that higher level of education enlarges the portfolio of board capital that are available for use and deepens the depth of

board capital, while longer average tenure may facilitate the accumulation of board internal social capital and thus improve the cooperation productivity on the board. However, board independence doesn't matter for firm growth but has positive effects on the incidence of voluntary CSR reporting.

The empirical results on board diversity are inclusive. For example, board diversity in terms of independence and education is positively associated with voluntary CSR disclosure but negatively related with corporate innovation. One problem is that in this thesis each dimension of board diversity is separately measured instead of using an integrate index. It's then hard to draw up a full picture of board diversity especially if the effects from different dimensions of diversity are assumed to hedge each other when they are aggregated. To solve this problem, in the future research it might be more helpful to design a board diversity index that appropriate to the institutional settings in Chinese listed firms.

## 7.2    Discussion

### 7.2.1    Board Internal Social Capital Deserves More Attention

We are living in a world of diversity. Inevitably, the board of directors is bound to be a collective of people from diverse backgrounds. As Confucius put forward two thousand years ago the importance of " harmony in diversity (和而不同)" (Kong & Muller, 2018), Kenneth J. Arrow also made an incisive argument on diversity: "diversity of viewpoints is of the greatest importance in solving the problems that face us individually and collectively. Diversity among a group of problem solvers is more important than individual excellence", when he endorsed Page's book on diversity - *The Difference* (Page, 2008). In fact, diversity is the nature of human society, but harmony/inclusion turns to be the ultimate aim. Whether board diversity benefits firm performance depends how board directors cooperate on the board, in economic language, to what extent diversified types of board capital brought by directors can be efficiently coordinated.

Diversity is a double-edged sword. Many publications based on agency theory advocate more independent boards, but as our empirical findings suggest, the introduction of independent directors or other sources of board diversity will increase transaction costs for board's decision-making due to potential conflicts of interests on a diversified board, which has to manage a larger portfolio of values and opinions. If the existing trust (board internal social capital) is not enough to overcome those conflicts, the cooperation on the board may

fail, which will further decrease board internal social capital and disrupt the board's decision-making system at the end.

### 7.2.2 Different Types of Board Capital are Interdependent

Decades of research on board composition, board structure and board diversity have failed to reach any consensus, producing ambiguous and sometimes contradictory results. Nahapiet and Ghoshal (1998) recognize that human and social capital are conceptually and empirically difficult to isolate from each other. The classification of board capital is overlapping, as some board characteristics may influence not only one category (human capital, external social capital or internal social capital) or one dimension (breadth, depth or time spending) of board capital. Considering the time dimension, we should also distinguish board capital in stock from board capital in use, because some variables like the interlocking directorates ties will on one hand enhance board external social capital but on the other hand reduce the time directors spend on the board, the so-called "busy directors" problem. Moreover, several demographic variables (e.g., age) are highly associated with board human or social capital, but meanwhile they are indicators of directors' risk attitudes or incentives (e.g., reputation). Therefore, when an empirical analysis on boards of directors is conducted, it should be cautious that these relationships might be nonlinear or contingent on contextual factors that interact with the observed variables. Therefore, the three types of board capital that defined in this thesis may interact with each other and the potential interactions should be considered comprehensively in empirical studies. Moreover, aggregating these aspects from the individual to the board level is somehow more complex and difficult, but necessary and valuable for understanding the whole thing.

### 7.2.3 Board Incentives Might have Moderation Effects

The influence of board capital on board functions may be moderated by board incentives (Hillman & Dalziel, 2003), or vice versa. For example, as shown in Figure 3.1, board independence, an indicator of board incentives, may not impact on board functions directly, but indirectly through moderating board directors' capacity for decision-making (board capital). If board directors are motivated to perform the duties, they will try their best to supervise management and provide resources. In this case, even though board capital in stock stays unchanged, board capital in use will be increased, improving board functions and thus firm performance.

## 7.3 Future Research

Beyond the conclusion and discussion, the answer to the research question of how board capital impacts on firm performance in China, especially from the perspective of board diversity, is not clear and incisive enough at the current stage. There remain some relevant problems to solve and some interesting research questions to answer for future research:

### 7.3.1 Design a Board Diversity Index in the Context of China

As discussed before, instead of separately measuring each dimension of board diversity, an integrate board diversity index could be more helpful to obtain comprehensive understanding of how board diversity impacts firm performance in China. The key practical issue will be how to properly weight different dimensions of board diversity in the context of China. According to the latest updating of the database, those dimensions of board capital could include: nationality, gender, age, education degree, functional background, oversea background, academic background, finance background, tenure, independence and interlocking directorates ties.

### 7.3.2 CSR Disclosure in the Context of Global Value Chains

The investigation on corporate CSR disclosure in Chapter 5 could be further extended to the context of global value chains (GVCs), as firms situate at different stages of GVCs confront systematically different pressures on CSR disclosure. According to the data availability, it could be empirically investigated whether more export-oriented Chinese firms regard corporate CSR reporting as a valuable signal for their international partners along the global value chains. Based on an integrate board diversity index as described above, it's also feasible to test the effects of overall board diversity on corporate CSR disclosure and whether board diversity has moderating effects on the link between firm's involvement in GVCs and CSR disclosure.

### 7.3.3 What Drives Chinese Firms' Patenting Strategies

Based on the research on corporate innovation in Chapter 6, it's a bit surprising that Chinese listed SOEs have significantly more granted patents than non-SOEs in the sample period. It's then important to understand whether the incentive system for patenting (e.g., the access to subsidiaries for patent applications and priorities for getting patents granted) in SOEs is systematically different from non-SOEs. Do board directors' political connections matter? There are admitted biases if only the number of granted patents that filed in China is

considered as the indicator of corporate innovation output, as some firms prefer to file patents oversea. So what will be a better or more comprehensive measure for corporate innovation?

# References

Acemoglu, D., & Robinson, J. A. (2012). *Why nations fail: The origins of power, prosperity, and poverty* (1st ed.). New York: Random House.

Adams, R. B., Almeida, H., & Ferreira, D. (2005). Powerful CEOs and their impact on corporate performance. *Review of Financial Studies*, *18*(4), 1403–1432. https://doi.org/10.1093/rfs/hhi030

Adams, R. B., & Ferreira, D. (2007). A theory of friendly boards. *the Journal of Finance*, *62*(1), 217–250.

Adams, R. B., & Ferreira, D. (2009). Women in the boardroom and their impact on governance and performance. *Journal of Financial Economics*, *94*(2), 291–309. https://doi.org/10.1016/j.jfineco.2008.10.007

Adams, R. B., Hermalin, B. E., & Weisbach, M. S. (2010). The role of boards of directors in corporate governance: A conceptual framework and survey. *Journal of Economic Literature*, *48*(1), 58–107. https://doi.org/10.1257/jel.48.1.58

Adams, R. B., & Mehran, H. (2012). Bank board structure and performance: Evidence for large bank holding companies. *Journal of Financial Intermediation*, *21*(2), 243–267. https://doi.org/10.1016/j.jfi.2011.09.002

Adler, P. S., & Kwon, S.-W. (2002). Social capital: Prospects for a new concept. *Academy of Management review*, *27*(1), 17–40.

Aghion, P., van Reenen, J., & Zingales, L. (2013). Innovation and institutional ownership. *The American Economic Review*, *103*(1), 277–304. https://doi.org/10.1257/aer.103.1.277

Aluchna, M. (2013a). One-tier board. In S. O. Idowu, N. Capaldi, L. Zu, & A. Das Gupta (Eds.), *Encyclopedia of corporate social responsibility* (pp. 1778–1790). Heidelberg: Springer. https://doi.org/10.1007/978-3-642-28036-8_294

Aluchna, M. (2013b). Two-tier board. In S. O. Idowu, N. Capaldi, L. Zu, & A. Das Gupta (Eds.), *Encyclopedia of corporate social responsibility* (pp. 2575–2587). Heidelberg: Springer. https://doi.org/10.1007/978-3-642-28036-8_297

Amran, A., Lee, S. P., & Devi, S. S. (2014). The influence of governance structure and strategic corporate social responsibility Toward Sustainability Reporting Quality. *Business Strategy and the Environment*, *23*(4), 217–235. https://doi.org/10.1002/bse.1767

Aoki, M., & Kim, H.-K. (Eds.). (1995). *Corporate governance in transitional economies: Insider control and the role of banks*. The World Bank. https://doi.org/10.1596/0-8213-2990-1

Balsmeier, B., Fleming, L., & Manso, G. (2017). Independent boards and innovation. *Journal of Financial Economics*, *123*(3), 536–557. https://doi.org/10.1016/j.jfineco.2016.12.005

Barro, R. J., Mankiw, N. G., & Sala-i-Martin, X. (1995). Capital mobility in neoclassical models of growth. *The American Economic Review*, *85*(1), 103–115.

Barro, R. J., & Sala-i-Martin, X. (1992). Convergence. *Journal of political Economy*, *100*(2), 223–251. https://doi.org/10.1086/261816

Barro, R. J., & Sala-i-Martin, X. (1995). *Economic growth*. New York: McGraw-Hill.

Bear, S., Rahman, N., & Post, C. (2010). The impact of board diversity and gender composition on corporate social responsibility and firm reputation. *Journal of Business Ethics*, *97*(2), 207–221. https://doi.org/10.1007/s10551-010-0505-2

Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of political Economy*, *70*(5 (Part 2)), 9–49. https://doi.org/10.1086/258724

Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education* (Third edition, 1993). The University of Chicago Press.

Bhagat, S., & Black, B. (2000). *Board independence and long-term firm performance*. Unpublished paper.

Bhagat, S., & Black, B. (2002). The non-correlation between board independence and long-term firm performance. *Journal of Corporation Law*, *27*, 231–273.

Blum, U. (1997). Greed and grief in East Germany: The socialist system's crisis, collapse and transformation. *Konjunkturpolitik*, *45*, 11–34.

Blum, U. (2013a). East Germany's economic development revisited: Path dependence and East Germany's pre- and post-unification economic stagnation. *Journal of Post-Communist Economies*, *25*(1), 37–58.

Blum, U. (2013b). Unternehmertum, unternehmerwerte und wachstum. *Wirtschaftspolitische Blätter der Wirtschaftskammer Österreich*, *1*, 75–85.

Blum, U. (2017). *The West against the rest: Wie wirtschaftlich erfolgreich ist das sogenannte Abendland im Vergleich zu China? Eine kurze Einordnung*. Conference paper of SMS-Tagung ("Silk Meets Salt"), Halle (Saale), Germany.

Blum, U., & Dudley, L. (1998). Fast convergence: Institutions and economic growth in new East Germany. *Jahrbuch für Wirtschaftswissenschaften - Review of Economics*, *49*(2), 124–143.

Blum, U., & Dudley, L. (1999). The two Germanies: Information technology and economic divergence, 1949-1989. *Journal of Institutional and Theoretical Economics*, *155*(4), 710–737.

Blum, U., & Dudley, L. (2001). Religion and economic growth: was Weber right? *Journal of Evolutionary Economics*, *11*(2), 207–230. https://doi.org/10.1007/PL00003862

Blum, U., & Leibbrand, F. (Eds.). (2001). *Entrepreneurship und Unternehmertum: Denkstrukturen für eine neue Zeit*. Wiesbaden: Gabler Verlag. https://doi.org/10.1007/978-3-322-90420-1

Blum, U., & Scharfe, S. (2002). Die Transformation in Ostdeutschland als entwicklungsökonomisches Phänomen. *List Forum für Wirtschafts- und Finanzpolitik*, *28*(4), 348–369.

Blum, U., & Dudley, L. (2003). Standardised Latin and medieval economic growth. *European Review of Economic History*, *7*(2), 213–238. https://doi.org/10.1017/S136149160300008X

Boeing, P. (2016). The allocation and effectiveness of China's R&D subsidies-Evidence from listed firms. *Research Policy*, *45*(9), 1774–1789. https://doi.org/10.1016/j.respol.2016.05.007

Brandt, L., van Biesebroeck, J., & Zhang, Y. (2012). Creative accounting or creative destruction? Firm-level productivity growth in Chinese manufacturing. *Journal of Development Economics*, *97*(2), 339–351. https://doi.org/10.1016/j.jdeveco.2011.02.002

Brewer, M. B., & Kramer, R. M. (1985). The psychology of intergroup attitudes and behavior. *Annual Review of Psychology*, *36*(1), 219–243. https://doi.org/10.1146/annurev.ps.36.020185.001251

Burt, R. S. (1992). *Structural holes: The social structure of competition*. Cambridge, Mass: Harvard University Press.

Bushee, B. J. (1998). The influence of institutional investors on myopic R&D investment behavior. *The Accounting review*, *73*(3), 305–333.

Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, *125*(3), 367–383. https://doi.org/10.1037/0033-2909.125.3.367

Cameron, G., Proudman, J., & Redding, S. (2005). Technological convergence, R&D, trade and productivity growth. *European Economic Review*, *49*(3), 775–807. https://doi.org/10.1016/S0014-2921(03)00070-9

Campbell, J. Y., Hilscher, J., & Szilagyi, J. (2008). In search of distress risk. *Journal of Finance*, *63*(6), 2899–2939. https://doi.org/10.1111/j.1540-6261.2008.01416.x

Carpenter, M. A., & Westphal, J. d. (2001). The strategic context of external network ties: Examining the impact of director appointments on board involvement in strategic decision making. *Academy of Management journal*, *44*(4), 639–660. https://doi.org/10.5465/3069408

Carter, D. A., D'Souza, F., Simkins, B. J., & Simpson, W. G. (2010). The gender and ethnic diversity of US boards and board committees and firm financial Performance. *Corporate Governance: An International Review*, *18*(5), 396–414. https://doi.org/10.1111/j.1467-8683.2010.00809.x

Carter, D. A., Simkins, B. J., & Simpson, W. G. (2003). Corporate governance, board diversity, and firm value. *Financial review*, *38*(1), 33–53. https://doi.org/10.1111/1540-6288.00034

Chang, Y. K., Oh, W.-Y., Park, J. H., & Jang, M. G. (2017). Exploring the relationship between board characteristics and CSR: empirical evidence from Korea. *Journal of Business Ethics*, *140*(2), 225–242. https://doi.org/10.1007/s10551-015-2651-z

Chen, B., & Feng, Y. (2000). Determinants of economic growth in China: Private enterprise, education, and openness. *China Economic Review*, *11*(1), 1–15. https://doi.org/10.1016/S1043-951X(99)00014-0

Chen, V. Z., Li, J., Shapiro, D. M., & Zhang, X. (2014). Ownership structure and innovation: An emerging market perspective. *Asia Pacific Journal of Management*, *31*(1), 1–24. https://doi.org/10.1007/s10490-013-9357-5

Chen, Y.-C., Hung, M., & Wang, Y. (2018). The effect of mandatory CSR disclosure on firm profitability and social externalities: Evidence from China. *Journal of Accounting and Economics*, *65*(1), 169–190. https://doi.org/10.1016/j.jacceco.2017.11.009

China Banking Regulatory Commission (2016). First quarter report. Retrieved from http://www.cbrc.gov.cn/chinese/home/docView/220A7FA6D357494F9E1B10A7D9A4 B721.html

China Securities Regulatory Commission (2008). *China capital markets development report*. Retrieved from China Securities Regulatory Commission website: http://www.csrc.gov.cn/pub/newsite/yjzx/cbwxz/ebook/index.htm

Choi, S. B., Lee, S. H., & Williams, C. (2011). Ownership and firm innovation in a transition economy: Evidence from China. *Research Policy*, *40*(3), 441–452. https://doi.org/10.1016/j.respol.2011.01.004

Choi, S. B., Park, B. I., & Hong, P. (2012). Does ownership structure matter for firm technological innovation performance? The case of Korean firms. *Corporate Governance: An International Review*, *20*(3), 267–288. https://doi.org/10.1111/j.1467-8683.2012.00911.x

Christaller, W. (1933). *Die zentralen Orte in Süddeutschland: Eine ökonomisch-geographische Untersuchung über die Gesetzmäßigkeit der Verbreitung und Entwicklung der Siedlungen mit städtischen Funktionen*. Darmstadt (2006): Wiss. Buchges.

Clarke, D. C. (2003). Corporate governance in China: An overview. *China Economic Review*, *14*(4), 494–507. https://doi.org/10.1016/j.chieco.2003.09.019

Coase, R. H. (1937). The nature of the firm. *Economica*, *4*(16), 386–405. https://doi.org/10.1111/j.1468-0335.1937.tb00002.x

Dalziel, T., Gentry, R. J., & Bowerman, M. (2011). An integrated agency–resource dependence view of the influence of directors' human and relational capital on firms' R&D spending. *Journal of Management Studies*, *48*(6), 1217–1242. https://doi.org/10.1111/j.1467-6486.2010.01003.x

Delgado, M., Porter, M. E., & Stern, S. (2014). Clusters, convergence, and economic performance. *Research Policy*, *43*(10), 1785–1799. https://doi.org/10.1016/j.respol.2014.05.007

Demsetz, H. (1983). The structure of ownership and the theory of the firm. *The journal of law and Economics*, *26*(2), 375–390. https://doi.org/10.1086/467041

Dittmar, A., & Duchin, R. (2016). Looking in the rearview mirror: The effect of managers' professional experience on corporate financial policy. *The Review of Financial Studies*, *29*(3), 565–602. https://doi.org/10.1093/rfs/hhv051

Dong, J., & Gou, Y.-n. (2010). Corporate governance structure, managerial discretion, and the R&D investment in China. *International Review of Economics & Finance*, *19*(2), 180–188. https://doi.org/10.1016/j.iref.2009.10.001

Easterly, W., & Fischer, S. (1994). *The soviet economic decline: Historical and republican data* (NBER Working Paper No. 4735). Retrieved from National Bureau of Economic Research website: https://www.nber.org/papers/w4735.pdf https://doi.org/10.3386/w4735

El-Bassiouny, D., & El-Bassiouny, N. (2019). Diversity, corporate governance and CSR reporting. *Management of Environmental Quality: An International Journal*, *30*(1), 116–136. https://doi.org/10.1108/MEQ-12-2017-0150

Estélyi, K. S., & Nisar, T. M. (2016). Diverse boards: Why do firms get foreign nationals on their boards? *Journal of Corporate Finance*, *39*, 174–192. https://doi.org/10.1016/j.jcorpfin.2016.02.006

Evans, D. S. (1987). The relationship between firm growth, size, and age: Estimates for 100 manufacturing industries. *The Journal of Industrial Economics*, *35*(4), 567–581. https://doi.org/10.2307/2098588

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *The journal of law and Economics*, *26*(2), 301–325. https://doi.org/10.1086/467037

Farrell, K. A., & Hersch, P. L. (2005). Additions to corporate boards: the effect of gender. *Journal of Corporate Finance*, *11*(1-2), 85–106. https://doi.org/10.1016/j.jcorpfin.2003.12.001

Ferguson, N. (2012). *Civilization: the West and the rest*. London: Penguin Books.

Fich, E. M. (2005). Are some outside directors better than others? Evidence from director appointments by fortune 1000 firms. *The Journal of Business*, *78*(5), 1943–1972. https://doi.org/10.1086/431448

Flynn, M., & Schröder, H. (2018). Age, work and pensions in the United Kingdom and Hong Kong: An institutional perspective. *Economic and Industrial Democracy*, *67*(3), 0143831X1876354. https://doi.org/10.1177/0143831X18763542

Fukuyama, F. (1996). *Trust: The social virtues and the creation of prosperity*. New York: Free Press.

Geroski, P., & Gugler, K. (2004). Corporate growth convergence in Europe. *Oxford Economic Papers*, *56*(4), 597–620. https://doi.org/10.1093/oep/gpf055

Giannarakis, G., Konteos, G., & Sariannidis, N. (2014). Financial, governance and environmental determinants of corporate social responsible disclosure. *Management Decision*, *52*(10), 1928–1951. https://doi.org/10.1108/MD-05-2014-0296

Gibrat, R. (1931). *Les Inégalités économiques*. Paris, France.

Golden, B. R., & Zajac, E. J. (2001). When will boards influence strategy? inclination × power = strategic change. *Strategic Management Journal*, *22*(12), 1087–1111. https://doi.org/10.1002/smj.202

Greif, A. (2000). The fundamental problem of exchange: A research agenda in historical institutional analysis. *European Review of Economic History*, *4*(3), 251–284. https://doi.org/10.1017/S1361491600000071

Guariglia, A., Liu, X., & Song, L. (2011). Internal finance and growth: Microeconometric evidence on Chinese firms. *Journal of Development Economics*, *96*(1), 79–94. https://doi.org/10.1016/j.jdeveco.2010.07.003

Guldiken, O., & Darendeli, I. S. (2016). Too much of a good thing: Board monitoring and R&D investments. *Journal of Business Research*, *69*(8), 2931–2938. https://doi.org/10.1016/j.jbusres.2015.12.062

Hahn, T., Figge, F., Aragón-Correa, J. A., & Sharma, S. (2017). Advancing research on corporate sustainability. *Business & Society*, *56*(2), 155–185. https://doi.org/10.1177/0007650315576152

Handajani, L., Subroto, B., Sutrisno, T., & Saraswati, E. (2014). Does board diversity matter on corporate social disclosure? An Indonesian evidence. *Journal of Economics and Sustainable Development*, *5(9)*, 8–16.

Harjoto, M., Laksmana, I., & Lee, R. (2015). Board diversity and corporate social responsibility. *Journal of Business Ethics*, *132*(4), 641–660. https://doi.org/10.1007/s10551-014-2343-0

Hayek, F. A. (1945). The use of knowledge in society. *The American Economic Review*, *35*(4), 519–530.

Haynes, K. T., & Hillman, A. (2010). The effect of board capital and CEO power on strategic change. *Strategic Management Journal*, *31*(11), 1145–1163. https://doi.org/10.1002/smj.859

Heckathorn, D. D. (1989). Collective action and the second-order free-rider problem. *Rationality and Society*, *1*(1), 78–100. https://doi.org/10.1177/1043463189001001006

Heckathorn, D. D. (1996). The dynamics and dilemmas of collective action. *American Sociological Review*, *61*(2), 250–277. https://doi.org/10.2307/2096334

Helpman, E. (Ed.). (1998). *General purpose technologies and economic growth*. Cambridge, Massachusetts: MIT Press.

Helpman, E., Melitz, M. J., & Yeaple, S. R. (2004). Export versus FDI with heterogeneous firms. *The American Economic Review*, *94*(1), 300–316. https://doi.org/10.1257/000282804322970814

Hermalin, B. E., & Weisbach, M. S. (1991). The effects of board composition and direct incentives on firm performance. *Financial management*, 101–112. https://doi.org/10.2307/3665716

Hermalin, B. E., & Weisbach, M. S. (2001). *Boards of directors as an endogenously determined institution: A survey of the economic literature* (NBER Working Paper No. 8161). https://doi.org/10.3386/w8161

Hillman, A. J. (2005). Politicians on the board of directors: Do connections affect the bottom line? *Journal of Management*, *31*(3), 464–481. https://doi.org/10.1177/0149206304272187

Hillman, A. J., & Dalziel, T. (2003). Boards of directors and firm performance: Integrating agency and resource dependence perspectives. *Academy of Management review*, *28*(3), 383–396. https://doi.org/10.5465/amr.2003.10196729

Hoang, T. C., Abeysekera, I., & Ma, S. (2018). Board diversity and corporate social disclosure: Evidence from Vietnam. *Journal of Business Ethics*, *151*(3), 833–852. https://doi.org/10.1007/s10551-016-3260-1

Hooghiemstra, R., Hermes, N., Oxelheim, L., & Randøy, T. (2019). Strangers on the board: The impact of board internationalization on earnings management of Nordic firms. *International Business Review*, *28*(1), 119–134. https://doi.org/10.1016/j.ibusrev.2018.08.007

Horwitz, S. K., & Horwitz, I. B. (2007). The effects of team diversity on team outcomes: A meta-analytic review of team demography. *Journal of Management*, *33*(6), 987–1015. https://doi.org/10.1177/0149206307308587

Hoskisson, R. E., Hitt, M. A., Johnson, R. A., & Grossman, W. (2002). Conflicting voices: The effects of institutional ownership heterogeneity and internal governance on corporate innovation strategies. *Academy of Management journal*, *45*(4), 697–716. https://doi.org/10.5465/3069305

Huang, H., & Zhou, Z. (2015). Female executives, trust environment and corporate social responsibility information: Evidence from A-share listed companies with voluntary CSR report disclosure. *Journal of Audit & Economics*, *4*, 30–39.

Isidro, H., & Sobral, M. (2015). The effects of women on corporate boards on firm value, financial performance, and ethical and social compliance. *Journal of Business Ethics*, *132*(1), 1–19. https://doi.org/10.1007/s10551-014-2302-9

Jain, T., & Jamali, D. (2016). Looking inside the black box: The effect of corporate governance on corporate social responsibility. *Corporate Governance: An International Review*, *24*(3), 253–273. https://doi.org/10.1111/corg.12154

Jefferson, G. H., Rawski, T. G., & Zhang, Y. (2008). Productivity growth and convergence across China's industrial economy. *Journal of Chinese Economic and Business Studies*, *6*(2), 121–140. https://doi.org/10.1080/14765280802028237

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *the Journal of Finance*, *48*(3), 831–880. https://doi.org/10.1111/j.1540-6261.1993.tb04022.x

Jensen, M. C., & Heckling, W. H. (1995). Special and general knowledge, and organizational structure. *Journal of Applied Corporate Finance*, *8*(2), 4–18. https://doi.org/10.1111/j.1745-6622.1995.tb00283.x

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Jiang, F., & Kim, K. A. (2015). Corporate governance in China: A modern perspective. *Journal of Corporate Finance*, *32*, 190–2016. https://doi.org/10.1016/j.jcorpfin.2014.10.010

Jiang, G., Lee, C. M.C., & Yue, H. (2010). Tunneling through intercorporate loans: The China experience. *Journal of Financial Economics*, *98*(1), 1–20. https://doi.org/10.1016/j.jfineco.2010.05.002

Jiang, L. A., Waller, D. S., & Cai, S. (2013). Does ownership type matter for innovation? Evidence from China. *Journal of Business Research*, *66*(12), 2473–2478. https://doi.org/10.1016/j.jbusres.2013.05.037

Johnson, R. A., Hoskisson, R. E., & Hitt, M. A. (1993). Board of director involvement in restructuring: The effects of board versus managerial controls and characteristics. *Strategic management journal*, *14*(S1), 33–50. https://doi.org/10.1002/smj.4250140905

Johnson, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2000). Tunneling. *American Economic Review*, *90*(2), 22–27. https://doi.org/10.1257/aer.90.2.22

Kang, N. (2014). Towards middle-range theory building in development research: Comparative (historical) institutional analysis of institutional transplantation. *Progress in Development Studies*. (3), 221–235.

Khan, A., Muttakin, M. B., & Siddiqui, J. (2013). Corporate governance and corporate social responsibility disclosures: Evidence from an emerging economy. *Journal of Business Ethics*, *114*(2), 207–223. https://doi.org/10.1007/s10551-012-1336-0

Kim, Y. (2005). Board network characteristics and firm performance in Korea. *Corporate Governance: an International Review*, *13*(6), 800–808. https://doi.org/10.1111/j.1467-8683.2005.00471.x

Klein, K. J., & Harrison, D. A. (2007). On the diversity of diversity: Tidy logic, messier realities. *Academy of Management Perspectives*, *21*(4), 26–33. https://doi.org/10.5465/amp.2007.27895337

Knack, S. (1996). Institutions and the convergence hypothesis: The cross-national evidence. *Public Choice*, *87*(3-4), 207–228. https://doi.org/10.1007/BF00118645

Knight, D., Pearce, C. L., Smith, K. G., Olian, J. d., Sims, H. P., Smith, K. A., & Flood, P. (1999). Top management team diversity, group process, and strategic consensus. *Strategic Management Journal*, *20*(5), 445–465. https://doi.org/10.1002/(SICI)1097-0266(199905)20:5<445::AID-SMJ27>3.0.CO;2-V

Knight, F. H. (1921). *Risk, uncertainty and profit*. Boston & New York: Houghton Mifflin.

Kong, Q., & Muller, A. C. (2018). The Analects of Confucius: Lun yun. Retrieved from http://www.acmuller.net/con-dao/analects.html#div-14

Kor, Y. Y., & Sundaramurthy, C. (2009). Experience-based human capital and Social capital of outside directors. *Journal of Management*, *35*(4), 981–1006. https://doi.org/10.1177/0149206308321551

Kornai, J. (1980). *Economics of shortage* (Vol. 131). Amsterdam: North-Holland.

Kramer, V. W., Konrad, A. M., & Erkut, S. (2016). *Critical mass on corporate boards: Why three or more women enhance governance*: Wellesley Centers for Women. Retrieved from https://www.wcwonline.org/vmfiles/CriticalMassExecSummary.pdf

Kroll, H., & Kou, K. (2018). Innovation output and state ownership: Empirical evidence from China's listed firms. *Industry and Innovation*, 1–23. https://doi.org/10.1080/13662716.2018.1456323

Krugman, P. R. (1990). *Rethinking international trade*. Cambridge, Mass: MIT Press.

Labucay, I. (2015). Diversity management and performance: paving the way for a revised business case. *European J. of International Management*, *9*(4), 425. https://doi.org/10.1504/EJIM.2015.070228

Lardy, N. R. (2014). *Markets over Mao: The rise of private business in China*. Washington, DC: Peterson Institute for International Economics.

Lardy, N. R. (2018). Private sector development. In R. Garnaut, L. Song, & C. Fang (Eds.), *China's 40 years of reform and development: 1978-2018* (pp. 329–344). Australian National University Press.

Lardy, N. R. (2019). *China's private firms continue to struggle*. Retrieved from Peterson Institute for International Economics website: https://piie.com/blogs/china-economic-watch/chinas-private-firms-continue-struggle

Le, S. A., Walters, B., & Kroll, M. (2006). The moderating effects of external monitors on the relationship between R&D spending and firm performance. *Journal of Business Research*, *59*(2), 278–287. https://doi.org/10.1016/j.jbusres.2005.04.003

Lee, P. M., & O'neill, H. M. (2003). Ownership structures and R&D investments of US and Japanese firms: Agency and stewardship perspectives. *Academy of Management journal*, *46*(2), 212–225. https://doi.org/10.5465/30040615

Lemmon, M. L., & Lins, K. v. (2003). Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. *Journal of Finance*, *58*(4), 1445–1468. https://doi.org/10.1111/1540-6261.00573

Lerner, J., & Seru, A. (2017). *The use and misuse of patent data: Issues for corporate finance and beyond.* https://doi.org/10.3386/w24053

Lester, R. H., Hillman, A., Zardkoohi, A., & Cannella, A. A. (2008). Former government officials as outside directors: The role of human and social capital. *Academy of Management journal*, *51*(5), 999–1013. https://doi.org/10.5465/amj.2008.34789675

Lewis, W. A. (1954). Economic development with unlimited supplies of labour. *The Manchester School*, *22*(2), 139–191.

Li, P., & Shen, Y. (2010). The corporate governance role of media: Empirical evidence from China. *Economic Research Journal*, *4*, 14–27.

Li, X. (2012). Behind the recent surge of Chinese patenting: An institutional view. *Research Policy*, *41*(1), 236–249. https://doi.org/10.1016/j.respol.2011.07.003

Li, Y., Guo, H., Yi, Y., & Liu, Y. (2010). Ownership concentration and product innovation in Chinese firms: The mediating role of learning orientation. *Management and Organization Review*, *6*(1), 77–100.

Li, Y., Zhang, J., & Foo, C.-T. (2013). Towards a theory of social responsibility reporting. *Chinese Management Studies*, *7*(4), 519–534. https://doi.org/10.1108/CMS-09-2013-0167

Li, Z., Qian, Y., & Wang, X. (2005). Tunneling, propping and M&A: Evidence from Chinese listed companies. *Economic Research Journal*, *40*(1), 95–105.

Liao, L., Le Luo, & Tang, Q. (2015). Gender diversity, board independence, environmental committee and greenhouse gas disclosure. *The British Accounting Review*, *47*(4), 409–424. https://doi.org/10.1016/j.bar.2014.01.002

Liao, L., Lin, T., & Zhang, Y. (2018). Corporate board and corporate social responsibility assurance: Evidence from China. *Journal of Business Ethics*, *150*(1), 211–225. https://doi.org/10.1007/s10551-016-3176-9

List, F. (1841). *Das nationale System der politischen Ökonomie* (1928th ed.). Jena: Fischer.

Liu, X., & Zhang, C. (2017). Corporate governance, social responsibility information disclosure, and enterprise value in China. *Journal of Cleaner Production*, *142*, 1075–1084. https://doi.org/10.1016/j.jclepro.2016.09.102

Liu, Y., Wei, Z., & Xie, F. (2014). Do women directors improve firm performance in China? *Journal of Corporate Finance*, *28*, 169–184. https://doi.org/10.1016/j.jcorpfin.2013.11.016

Lösch, A. (1948). *Die räumliche Ordnung der Wirtschaft*. Stuttgart (1962): Gustav Fischer.

Low, D. C.M., Roberts, H., & Whiting, R. H. (2015). Board gender diversity and firm performance: Empirical evidence from Hong Kong, South Korea, Malaysia and Singapore. *Pacific-Basin Finance Journal*, *35*, 381–401. https://doi.org/10.1016/j.pacfin.2015.02.008

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics*, *22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Lucas, R. E. (1990). Why doesn't capital flow from rich to poor countries? *American Economic Review*, *80*(2), 92–96.

Macpherson, A., & Holt, R. (2007). Knowledge, learning and small firm growth: A systematic review of the evidence. *Research Policy*, *36*(2), 172–192. https://doi.org/10.1016/j.respol.2006.10.001

Maddison, A. (2010). Statistics on world population, GDP and per capita GDP, 1-2008 AD. *Historical Statistics*, *3*, 1–36.

Marinova, J., Plantenga, J., & Remery, C. (2016). Gender diversity and firm performance: evidence from Dutch and Danish boardrooms. *The International Journal of Human Resource Management*, *27*(15), 1777–1790. https://doi.org/10.1080/09585192.2015.1079229

Markard, J. (2017, July). *Sustainability transitions: Exploring the emerging research field and its contribution to management studies*. 33rd EGOS Colloquium,

McGuinness, P. B., Vieito, J. P., & Wang, M. (2017). The role of board gender and foreign ownership in the CSR performance of Chinese listed firms. *Journal of Corporate Finance*, *42*, 75–99. https://doi.org/10.1016/j.jcorpfin.2016.11.001

McKinsey&Company (2016). Women matter 2016 reinventing the workplace to unlock the potential of gender diversity. Retrieved from https://www.mckinsey.com/~/media/mckinsey/featured%20insights/women%20matter/reinventing%20the%20workplace%20for%20greater%20gender%20diversity/women-matter-2016-reinventing-the-workplace-to-unlock-the-potential-of-gender-diversity.ashx

Minetti, R., Murro, P., & Paiella, M. (2015). Ownership structure, governance, and innovation. *European Economic Review*, *80*, 165–193. https://doi.org/10.1016/j.euroecorev.2015.09.007

Miozzo, M., & Dewick, P. (2002). Building competitive advantage: Innovation and corporate governance in European construction. *Research Policy*, *31*(6), 989–1008. https://doi.org/10.1016/S0048-7333(01)00173-1

Mohamed Adnan, S., Hay, D., & van Staden, C. J. (2018). The influence of culture and corporate governance on corporate social responsibility disclosure: A cross country

analysis. *Journal of Cleaner Production*, *198*, 820–832. https://doi.org/10.1016/j.jclepro.2018.07.057

Moon, J., & Shen, X. (2010). CSR in China research: Salience, focus and nature. *Journal of Business Ethics*, *94*(4), 613–629. https://doi.org/10.1007/s10551-009-0341-4

Morgan Stanley Capital International (2017). *Corporate governance in China*. Retrieved from https://www.msci.com/documents/10199/1d443a3d-0437-4af7-aa27-ada3a2655f6d

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management review*, *23*(2), 242–266. https://doi.org/10.5465/amr.1998.533225

National Bureau of Statistics of China (2016). Retrieved from http://data.stats.gov.cn/easyquery.htm?cn=E0102

Noronha, C., Tou, S., Cynthia, M. I., & Guan, J. J. (2013). Corporate social responsibility reporting in China: An overview and comparison with major trends. *Corporate Social Responsibility and Environmental Management*, *20*(1), 29–42. https://doi.org/10.1002/csr.1276

North, D. C. (1981). *Structure and change in economic history*. New York, London: Norton.

Novy-Marx, R. (2013). The other side of value: The gross profitability premium. *Journal of Financial Economics*, *108*(1), 1–28. https://doi.org/10.1016/j.jfineco.2013.01.003

Olson, M. (1982). *The rise and decline of nations: Economic growth, stagflation and social rigidities*. New Haven: Yale University Press.

Omair Alotaibi, K., & Hussainey, K. (2016). Determinants of CSR disclosure quantity and quality: Evidence from non-financial listed firms in Saudi Arabia. *International Journal of Disclosure and Governance*, *13*(4), 364–393. https://doi.org/10.1057/jdg.2016.2

Organisation for Economic Cooperation and Development (2004). *OECD principles of corporate governance*. Retrieved from https://www.oecd.org/daf/ca/corporategovernanceprinciples/31557724.pdf

Ortega-Argiles, R., Moreno, R., & Caralt, J. S. (2005). Ownership structure and innovation: Is there a real link? *The Annals of Regional Science*, *39*(4), 637–662.

Ortiz-de-Mandojana, N., Aragón-Correa, J. A., Delgado-Ceballos, J., & Ferrón-Vílchez, V. (2012). The effect of director interlocks on firms' adoption of proactive environmental

strategies. *Corporate Governance: An International Review*, *20*(2), 164–178. https://doi.org/10.1111/j.1467-8683.2011.00893.x

Oxelheim, L., Gregorič, A., Randøy, T., & Thomsen, S. (2013). On the internationalization of corporate boards: The case of Nordic firms. *Journal of International Business Studies*, *44*(3), 173–194. https://doi.org/10.1057/jibs.2013.3

Page, S. E. (2008). *The difference: How the power of diversity creates better groups, firms, schools, and societies*. Princeton: Princeton University Press.

Penrose, E. T. (1959). *The theory of the growth of the firm*. New York: John Wiley and Sons.

Pérez-Calero, L., Villegas, M. d. M., & Barroso, C. (2016). A framework for board capital. *Corporate Governance*, *16*(3), 452–475. https://doi.org/10.1108/CG-10-2015-0146

Pettus, M. L. (2001). The resource-based view as a developmental growth process: evidence from the deregulated Trucking Industry. *Academy of Management journal*, *44*(4), 878–896. https://doi.org/10.5465/3069420

Pfaffermayr, M. (2007). Firm growth under sample selection: Conditional σ-convergence in firm size? *Review of Industrial Organization*, *31*(4), 303–328. https://doi.org/10.1007/s11151-008-9159-y

Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence approach*. New York: Harper & Row.

Platt, H., & Platt, M. (2012). Corporate board attributes and bankruptcy. *Journal of Business Research*, *65*(8), 1139–1143. https://doi.org/10.1016/j.jbusres.2011.08.003

Pletzer, J. L., Nikolova, R., Kedzior, K. K., & Voelpel, S. C. (2015). Does gender matter? Female representation on corporate boards and firm financial performance: A meta-analysis. *PloS One*, *10*(6), e0130005. https://doi.org/10.1371/journal.pone.0130005

Porter, M. E. (2000). Location, competition, and economic development: Local clusters in a global economy. *Economic Development Quarterly*, *14*(1), 15–34. https://doi.org/10.1177/089124240001400105

Post, C., Rahman, N., & Rubow, E. (2011). Green governance: Boards of directors' composition and environmental corporate social responsibility. *Business & Society*, *50*(1), 189–223. https://doi.org/10.1177/0007650310394642

Prendergast, C., & Stole, L. (1996). Impetuous youngsters and jaded old-timers: Acquiring a reputation for learning. *Journal of political Economy*, *104*(6), 1105–1134. https://doi.org/10.1086/262055

Qian, Y. (1994). *Reforming corporate governance and finance in China* (EDI Working Papers: studies and training design division No. 94-49). Retrieved from Economic Development Institute of the World Bank website: http://documents.worldbank.org/curated/en/660761468025477232/pdf/multi-page.pdf

Qian, Y. (2002). *How reform worked in China* (William Davidson Working Paper No. 473). https://doi.org/10.2139/ssrn.317460

Quah, D. (1996). Twin peaks: Growth and convergence in models of distribution dynamics. *The Economic Journal*, *106*(437), 1045–1055.

Ramsey, F. P. (1928). A mathematical theory of saving. *The Economic Journal*, *38*(152), 543–559. https://doi.org/10.2307/2224098

Robinson, G., & Dechant, K. (1997). Building a business case for diversity. *The Academy of Management Executive*, *11*(3), 21–31. https://doi.org/10.5465/ame.1997.9709231661

Romer, P. M. (1990). Endogenous technological change. *Journal of political Economy*, *98*(5, Part 2), S71-S102.

Rosenstein, S., & Wyatt, J. G. (1990). Outside directors, board independence, and shareholder wealth. *Journal of Financial Economics*, *26*(2), 175–191. https://doi.org/10.1016/0304-405X(90)90002-H

Sala-i-Martin, X. X. (1996). Regional cohesion: evidence and theories of regional growth and convergence. *European Economic Review*, *40*(6), 1325–1352. https://doi.org/10.1016/0014-2921(95)00029-1

Schmidt, V. A. (2009). Comparative institutional analysis. In T. Landman & N. Robinson (Eds.), *The SAGE Handbook of Comparative Politics* (pp. 125–143). London: SAGE Publications Ltd.

Schneider, L. (2007). Mit 55 zum alten Eisen? Eine Analyse des Alterseinflusses auf die Produktivität anhand des LIAB. *Zeitschrift für ArbeitsmarktForschung - Journal for Labour Market Research*, *40*(1), 77–97.

Schneider, L. (2011). *Alterung und Arbeitsmarkt: Eine Untersuchung zum Einfluss des Alters von Beschäftigten auf Produktivität, Innovation und Mobilität* (IWH-Sonderheft

No. 3). Retrieved from https://www.econstor.eu/bitstream/10419/140929/1/SH_11-3.pdf

Schumpeter, J. A. (1949). *The theory of economic development: An inquiry into profits, capital, credit, interest and the business cycle*. Cambridge, Mass: Harvard University Press.

Shapiro, D., Tang, Y., Wang, M., & Zhang, W. (2015). The effects of corporate governance and ownership on the innovation performance of Chinese SMEs. *Journal of Chinese Economic and Business Studies*, *13*(4), 311–335.

Shen, H., Yu, P., & Wu, L. (2012). State ownership, environment, uncertainty and investment efficiency. *Economic Research Journal*, *7*, 113–126.

Shen, W., Zhou, Q., & Lau, C.-M. (2016). Empirical research on corporate governance in China: A review and new directions for the future. *Management and Organization Review*, *12*(1), 41–73. https://doi.org/10.1017/mor.2015.11

Shi, C. (2007). Recent ownership reform and control of central state-owned enterprises in China: Taking one step at a time. *University of New South Wales Law Journal*, *30*(3), 855–866.

Shivdasani, A. (1993). Board composition, ownership structure, and hostile takeovers. *Journal of Accounting and Economics*, *16*(1-3), 167–198. https://doi.org/10.1016/0165-4101(93)90009-5

Shleifer, A., & Vishny, R. W. (1986). Large shareholders and corporate control. *Journal of political Economy*, *94*(3), 461–488.

Singh, H., & Harianto, F. (1989). Management-board relationships, takeover risk, and the adoption of golden parachutes. *Academy of Management journal*, *32*(1), 7–24. https://doi.org/10.2307/256417

Smith, A. (1776). *The wealth of nations: an inquiry into the nature and the causes* (1977th ed.). University of Chicago Press.

Solow, R. M. (1956). A contribution to the theory of economic growth. *The Quarterly Journal of Economics*, *70*(1), 65–94. Retrieved from http://piketty.pse.ens.fr/files/Solow1956.pdf

Song, J., Wei, Y. S., & Wang, R. (2015). Market orientation and innovation performance: The moderating roles of firm ownership structures. *International Journal of Research in Marketing*, *32*(3), 319–331. https://doi.org/10.1016/j.ijresmar.2015.03.005

State Council of China (2014). Press conference of the state council. Retrieved from http://gb.cri.cn/45731/2014/05/27/7493s4556113.htm, accessed on June 14, 2016

Stiglitz, J. E. (1994). *Whither socialism? The Wicksell lectures: Vol. 1994*. Cambridge, Mass.: MIT Press.

Tenev, S., Zhang, C., & Brefort, L. (2002). *Corporate governance and enterprise reform in China: Building the institutions of modern markets*. Washington, DC: World Bank and the International Finance Corporation.

Thünen, V., & Heinrich, J. (1826). *Der isolierte Staat in Beziehung auf Landwirtschaft und Nationalökonomie, oder Untersuchungen über den Einfluß, den die Getreidepreise, der Reichtum des Bodens und die Abgaben auf den Ackerbau ausüben*. Berlin (1990): Akademie-Verlag.

Tian, J. J., Haleblian, J. J., & Rajagopalan, N. (2011). The effects of board human and social capital on investor reactions to new CEO selection. *Strategic Management Journal*, *32*(7), 731–747. https://doi.org/10.1002/smj.909

Torchia, M., Calabrò, A., & Huse, M. (2011). Women directors on corporate boards: From tokenism to critical mass. *Journal of Business Ethics*, *102*(2), 299–317. https://doi.org/10.1007/s10551-011-0815-z

Velte, P. (2017). Does board composition have an impact on CSR reporting? *Problems and Perspectives in Management*, *15*(2), 19–35. https://doi.org/10.21511/ppm.15(2).2017.02

Wang, X., Fan, G., & Hu, L. (2018). *Marketization index of China's provinces: NERI report 2018*. Peking: Social Sciences Academic Press (China).

Wang, Y., & You, J. (2012). Corruption and firm growth: Evidence from China. *China Economic Review*, *23*(2), 415–433. https://doi.org/10.1016/j.chieco.2012.03.003

Westphal, J. d., & Zajac, E. J. (1995). Who shall govern? CEO/board power, demographic similarity, and new director selection. *Administrative Science Quarterly*, *40*(1), 60–83.

Williamson, O. E. (1985). *The economic institutions of capitalism: Firms, markets, relational contracting*. New York: The Free Press.

Wincent, J., Anokhin, S., & Örtqvist, D. (2010). Does network board capital matter? A study of innovative performance in strategic SME networks. *Journal of Business Research*, *63*(3), 265–275. https://doi.org/10.1016/j.jbusres.2009.03.012

Wolfrum, M., & Gleißner, W. (2009). Cost of capital and valuation with imperfect diversification and unsystematic risks. Advance online publication. https://doi.org/10.2139/ssrn.1437629

Wright, M., Filatotchev, I., Hoskisson, R. E., & Peng, M. W. (2005). Strategy research in emerging economies: Challenging the conventional wisdom. *Journal of Management Studies*, *42*(1), 1–33. https://doi.org/10.1111/j.1467-6486.2005.00487.x

Xiao, H., & Yuan, J. (2007). Ownership structure, board composition and corporate voluntary disclosure. *Managerial Auditing Journal*, *22*(6), 604–619. https://doi.org/10.1108/02686900710759406

Yao, Y. (2018). The political economy causes of China's economic success. In R. Garnaut, L. Song, & C. Fang (Eds.), *China's 40 years of reform and development: 1978-2018* (pp. 75–92). Australian National University Press.

Ye, K., Zhu, J., Lu, Z., & Zhang, R. (2011). The independence of independent directors: Evidence from board voting behavior. *Economic Research Journal*, *1*, 126–139.

Zahra, S. A., & Pearce, J. A. (1989). Boards of directors and corporate financial performance: A review and integrative model. *Journal of Management*, *15*(2), 291–334. https://doi.org/10.1177/014920638901500208

# Appendix

## A. *Diversity measures employed in the study*

**A1. Measure of diversity-in-boards** (gender, age, tenure, nationality, education) (Hoang et al., 2018):

$$Blau's\ Index = \frac{N}{N-1}\left[1-\sum_{n=1}^{N}\left(p_n{}^2\right)\right]$$

Where $n = 1, \ldots, N$ possible categories, and $p$ is the percentage of members of the board of directors in the $n$th category (standardized Blau-Index according to Hoang et al. (2018) and the studies cited therein). Specifically,

for gender, N=2: Female; Male.
for age, N=5: Age<36; 36 <=Age <46; 46 <=Age<56; 56 <=Age<66; Age>=66.
for tenure, N=3: Tenure<=3 years; 3 years < Tenure<=6 years; Tenure >6 years.
for nationality, N=2: Mainland China; Others.
for education, N=4: Doctor Degree; Master Degree; Bachelor Degree; Others.

**A2. Measure of diversity-of-boards** (independent/non-independent directors) (Hoang et al., 2018):

Average distance (dissimilarity) D(i) of firm i's board to all the other boards in the sample:

$$D(i) = \frac{\sum_{j=1}^{k} d(i,j)}{k-1}$$
$$\text{with}\quad d(i,j) = \sum_{f=1}^{p} d_{ij}{}^{(f)}$$

where $d(i,j)$ stands for the dissimilarity between pairs of firm i and firm j

$$\text{and}\quad d_{ij}{}^{(f)} = \frac{|x_{if} - x_{jf}|}{\max_h x_{hf} - \min_h x_{hf}}$$

where $d_{ij}$ stands for the contribution made by an attribute f (here: the percentage of independent directors on the board) to the dissimilarity function between firm i and firm j.

## B. *MCTi System*

| | General Description | Detailed Perspectives |
|---|---|---|
| **Macrocosm (Mvalue)** | Overall goals, values and participants of CSR activities | Strategy, Governance, Stakeholders |
| **Content (Cvalue)** | General aspects of CSR related issues that should be included in the report | Economic performance, Labor and human rights, Environment, Fair operation, Consumer, Community participation and development |
| **Technique (Tvalue)** | How are CSR issues reported in text? (logic, language, structure) | Balanced distribution of contents, Comparable information, Innovation of reporting, Reliability and transparency, Normativity, Availability and efficiency of information |
| **Industry** | Issues of CSR related to industry | |

Notes*: These are relevant points of the MCTi system (Rating System of CSR reports) by RKS. The aggregate rating score of a CSR report, which is calculated as the sum of Mvalue, Cvalue, Tvalue and Industry value, has a range of 0-100.*

*Source:* Author design based on "*The Introduction for MCTi System* of RKS*":*

http://www.rksratings.com/index.php/Index/Report/detail/id/73