The Effect of Political Connection on Derivatives Hedging in the Chinese Market

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Abstract

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This paper examines the effects of political connection on derivatives hedging in the Chinese market from 2007 to 2018. Using a sample of privately-owned enterprises (POEs), this study hypothesizes and argues that the top managers or non-independent board directors who have current or previous political work experience exert a negative influence on a firm's hedging incentives since these firms may benefit from governmental bailouts by building connections and resultantly have fewer motives to hedge. Similarly, state-owned enterprises (SOEs) are considered to have natural political connections as their ownership rests in the hands of the government, and therefore should have even fewer incentives to hedge compared with POEs. However, the results we obtain in this thesis do not support this widely held assumption. Interestingly, the financial background of top managers and board directors appears to have different effects on hedging activities in POEs and SOEs.

Key words: Hedging derivatives, political affiliation, risk management, financial background, top managers, board directors

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1. Introduction

Risk management activities have been shown to either maximize shareholders' value or to maximize managers' personal utility (Jin and Jorion, 2006). Hedging risks can reduce taxes, release financial distress, and alleviate agency conflicts, and consequently increase firm value (Nance, Smith and Smithson, 1993). Hedging is also driven by managerial incentives (Smith and Stulz, 1985). Thus, as the firm's decision makers and executors, board members – who represent the interest of shareholders – and managers can critically impact hedging activities.

Derivatives are widely used as an effective instrument in hedging around the world. Since the 1990s, the Chinese derivatives market has increasingly expanded, which has seen the introduction of diversified products to Chinese firms. Even though the Chinese derivatives market is still relatively small, the market is growing continuously, and already have a complete products system. According to the study conducted by Chen and Shao (2010), derivatives hedging functions better than non-derivatives hedging methods based on the Chinese market. Thus, we measure hedging activities by derivatives use in this study. The derivatives measure used in this paper is specifically tailored to hedging, as opposed to other non-derivatives instruments mentioned in the following section, such as leverage, convertible bonds, as well as operational hedges. Whereas these broader instruments are indeed more versatile, they are less suited to the particular study of hedging than the derivative measure applied herein.

In China, the government plays an important role in the market. Firms that are connected to the government may have more financial benefits and looser constraints (Claessens et al., 2008). Such firms hold shares to take control over state-owned enterprises (SOE), which makes SOEs more advantageous than private owned enterprises (POE) and have easier access to key resources for development. On the other hand, POEs are eager to develop relationships with the government by hiring a politically-connected employee as their board members or top managers in order to garner the financial benefits and to take advantage of "flexibility" with regards to constraints that apply to unconnected firms. With support from the government, firms may feel more secure and therefore might have less of an incentive to hedge risk. In order to contribute to literature on Chinese government-connected firms, this paper examines the effects of political affiliation on hedging.

While previous studies explore the respective impacts of political connections and hedging activities on firm value, little attention has been dedicated to tests conducted in order to study the

relationship between political ties and use of hedging derivatives. In addition, the endogeneity problem has been raised from previous studies which will be discussed in following section. As an extension of previous research, instrumental variable estimation (IV) is adopted to provide more reliable results on the political connection effect. Per the results section, negative political effects on hedging decisions become more significant after introducing a geographical variable and a market index variable.

2. Literature Review

2.1 Chinese Derivatives Market and Accounting Measures

Financial derivative products began to appear in Chinese market in the late 1980s. Foreign exchange, commodity futures products, and other types of financial instruments (such as equity warrants, convertible bonds and government bond futures) were introduced to the market. According to Huang and Gao (2008), China started to build its own commodity futures market. The first one was launched in October 1990 and followed by a quick expansion of commodity futures market afterwards. However, due to lack of adequate regulation and insufficient knowledge about these new rising financial instruments, financial fraud and inefficient products appeared in the market. In order to control the unfavorable expansion, the authorities introduced new regulations at the beginning of 1994, and began to establish strict regulatory regime for commodity futures market. Since then, there was a decline in both number of commodities traded and number of exchanges. At the same time, other financial markets, like the equity market, began to grow. The reform of regulation system for commodity futures lasted until the recovery observed in 2001 and 2002 (Xin et al., 2006).

Liu (2009) states that the use of derivatives in Chinese market is at a nascent stage. Derivatives have not been widely used by firms, reflected in this study's data: only a small group of firms hold financial derivatives. Furthermore, derivatives products were mainly concentrated in commodity futures. The derivatives used for interest rates and foreign currency exposure are relatively low. The operation of derivatives was also considered to be low-level and inefficient. Though there are many shortcomings in the derivatives market in China, it is on the path to development and growth. Until 2010, there was a complete financial derivatives products system that included futures, forwards, options and swaps in China (Zheng and Zheng, 2012). Adapting to the continual growth of the derivatives market, as well as to the influence of globalization, Chinese authorities adopted

the IFRS for the derivatives reporting. Firms were required to recognise all financial instruments as assets or liabilities on the balance-sheet at their fair value, and the change of derivatives fair value needed to be recognised in current earnings, unless specific hedge accounting criteria are met (Huang and Gao, 2008).

2.2 Hedging Derivatives

Risk management is valuable to firms as it allows for the offsetting of activities that can maximize value by reducing financing costs (Booth, Smith and Stulz, 1984). Existing literature has theorized this relationship. Nance, Smith and Smithson (1993) state the benefits of hedging as tax reduction, financial distress relief and agency conflict mitigation. Mayers and Smith (1982) point out that hedging can effectively abate problems associated with underinvestment. In these theories, firm hedge is an effective way to enhance market value.

Jin and Jorion (2006) conclude that shareholder value maximization reduces the various costs caused by highly volatile cash flows. Smith and Stulz (1985) shed light on managerial utility maximization incentives. Risk-averse managers tend to become involved in hedging activities if they hold wealth and human capital in the firm. Under this theory, hedging decisions are made based on managers' personal preference and not necessarily according to what enhances the firm's value. The conflict of incentives is caused by the separation of control and ownership. The increase of managerial control over the firm would raise agency cost (He & Sommer, 2010). Monsen et al. (1968) find that different motivations among managers and shareholders may lead to the ineffectiveness of shareholder control over the firms, and consequently compromises the interests of shareholders. According to research conducted by Fama (1980), as well as Fama and Jensen (1983), the use of outside directors as efficient monitors could ensure the smooth operation of decision-making mechanisms and the lowering of agency costs.

The different effects of hedging are presented in multiple studies based on various markets and industries. Carter, Rogers and Simkins (2003) find a significant and valuable effect of hedging for fuel with a sample of US airlines. The results show an approximate14% hedging premium, which helps to alleviate underinvestment. However, the authors do not find evidence to prove that hedging for the price of oil and gas can add value to firms. Fauver and Nranjo (2010) find a negative relationship between use of derivatives and firm value in firms with both great agency and

monitoring problems. Allayannis and Weston (2001) show important evidence of a positive effect on foreign currency derivatives and firm value with a sample of 720 large US multinationals.

Similar research has been conducted specifically on the Chinese market. Chen & Shao (2010) found that derivates have a positive impact on firm value for Chinese listed companies. These hedged firms are more likely to have larger scale of business. In addition, the authors divided their sample into two groups by derivatives types: commodity price exposure and foreign exchange exposure. Interestingly, the use of foreign exchange derivatives increases firm value more than commodity hedge derivatives, while a larger scale of commodity derivatives use sees a performance superior to that of foreign currency hedging. Chen and Shen (2008) find a value-added effect in a study of political connection using a sample of 39 listed Chinese nonferrous metal firms, yet there is no evidence to prove the relationship affects the firms net profits.

Financial derivatives play a role in risk hedging, price discovery and resources allocation. Firms can buy or sell derivatives without actually owning the underlying assets, which can effectively lower the cost to trade assets. In addition to the use of derivatives, there are alternative ways to effectively hedge risk, which could reduce incentives to hedge by financial derivatives. Nance, Smith and Smithson (1993) argue that the restructure of assets and liabilities could reduce exposure to price changes, which accordingly supports that debt reduction in capital structure may ease conflict between shareholders and bondholders. However, one drawback to adjusting leverage is the weakening of debt-related tax shields. In addition, a high portion of debt may incentivize risk management in order to prevent firms from falling into distress. Andrade and Kaplan (1998) find that high leverage increases the possibility of financial distress. Purnanandam (2004) claims a positive relationship between leverage and hedging incentives when the leverage is moderate. In addition, the author also reveals the negative effect of hedging on deadweight loss costs from financial distress, that is, hedging activities can effectively reduce related costs. However, this research shows a U-shape relation between firm hedge and leverage. Once a firm, suffering from a high level of debt, crosses the "leverage inflection point", hedging incentives are no longer positively related to leverage. The hedge motivations are be weakened when firms go to insolvency. Dolde (1995) and Haushalter (2000) trace a consistently positive relationship between hedging and leverage. Belghitar, Clark and Judge (2008) recognize that firms use not only derivative techniques, but also non-derivative tools, such foreign currency debt, to hedge foreign currency risk.

Underinvestment theories raised by Bessembinder (1991) and Froot, Scharfstein, and Stein (1993) argue that firms with greater growth opportunities should hedge more because of capital market imperfections. Luo and Wang (2018) examine the influence of profitability and investment opportunities based on the Chinese market. They discover that foreign currency hedging has a positive effect on firm value, and that the effect is reinforced with greater profitability and investment opportunities. There is convincing evidence support the positive relationship between firm size and hedging (Mian, 1996; Chen and Cui, 2009), as larger firms are more likely to adopt techniques to hedge risk. An explanation for this phenomenon is provided by Jin and Jorion (2006): the cost of establishing a risk management program is substantial, even though small firms should have more incentives to hedge risk because they are more susceptible to financial distress.

Using convertible bonds and preferred stocks are two alternative ways to hedge risk. Convertible bonds are more flexible in transferring between liability and equity. Thus, related liability becomes more sensitive to changes in a firm's value, while equity becomes less sensitive, which effectively mitigates the conflict between shareholders and bondholders. Preferred stock can reduce financial pressure when firms are struggling from a shortage of funds, since they can omit a preferred dividend payment without being forced into bankruptcy (Nance, Smith and Smithson, 1993). However, in the Chinese market, though there has been rapid development since the first issuing of a convertible bond in 1992, the convertible market is still in the early stages of development and innovation. The complex bureaucratic procedures associated with convertible bonds also reduce their attractiveness (Zhu, 2009). Preferred stock started to be used in more recent years in China. It was written as prohibited in the Company Law of 1993, and then abated the restriction in the Company Law of 2006. Until 2014, the China Securities Regulatory Commission released the Rule for Administration of the Pilot Project for Preferred Stocks, which represent the establishment of a legal system for the issuing of preferred stock (Donggen, 2016). Since these alternative hedging tools are not widely used in China and there has no sufficient data to conduct tests, this study does not include relevant variables to study their effects.

Finally, the existence of substitutes may weaken the motivation of derivatives use. Guay and Kothari (2003) question the effectiveness of derivatives on firm value enhancement, as the gain on derivatives is smaller when compared to cash flows or movement in equity values. The observed effect may from other hedging activities, such as operational hedges. However, according to the

study conducted by Chen and Shao (2010), derivatives perform better than other non-derivative hedges based on the Chinese market. Research conducted by Belghitar, Clark and Judge (2008) also attests that the use of derivative hedging adds more value to firms than non-derivative hedging.

2.3 Political Connection

In China, the political infuses industry both implicitly and explicitly. Rajan and Zingales (1998) argue that political connectedness is an alternative way against ineffective operation when the regulation system is deficient and poorly enforced. Before 21st century, the Chinese market lagged as a result of capital scarcity and lack of regulation. The government played a major role in the planned economy, since it decided on goals, directions and resource allocation, and then directly gave commands to operational units (Brown and Neuberger, 1968). Though enterprises have more autonomy since the market-oriented reform of 1978 (Lin, 2004), political ties continue to play a role in the market. Francis, Hasan and Sun (2009) demonstrate that the government imposed strict restrictions and stringent censorship on the process of "going public". Thus, corporations are willing to seek political connections in order to smooth the process to go public and lower the relevant costs.

With the rapid growth of the Chinese market economy has come more capital flow into the market, along with advanced mechanisms and more varied tools that can be used to increase performance. Such diversification may bring into question the efficacy of seeking political ties as a strategy. According to research by Rajan and Zingales (1998), political connections violates the pricing system and misallocates capital, as large external resources come in through the process of becoming connected. Political intervention adversely impacts corporation performance (Fan et al., 2007; Boudakri, 2008). Deng and Zeng (2009) find deeper political connections could lead to worse performance. Fan and Wong (2004) provide evidence that politically connected firms underperform in the market compared to those have no political connections. One of the explanations is that firms with political ties are more likely hire bureaucrats as top managers or board members, as the primary objective for appointed managers is social and political fulfillment instead of enhancing profit (Li et al., 2008). Faccio (2006) points out that firms with political connection can obtain government bailouts, but ironically perform worse. Feng, Sun and Tong (2004) do not find clear evidence to demonstrate that political affiliation impacts sales revenue. Multiple researchers found that political connections are more likely take effect in areas that have

weaker regulation systems and inferior market mechanisms (Faccio, 2006; Fisman, 2001; Yu and Pan, 2008). Firms in poorly regulated environments are more inclined to seek "protection" from government. Krueger (1974) states that some corporations are willing to spend money on establishing relationships with the government in order to avoid unnecessary obstacles such as restricted entry to markets, increased time cost of obtaining licenses or permits etc., which helps to improve operational efficiency for firms.

It is worth noting that some research has pointed to the existence of a positive relationship between political connection and firm performance (Fisman, 2001; Goldman et al., 2009; Li et al, 2008). Firms can take advantage of government-related benefits, such as licenses or broader access to external financing, tax treatment and market power, all of which are vital to a firm's survival and development (Adhikari et al., 2006).

Following research conducted by Schweizer, Walker and Zhang (2019), the strength of a political connection is also considered in this paper, through the inclusion of a strength variable to measure the level of political ties, operating on the premise that that higher levels of political connection could bring more "protection" to firms, and therefore result in less hedge motivation. Zhang, Zhang and Huang (2020) find that a strong political connection has positive effects on internationalization process. Stronger ties contribute to better performance in internationalization activities. However, Deng and Zeng (2009) find that higher-level political connections lead to worse performance. But with the improvement of the regulation system, the adverse impact of government intervention would be abated.

In China, state-owned enterprises (SOE) are dominant in certain contexts as their natural connection with government provides them with support in various ways. They are considered to have a different situation compared to private owned enterprises (POE). They usually have easier access to funding, as the state would be their backup when they face with financial stress. One example is that quotas for long-term loans are allocated to SOEs exclusively (Poncet et al., 2010; Guariglia et al., 2011). This is particularly salient in considering that the liquidation of SOEs is determined by the government, which decreases the possibility of failure as they will be saved if necessary (Peng, Bruton, Stan, and Huang, 2016). Financial advantages make SOEs feel safe and thus less motivated to pursue profit. Furthermore, SOEs carry policy burdens such as boosting GDP, increasing employment and preventing social unrest. Their social and political objectives deviate

from the original incentives of business. Instead of being purely profit-driven, they focus more on balancing the government's sometimes conflicting agendas. This soft-budget constraint on SOEs also increases their risk-taking capacity (Stiglitz, 1988). POEs, on the other hand, experience more challenges than SOEs in this regard. Cheng and Ma (2010) stress that POEs have more restrictions when operating business and financing externally, such as longer processing times and higher thresholds. POEs are considered to be high risk since there are short on extra support, which makes it even more difficult to obtain loans (Liu and Tan, 2004). Thus, building political connections is a practical way to mitigate disadvantage, as evidence by previous research positing that political ties can improve firms' performance. However, Wu, Wu and Liu (2008) find that there is no obvious evidence to show that political connection can ameliorate firm performance. Yet, after controlling the extent of governmental intervention, the positive effect turns out to be significant. Wang and Wu (2008) trace the different impact of political in playing the "supporting hand", to enhance performance of private-owned corporations (POE), or playing the "grabbing hand" to harm the business effectiveness of state-owned corporations (SOE).

2.4 Political Effect on Hedging Activities

There are not much papers study on the political connection on derivatives hedging. One study conducted by Shao (2019) reveals that the building of a political connection diminishes interest rate risk exposure and that firms rely less on other explicit financial tools for risk management, but the author also raises concerns on endogeneity. Hutzschenreuter & Harhoff (2020) state that geographic location impacts the development of a political connection, that is, if multinational firms locate their equity investment closer to national capital city of the host country, then portfolio expansion becomes more rapid. Besides, Wu, Wu and Liu (2008) stress the economical impact on the power of political connection in an area. They assume that political connections may have more influence in undeveloped areas. Thus, geographical characteristics should be considered when exploring the effect of political connection.

3. Data

This research is conducted using a sample of Chinese non-financial firms, accessed by consulting the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) listings from the period of 2007 to 2018. Since 2007, listed firms have been required to disclose their hedging activities in financial statements and footnotes, and derivatives have begun to be

recognized and measured as on-balance sheet item. This study collects the majority of its firm-related data from the China Stock Market and Accounting Research (CSMAR). All the corporate governance, financial related data and coordinates of head offices locations for listed firms are found in the China Stock Financial Statement database on CSMAR. CSMAR is also the source for board directors' and CEOs' political and financial background information. The Chinese market index (which measures the degree of marketization) is retrievable from the Economic Forum of Renmin University of China (https://bbs.pinggu.org/). For missing data on the nature of firms from CSMAR, Sina Finance (https://finance.sina.com.cn/) provided the opportunity for manual collection. This study omits firms with special treatment (marked as ST or ST* before their company name), which are recognised as having a negative net profit latest three or two years. They are considered to have delisting risk.

4. Variables Description

Derivatives variables

According to the New Accounting Standards (NASs) issued in 2006 (effective since 2007), all Chinese entities must recognise financial instruments as assets or liabilities on their balance-sheets, and must also measure these at fair value. The CSMAR's China Stock Financial Statement database lists the value of derivative assets and liabilities, which are defined as the amount of derivatives, hedging instruments, or hedged items belonging to derivative financial assets/liabilities held by enterprises. For this research, the total amount of derivatives is a proxy for the magnitude of derivative use. A natural log of the amounts of derivatives alleviates any skewing due to large value. Following the study conducted by Bartram et al. (2011) and Allayannis et al. (2012), this study uses a binary dummy variable to measure derivative use, which provides a view on the effect of political connection on derivative hedge decisions. In the following tests, Derivatives Dummy variable equals to 1 if the firm uses derivatives, and 0 otherwise.

Political Connection variables

This research defines the subject of political connection as top managers and board members. Independent directors are excluded as they are intended to play a role in monitoring and enhancing the transparency of firms rather than engaging in operating activities (Weisbach, 1988; Fama, 1980). Their political connection may not have the same strength on hedging decisions as that of an executive director or a manager. Per research conducted by Schweizer, Walker and Zhang

(2019), this thesis implements two variables to measure political connections and political index. Political connection as a dummy variable equals to 1, when the top manager or a board member has current or previous work experience in a central or local government department, the military, the People's Congress (PC), the People's Court and Procuratorate, or the Chinese People's Political Consultative Conference (CPPCC), and equals to 0 otherwise. The Political Index measures the level of political connections, which ranges from 1 to 3. It equals to 3 when the politically-connected chairperson or CEO is a senior cadre or a chairperson of the PC or CPPCC, equals to 2 if he or she is a middle-level cadre, or a member of PC or CPPCC, and equals to 1 if he or she is a governmental or military officer.

Financial work experience

Top managers or non-independent board directors that have finance or accounting related experience bring financial knowledge and therefore improve the understanding of financial policies and financial statements at their firms (Aebi, Sabato & Schmid, 2012). Du and Zhou (2009) consider that top managers who have previous or current work experience in banks are politically-connected, since banks are usually government-controlled. Bank-connected managers are a bridge between firms, as banks may bring financial benefit to firms. However, Güner et al. (2008) state that financial benefits are only for the firms with good credit and poor investment opportunities. Firms that have financial restrictions are not able to secure funding, even if they have financially-connected managers and/or directors. In this research, we isolate financial background from political connection to explore pure effect of financial background on hedging incentives. Financial institutions include not only banks, but also other financial companies, such as insurance companies, securities companies, trust companies, investment banks, futures companies, fund management companies and others. A binary variable is applied to measure financial background, which equals to 1 when top managers or non-independent directors whom have current or past work experience in financial institutions, and 0 otherwise.

Leverage

Per precedents set by Nance et al. (1993) and Lin and Smith (2007), the leverage ratio (LEVERAGE) of a firm is the book value of long term debt (long-term debt plus debt included in the current liabilities) scaled by the book value of total assets. The assumption for leverage is that higher leverage may increase the possibility of falling into financial distress and therefore may

increase the incentive to hedge the risk. Moreover, leverage as a substitute for derivative hedging can weaken the motivation to use financial instrument to hedge.

Market to Book ratio

Based on trade-off theory, firms with higher market-to-book ratios (MTB) are expected to have more growth opportunities (Hovakimian, Opler, and Titman, 2001). In research conducted by Adam and Goyal (2000), the best measure of growth opportunities is the market-to-book asset ratio, indicating the highest correlation with the firm's actual investment opportunities. A high MTB ratio could aggravate underinvestment problems, which may incentivize to hedging. However, more growth opportunities may bring additional free cash flow and therefore disincentivizes hedging (Aretz & Bartram, 2010).

Total asset, return on asset and volatility of stock return

Much scholarship suggests a positive relationship between firm size and hedging incentives, which proves that hedging firms tend to be larger (Mian, 1996; Jin and Jorion, 2006; Chen and Cui, 2009). Thus, this thesis's testing uses a natural log of total assets 'LN_Asset" to control firm size. Return on Asset (ROA) measures firm performance. The application of the volatility of stock return also measures the risk exposure of firms.

Separation of control and ownership

Cummins and Sommer (1996) find a negative correlation between firms' risk-taking behaviour and the separation degree of control and ownership. On the one hand, managers are expected to engage in hedging activities in order to reduce risk, as they are deemed to be risk-averse (Amihud and Lev, 1981). Moreover, the separation of control and ownership can aggravate agency costs and thus increase incentive to hedge (He & Sommer,2010). On the other hand, firms with higher managerial control are more likely to engage in activities that have less risk. With lower exposure to risk, it is less necessary to hedge by derivatives. Thus, the relationship between hedging incentives and degree of separation becomes indistinct.

Ownership concentration and independent directors

Desender and Lafuente (2009) reveal the importance of autonomy in board and ownership concentration on risk management. Firms with more independent board members and more concentrated ownership show higher levels of risk management which implies more practices related to risk management and more effective risk control mechanism. Large shareholders are considered to have stronger motivation to control and monitor the firm in which they invest. In

order to address the effect of these two factors, this thesis applies the Herfindahl index to firms' top three owners so as to measure ownership concentration, and uses the percentage of independent board members (scaled by total board members) to measure the independence of board.

Instrumental Variables

Two instrumental variables solve any potential endogeneity problems. The first is the distance between firms' head offices and the capital city of the province in which they are located, with the assumption that if firms are closer to the capital city of their province, then they are more likely to build a political connection. The second variable is the Chinese market index which measures the process of marketization in a city. The assumption is that political connection has a stronger effect in undeveloped areas.

5. Methodology

5.1 Panel Data

First, we examine the effect of political connection on hedging activities for POEs. The application of both political connection and its strength index measure political ties. To examine the political effect on hedging decision-making (hedge dummy) with the data for various industries for an 11 year period (from 2007 to 2018), this study applies the panel logit regression with two data dimensions of firms' stock code and year:

$$\text{Deriv\_Dummy } (1/0)_{I,t} = \alpha + \beta_1 * \text{PC\_Connection } (1/0)_{i,t} + V_n * \text{Control Variables}_{i,n,t} + \pi_t + \varepsilon_{i,t} \quad (1)$$

$$\text{Deriv\_Dummy } (1/0)_{I,t} = \alpha + \beta'_1 * \text{PC\_Index}_{i,t} + V'_n * \text{Control Variables}_{i,n,t} + \pi_t + \varepsilon_{i,t} \quad (2)$$

Where Deriv_Dummy is a binary variable which equals to 1 when a firm uses derivatives to hedge, and 0 otherwise; Political_Connection is also a dummy variable which equals to 1 when a firm has politically-connected top managers or board members, excluding independent directors, and 0 otherwise; PC_Index is a measure for political strength ranging from 1 to 3 – the variables description section defines the level classification details for this index; Control Variables include a natural log of total assets, ROA, MTB, a financial background dummy, leverage ratio, stock volatility, a separation ratio of control and ownership, Herfindahl index for the top 3 shareholders as a proxy for ownership concentration, and the percentage of independent directors; π_t is year

fixed effect. Our hypothesis predicts a negative result for the coefficients for political connection (β_1) and political index (β'_1), as political ties may lessen the incentive to hedge.

Second, this thesis conducts tests based on aggregated full samples, which includes both SOEs and POEs. A SOE dummy variable is set to test if there is a significant and negative effect on SOEs with the hypothesis that SOEs may have less incentive to hedge, as they have both more implicit and more explicit benefits from the government.

$$\text{Deriv\_Dummy } (1/0)_{I,t} = \alpha + \beta_1 * \text{ SOE } (1/0)_{I,} + V_n * \text{Control Variables}_{i,n,t} + \pi_t + \varepsilon_{i,t} \quad (3)$$

Where SOE equals to 1 if the firm is a state-owned firm, and 0 otherwise; the control variables are the same as the models above for POEs. The application of the random effect model and the fixed effect model allows for a robustness check. According to the hypothesis, the coefficients for SOEs are expected to be negatively related to derivative use.

The third test is conducted to study SOEs' hedging incentives based on a different hierarchical background:

$$\text{Deriv\_Dummy } (1/0)_{I,t} = \alpha + V_m * \text{Hierarchy}_{i,m,t} + V_n * \text{Control Variables}_{i,n,t} + \pi_t + \varepsilon_{i,t} \quad (4)$$

Where Hierarchy is a set of dummy variables for SOEs, whether they are central enterprises, state-owned enterprises, provincial state-owned enterprises or municipal state-owned enterprises; the remainder of the function mimics that of the previously-proposed models.

5.2 PSM Techniques

Given that only a small group of firms in our sample use hedging derivatives, the sample would have selection bias. In order to avoid this potential issue and to collect more reliable results, we use propensity score matching (PSM) techniques with the nearest neighbour matching method to match firms that use hedging derivatives with similar firms that do not hedge by derivatives. The treatment variable is a hedging dummy, and controlled by a natural log of total assets, ROA, MTB, financial background dummy, leverage ratio, stock volatility, separation ratio of control and ownership, Herfindahl index, as well as the percentage of independent directors. After matching, we have a cross-sectional sample of 724 observations for full firms, which has 362 observations for test and 362 observations for control. Similarly, the approach repeats the matching method for POEs and SOEs separately to collect a sample of 348 observations for POEs with 174 testing and 174 control, and another sample of 376 observations for SOEs with 188 testing and 188 control.

5.3 Endogeneity

Given the potential impact of endogeneity, this study conducts a two-stage instrument variable (IV) analysis along with PSM technique for POEs to study the political effect on hedging activities based on different situations in areas. The first stage tests the relationship between instrumental variables and political connection with a probit model. This stage includes two instrumental variables, distance to capital city of the province and market index:

$$PC\_Connection\ (1/0)_{i,t} = \alpha + \lambda_1 * d_{i,t} + \lambda_2 * mindex_{i,t} + V_{0n} * Control\ Variables_{i,n,t} + \varepsilon_{i,t} \quad (5)$$

Where d is the distance between a firm's head office to the capital city of the province in which the firm is located; mindex is the market index in the firm's area; the control variables stay the same as those in previous tests. The second stage tests the relationship between derivative hedging and predicted value from first stage:

$$Deriv\_Dummy\ (1/0)_{I,t} = \alpha + \beta_1 * xb + V_n * Control\ Variables_{i,n,t} + \pi_t + \phi_k + \varepsilon_{i,t} \quad (6)$$

Where xb is the predicted value from first stage in Eq. (5); ϕ_k is industry fixed effect; the remainder of the variables remain consistent with previous models.

In addition to the use of the dummy variable to measure whether a firm uses hedging derivatives or not, a numerical variable is also applied to measure the magnitude of derivatives used for hedging. 'Deriv' replaces the variable 'Deriv_Dummy', which is the natural log of the amount of hedging derivatives, and tests with the tobit model, since the dependent variable is concentrated at 0 because of the small use of hedging derivatives in our sample:

$$Deriv_{i,t} = \alpha + \Upsilon_1 * xb + V_{1n} * Control\ Variables_{i,n,t} + \pi_t + \phi_k + \varepsilon_{i,t} \quad (7)$$

Where the coefficients for political measures are expected to be negative with the assumption that firms that have political ties hedge less.

The political index replaces the political connection dummy and this study repeats the two-stage IV test to assess the effect of political strength on derivatives hedging. As the political index ranges from 0 to 3, this thesis uses the poisson model in the first stage rather than the probit model:
First stage:

$$PC\_Index_{i,t} = \alpha + \lambda_1 * d_{i,t} + \lambda_2 * mindex_{i,t} + V_{0n} * Control\ Variables_{i,n,t} + \varepsilon_{i,t} \quad (8)$$

Second stage :

$$Deriv\_Dummy\ (1/0)_{i,t} = \alpha + \beta_1 * xb' + V_n * Control\ Variables_{i,n,t} + \pi_t + \phi_k + \varepsilon_{i,t} \quad (9)$$

$$Deriv_{i,t} = \alpha + \Upsilon_1 * xb' + V_{1n} * Control\ Variables_{i,n,t} + \pi_t + \phi_k + \varepsilon_{i,t} \quad (10)$$

Where xb' is the prediction value from first stage in Eq. (8)

6. Empirical Results

6.1 Descriptive Statistics

The collected sample consists of 3,347 firms in total, during the period from 2007 to 2018, with 2,362 POEs and 1,154 SOEs. In addition, the sample includes 169 firms that have transferred from POE to SOE or vice versa. After removing observations with missing data, the sample stands at 22,658 firm-year observations. Table 1 represents the statistical summary. However, there is only a small group of 362 observations that show the use of financial derivatives to hedge. For SOEs, about 1.89% (188 observations scaled by total SOE observations of 9,946) uses derivatives for hedging, while only 1.36% of POE sample (174 observations scaled by total POE observations of 12,712) shows hedging derivative use. The statistics may hint that POEs may not hedge more than SOEs, which opposes this thesis's original hypothesis.

Table 2 offers a breakdown of political connection at POEs. Close to one third of total firm-year observations has political connection, and only 1% of these (49 scaled by 4,744) use derivatives to hedge, while 1.5% of non-politically connected observations has derivatives for hedging. It is consistent with the stated hypothesis that politically connected POEs may have less incentive to hedge than non-politically connected firms. Since SOEs are owned by the government, the very establishment of such firms hinges on political connection.

In Table 3 presents the trend of derivatives use during the sample period. However, due to missing data in 2007, our results only show the use of derivatives start from 2008. The number of firm-year observations that use derivatives to hedge are continuously increasing, which may suggest that derivatives are gradually becoming widely used, compared to the concentrated use of 1 firm-year observation for first two years of the sample. In addition, the amount range of derivatives presents as wider.

Table 4 shows the industry variety for derivative use for hedging. According to the number of observations for different industries, derivatives are widely used in manufacturing-related fields, where firms tend to hedge the price volatility of materials. They are considered to hedge with commodity derivatives, which applies to specific industries, such as energy-based firms, direct product and consumer merchandise companies. Moreover, the oil and gas industry shows a large amount of derivatives use, even though there is only one firm-year observation found to have hedging derivatives in our sample.

Table 5 shows hierarchical details for SOEs, as they are specifically classified based on the administrative level of their owner. For example, if a firm is owned by the provincial government, then the firm is classified as a provincial state-owned enterprise. The summary shows that Central Enterprises hedge less in relative terms, both qualitatively and quantitatively. This finding is, to some extent, in accordance with our assumption as central enterprises are highly controlled by the government. Such enterprises may obtain more support from government and thus have less of an incentive to hedge. Furthermore, as SOEs have their political and social goals to achieve, their incentives to hedge are more ambiguous.

Table 6, Panel A, B and C show the statistics summary of all variables for the full sample, POE sample and SOE sample. The full samples consist of 22,658 firm-year observations, and 12,712 of them are POEs and 9,946 of them are SOEs. In Panel A, the mean for the hedging dummy is 0.016, which indicates that only 1.6% observations use derivatives to hedge. 43.9% of total observations are SOEs (Mean of SOE dummy is 0.439). In the full sample, 66.4% of observations (Mean of FinanGr is 0.664) have financial background, which implies broad connections with financial institutions. However, there is not much difference in terms of financial background for POEs (0.660) and SOEs (0.670) from Panel B and C. Moreover, the leverage of SOEs is also higher than POEs. It supports the theory that SOEs usually have more access to external financing and have more debt capacity from previous studies. The degree of separation in ownership and control is higher for POEs, which indicates more managerial control over the firms and may contribute to higher agency costs. POEs' market-to-book ratio is higher than that of SOEs. Based on trade-off theory, POEs have more growth opportunities.

6.2 Multivariate Results

6.2.1 POEs

First, this study tests the effect of political connection and its strength on hedging decisions for POEs with both fixed effect and random effect, and the results are shown in Table 7. We conducted Hausman test to decide which model is preferred for our sample. And the statistics (p – value) of Hausman test when we use political connection dummy variable as main explanatory variable is 2.55 (0.6365), and the statistics (p – value) of Hausman test when we use political index as main explanatory variable is 2.49 (0.6461). Both results prove the null hypothesis that random effect model is preferred can not rejected. Thus, we conduct mainly by random effect model, while

the fixed effect model is also tested for robustness. The signs of political variables' coefficients are negative, except one, for the political index with random effect. Yet, none of these is significant. The firm size (measured by the natural log of firm size) has a positive and significant effect on hedging decisions as larger firms are more likely to use derivatives to hedge, which is consistent with previous research. The Herfindahl index for the top three shareholders is a proxy for ownership concentration, and plays a constant and positive role for hedging decisions, which is also in line with previous studies which suggest that large shareholders are motivated to hedge risk. The coefficients for financial background are negative as expected, but all statistics are not significant.

As mentioned in a previous section, there is one concern with the sample. Since only a small group of observations (362 obs.) have hedging derivatives, relative to the total number of 22,658 observations, the sample selection could be biased. In order to make the results more reliable, the study applies the propensity score matching technique (PSM) to match hedged firms with similar non-hedged firms. This is expected to test effect of political ties in a purer way. In addition, the study also includes the instrument variables (IV) with the concern of endogeneity. Table 8 shows the two-stage results of PSM-IV tests for POEs. In Panel A, the main test variable is the political connection dummy, used to test the effect of building a political connection. As the results shown in stage one, the Chinese market index has a negative and significant relationship with political connections, which is coherent with the assumption that political connection has more power in less developed areas. However, the distance from firm's head offices to the capital city of the province in which the firm is located is slightly positive, which is contrary to this study's hypothesis. However, the coefficient is not significant at all. In the second stage, the coefficient of the political connection dummy is -3.909 with p-value (0.009) less than 0.01 significance level, which indicates a negative and significant effect on hedging derivatives use (derivatives dummy). It provides strong evidence to support the claim that political connection decreases the incentive to hedge for POEs. In addition, this study tests the amount of derivatives used for hedging as a proxy for hedging magnitude. As the results demonstrate in the second column in second stage, the coefficient (-15.008) is also negative and significant (p-value equals to 0.033) at 0.05 significance level. Thus, political ties not only reduce the incentive to hedge, but also reduce the hedge amount. Firm size has a positive effect on hedging amount as larger firms hedge more. However, the results do not imply a significant effect on hedging decisions. The financial background of top managers

and directors has significant and positive impact on hedging decisions for POEs, which is contrary to the hypothesis that such a background could bring more financial benefits to firms and consequently release financial pressure. However, finance-related experience does not bring benefit to firms with bad credit and financial restrictions (Güner et al., 2008). Furthermore, managers or board members that have financial work experience can bring related knowledge, and accordingly enrich risk management strategies at their firms, which would prompt the engagement in hedging activities (Aebi, Sabato & Schmid, 2012). The positive and significant coefficients of market-to-book ratio reveal a positive relationship between growth opportunities and derivatives hedging. Stock volatility has a negative and significant relationship with derivatives hedging. One possible explanation is that of managerial incentives for hedging. POEs have more degrees of separation between ownership and control on average, per the descriptive statistics from the previous section, which indicates more managerial control in POEs than in SOEs. Moreover, the sensitivity of managers' portfolio to stock volatility can affect their hedging decisions[1]. Thus, more volatile stock returns may reduce the motivation to hedge among managers.

Panel B shows the effect of political connection strength on hedging activities. Consistent with the results of first stage in Panel A, the market index shows a negative effect on political connection, which is consistent with the assumption when a city is becoming more market-oriented, the political connection will become less effective. While the coefficient of the firm's distance to the province's capital city is slightly positive but not significant. In the second stage, the political index has a negative effect on both hedging decisions and hedging amounts, which indicates that the higher political level of managers or directors could mitigate the hedging motives. However, in this case, the results are less conclusive as the statistics are not significant.

6.2.2 SOEs

Table 9 specifies the hedging motivations of SOEs. Since they, by default, have a natural connection with the government, they may have less incentives to hedge compared to POEs. Per the panel regression for POEs, this study conducts panel data test for a full aggregated sample with both random and fixed effects. Since the Hausman-generated statistic is 9.48, with a p-value equal

[1] Pagach & Warr (2007) state that managers may be compensated with stock and options, which will affect their risk-taking behavior. Knopf, Nam & Thornton (2002) find that if managers' stock and stock option portfolios are more sensitive to stock volatility, then firms hedge less.

to 0.394, the random effect is preferred. The coefficients for the random effect model are shown in the first column. The sign of SOE is negative, which is consistent with the assumption that SOEs have less of an incentive to hedge because of their connection to government, but the result is not significant. Unexpectedly, the coefficient of SOE becomes positive and significant at a level of 0.1, with the fixed effect in the second column. One possible explanation for this result is that SOEs are usually dominant in industries especially in national resources related fields such as energy, production etc., and these industries are more vulnerable to material prices and therefore may hedge more. Thus, even though SOEs have more benefits through their connection to the government, they still show more use of hedging derivatives. Column 3 and 4 provide results for the hedging incentives of SOEs in different political hierarchies. Comparing to the basement test of Central Enterprises, municipal state-owned enterprises have more hedging motivations, while provincial state-owned enterprises are less likely to hedge. State-owned enterprises have different coefficient signs for the fixed effect and the random effect. However, none of these indicates significant results. It is noteworthy that the separation ratio related to derivatives hedging is significantly negative, which supports the proposition that more manager-controlled firms are more inclined to engage in activities with less risk, which consequently reduces the incentive to hedge.

As mentioned above, the sample is susceptible to bias, as only a small group of firms use hedging derivatives. Thus, the performance of retesting provides a full sample, and a SOE sample with the PSM technique, the results of which are listed in Table 10. Unfortunately, none of the coefficients are significant for the full sample in the first column. In the case of the SOE sample in the second column, the coefficients of the hierarchy dummies remain insignificant. The separation ratio remains negative but turns out to be insignificant. However, the financial background of managers and directors becomes negative and significant at 0.05 level, which proves the hypothesis that top managers or board directors who have financial backgrounds may also bring benefits to firms via their expertise, and consequently may assist in reducing the motivation to hedge. Unlike POEs, stock volatility has a positive effect on derivatives hedging, though the coefficients are not significant.

7. Conclusion

This paper investigates the effect of political connection on derivatives hedging for POEs and SOEs. Out of concerns for sample selection bias and endogeneity, this thesis applies the PSM

technique and Instrumental variables, and locates strong evidence that building political connections can effectively reduce the incentive to hedge for POEs. However, there are no significant results to support the assumption that SOEs, which are politically affiliated by default, have less incentive to hedge than POEs. Moreover, firm size plays an important role in hedging activities. The results indicate that larger firms usually hedge more, which is consistent with previous studies that posit that larger firms may have more resources to build risk management programs, so that they have more motivations to hedge. Interestingly, financial background has different effects on POEs than on SOEs. For SOEs, results support the hypothesis that top managers or board directors who have financial backgrounds may bring in financial benefits to firms, which in turn decreases motives to pursue hedging, while financial background has a positive effect on hedging decisions for POEs. One possible explanation for this finding is that POEs are expected to have less access to resources in building their risk management systems, and managers or directors with finance-related experience bring more advanced financial knowledge to improve the risk hedging mechanism. Thus, less access to resources may have a positive impact on hedging activities for POEs. Unexpectedly, the results show that stock volatility as a proxy for risk exposure has a significantly negative effect on hedging for POEs. One possible interpretation of this result is managerial incentives from compensation portfolios, a hypothesis that would benefit from examination in future research. Besides, as discussed in previous studies, convertible bonds and preferred stock as two alternatives for derivatives hedging are worthy considering in the future when Chinese market has sufficient practices of these financial instruments.

Table 1: Derivatives Hedging Activities

This table reports full sample breakdown which shows how many firm-year observations that use hedging derivatives and how many observations do not use them during the period from 2007 to 2018 in groups of POEs and SOEs. The derivatives use data is collected from CSMAR database.

Full sample	Derivative hedge	No derivative hedge	**Total**
SOE	188	9,758	**9,946**
POE	174	12,538	**12,712**
Total	**362**	**22,296**	**22,658**

Table 2: Political Connection in POEs

This table reports POE sample details of hedging derivatives use and political connection, which shows number of firm-year observations that have political connection and use hedging derivatives; number of firm-year observations that do not have political connection and use hedging derivatives; number of firm-year observations that have political connection and do not use hedging derivations; and number of firm-year observations that have neither political connection nor hedging derivatives.

POE sample	Derivative hedge	No derivative hedge	**Total**
Politically Connected	49	4,695	**4,744**
Non-politically connected	125	7,843	**7,968**
Total	**174**	**12,538**	**12,712**

Table 3: Year Trend of Derivatives Hedging

This table reports number of firm-year observations that use hedging derivatives and statistical summary for total amount of hedging derivatives used for each year from 2008 to 2018. The data collection period is from 2007 to 2018, but there is no observation found in 2007.

year	N Obs	Mean (¥'M)	Median (¥'M)	Std Dev (¥'M)	Minimum (¥'M)	Maximum (¥'M)
2008	1	557.921	557.921	.	557.921	557.921
2009	1	201.002	201.002	.	201.002	201.002
2012	2	505.354	505.354	691.950	16.071	994.636
2011	2	394.478	394.478	541.804	11.364	777.591
2010	2	216.141	216.141	269.329	25.696	406.585
2013	5	140.941	52.800	220.491	2.742	532.968
2014	40	117.145	11.639	310.510	0.089	1,783.973
2015	49	103.780	4.000	281.084	0.012	1,489.453
2016	60	151.916	14.415	321.663	0.001	2,007.419
2017	81	148.545	8.289	352.041	0.008	1,939.387
2018	119	286.829	5.989	1,983.965	0.035	21,458.000
Total	362					

Table 4: Hedging Derivatives Use in Different Industries

This table reports the number of firm-year observations that use hedging derivatives and statistical summary for total amount of derivatives use in different industries during the period of 2007-2018.

Industry	N Obs	Average Firm Size (¥'M)	Mean (¥'M)	Median (¥'M)	Std Dev (¥'M)	Minimum (¥'M)	Maximum (¥'M)
Electric Machines and Apparatuses Manufacturing	45	51,405.01	147.04	3.20	296.76	0.03	1,189.03
Wholesale	32	47,418.88	326.43	100.12	557.86	0.24	2,125.92
Computer, Communication and Other Electronic Device Manufacturing	26	32,529.26	191.24	49.14	315.85	0.09	1,269.87
Raw Chemical Materials and Chemical Products	26	25,047.60	155.59	6.53	442.93	0.05	1,969.40
Smelting and Pressing of Nonferrous Metals	20	16,423.69	41.03	11.82	81.56	0.05	358.16
Production and supply of electric power and thermal power	19	178,295.01	460.54	342.72	513.81	0.61	1,783.97
General Equipment Manufacturing	19	51,451.43	8.14	2.78	12.29	0.01	48.48
Special Equipment Manufacturing	17	25,204.19	299.80	49.09	554.69	0.61	1,939.39
Civil Engineering Construction	14	355,623.56	23.57	14.16	32.09	0.48	120.00
Farm Products Processing	13	9,777.13	65.79	2.04	142.38	0.04	500.83
Non-metallic Mineral Products	9	20,979.60	36.67	30.23	43.95	0.03	136.40
Automobile Manufacturing	9	20,989.60	19.17	9.12	28.75	0.49	88.96
Air Transportation	8	204,536.50	98.46	47.00	157.34	4.00	476.00
Retail Trade	8	43,651.57	51.61	15.32	58.20	3.16	135.38
Business Service	7	30,793.73	222.57	102.65	255.91	0.15	692.47
Medicine Manufacturing	7	16,669.41	33.48	28.78	33.19	1.97	79.98
Chemical Fibre Manufacturing	7	29,109.45	81.71	16.21	137.45	0.74	381.46
Rubber and Plastic Product Industry	7	7,474.01	2.52	2.26	1.57	0.34	5.18
Metal Products	6	31,566.89	66.15	1.24	159.53	0.16	391.78
Ferrous Metal Smelting and Extruding	5	76,275.53	20.73	6.96	29.95	2.14	73.29
Hotels	5	31,870.54	4.00	4.39	2.53	0.29	6.36
Nonferrous Metal Mining	5	24,374.48	25.80	3.30	33.82	1.23	75.42
Railway, Shipbuilding, Aerospace and Other Transportation Equipment Manufacturing	5	7,927.94	5.74	3.13	4.74	1.45	11.85
Warehousing	5	17,740.34	1.11	1.19	0.53	0.49	1.63
Conglomerates	4	16,803.22	25.89	21.71	25.49	0.41	59.74
Internet and Related Services	4	33,093.77	2.43	2.68	1.44	0.49	3.86
Papermaking and Paper Products	4	6,288.07	0.52	0.29	0.69	0.00	1.52
News and Publishing Industry	3	16,287.59	5.03	6.06	3.71	0.91	8.11
Production and Supply of Gas	2	27,271.37	51.08	51.08	0.89	50.45	51.71
Water Transportation	2	148,261.33	19.35	19.35	26.65	0.51	38.20
Loading, Unloading and Transportation Agency	2	23,612.72	18.53	18.53	10.13	11.36	25.70
Petroleum Processing, Coking and Nuclear Fuel Processing	2	22,889.85	10.01	10.01	11.97	1.55	18.47
Software and IT Services	2	1,413.22	2.51	2.51	1.26	1.61	3.40
Graziery	2	7,133.37	0.88	0.88	0.92	0.23	1.53
Oil and Gas Extraction	1	1,592,310.00	21,458.00	21,458.00	.	21,458.00	21,458.00
Instrument and Meter Manufacturing	1	4,289.81	52.45	52.45	.	52.45	52.45
Furniture Manufacturing	1	7,286.80	18.49	18.49	.	18.49	18.49
Highway Transport	1	24,209.13	16.07	16.07	.	16.07	16.07
Textiles, Garments and Apparel Industry	1	16,567.71	6.55	6.55	.	6.55	6.55
Culture and Education, Arts and Crafts, Sports and Entertainment Products Manufacturing	1	2,443.58	1.06	1.06	.	1.06	1.06
Sanitation	1	4,279.79	1.00	1.00	.	1.00	1.00
Textile	1	1,334.18	0.98	0.98	.	0.98	0.98
Professional Technological Service	1	3,239.58	0.27	0.27	.	0.27	0.27
Food Manufacturing	1	6,196.76	0.07	0.07	.	0.07	0.07
Coal Mining and Processing	1	105,407.00	0.01	0.01	.	0.01	0.01
Total	362						

Table 5: Hedging Derivatives Use in Different Hierarchical Level of SOEs

This table reports number of firm-year observations that use hedging derivatives and statistical summary for total amount of derivatives use in different hierarchical groups of SOEs.

Hierarchy	N Obs	Average Firm Size (¥'M)	Mean (¥'M)	Median (¥'M)	Std Dev (¥'M)	Minimum (¥'M)	Maximum (¥'M)
Central Enterprise	5	22,428.281	10.984	1.666	21.314	0.243	49.085
Municipal State-owned Enterprise	56	65,740.743	206.898	23.597	412.558	0.012	2,007.419
Provincial State-owned Enterprise	37	33,571.741	65.024	17.280	121.710	0.001	586.713
State-owned Enterprise	90	145,167.241	446.230	29.598	2,274.913	0.236	21,458.000
Total	188						

Table 6: Summary Statistics

This table reports summary statistics (number of observations, mean, standard deviation, minimum and maximum) of variables used for full sample tests (Panel A), POE sample tests (Panel B) and SOE sample tests (Panel C) respectively. Since political connection variables are only used for POE sample, the statistical summary for the two political variables (Political Connection and PC Index) are only shown in POE sample (Panel B). In full sample (Panel A), we differentiate SOEs by using dummy variable SOE. All the variables are explained in Appendix variables description table. Our sample collection period ranges from 2007 to 2018.

Panel A: Full Sample					
Variable	Obs	Mean	Std. Dev.	Min	Max
Derivatives amount	22,658	0.258	2.054	0.000	23.789
Derivatives dummy	22,658	0.016	0.125	0.000	1.000
SOE	22,658	0.439	0.496	0.000	1.000
LN_Asset	22,658	22.042	1.278	14.942	28.520
ROA	22,658	0.035	0.096	-4.946	0.590
Financial Background	22,658	0.664	0.472	0.000	1.000
Stock return volatility	22,658	0.478	0.152	0.116	3.111
Leverage	22,658	0.083	0.116	-0.120	0.943
MTB	22,658	2.197	5.547	0.153	715.820
Separation	22,658	4.883	7.713	0.000	47.850
Herfindahl	22,658	0.165	0.119	0.000	0.810
Independent director	22,658	0.372	0.055	0.000	0.800
Panel B: POE					
Variable	Obs	Mean	Std. Dev.	Min	Max
Derivatives amount	12,712	0.212	1.825	0.000	21.477
Derivatives dummy	12,712	0.014	0.116	0.000	1.000
Political Index	12,712	0.657	0.902	0.000	3.000
Political Connection	12,712	0.373	0.484	0.000	1.000
Financial background	12,712	0.660	0.474	0.000	1.000
LN_Asset	12,712	21.692	1.045	14.942	26.428
ROA	12,712	0.038	0.114	-4.946	0.590
Stock return volatility	12,712	0.484	0.149	0.131	3.111
Leverage	12,712	0.058	0.089	0.000	0.943
MTB	12,712	2.424	7.239	0.684	715.820
Separation	12,712	5.542	7.846	0.000	47.850
Herfindahl	12,712	0.143	0.104	0.000	0.810
Independent director	12,712	0.375	0.054	0.000	0.750

Table 6 continued

Panel C: SOE					
Variable	Obs	Mean	Std. Dev.	Min	Max
Derivatives amount	9,946	0.317	2.313	0.000	23.789
Derivatives dummy	9,946	0.019	0.136	0.000	1.000
ROA	9,946	0.031	0.067	-2.746	0.381
Financial background	9,946	0.670	0.470	0.000	1.000
LN_Asset	9,946	22.489	1.404	18.160	28.520
Stock return volatility	9,946	0.472	0.154	0.116	2.304
Leverage	9,946	0.115	0.136	-0.120	0.842
MTB	9,946	1.908	1.728	0.153	76.817
Separation	9,946	4.042	7.457	0.000	39.430
Herfindahl	9,946	0.193	0.130	0.003	0.794
Independent director	9,946	0.367	0.056	0.091	0.800

Table 7: Determining the Effect of Political Connection on Hedging with a sample of POEs (Panel Regression)

This table reports the results of a panel logit regression analysis for the effect of political connection (both political connection dummy variable and political connection index) on hedging decisions (hedging dummy variable). The models are in equation (1) and (2) in Methodology section. Results with both random effect and fix effect are shown in the table below. The statistics (p-value) of Hausman tests when use political connection as main explanatory variable is 2.55 (0.6365), and the statistics (p-value) of Hausman tests when use political index as main explanatory variable is 2.49 (0.6461), which indicates that we can not reject the null hypothesis that the preferred model is random effect. Related p-values are shown in the parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Derivatives Dummy	Random Effect		Fixed Effect	
Political Connection	-0.006		-0.233	
	(0.988)		(0.641)	
PC_Index		0.052		-0.038
		(0.818)		(0.886)
LN_Asset	1.578***	1.569***	2.619***	2.564***
	(0.000)	(0.000)	(0.005)	(0.006)
Financial Background	-0.261	-0.266	-0.043	-0.034
	(0.466)	(0.457)	(0.925)	(0.941)
Stock return volatility	-0.933	-0.931	0.9	0.88
	(0.595)	(0.595)	(0.685)	(0.692)
ROA	-0.666	-0.652	-2.168	-2.061
	(0.577)	(0.583)	(0.239)	(0.261)
MTB	-0.016	-0.017	0.077	0.067
	(0.923)	(0.917)	(0.74)	(0.772)
Leverage	0.125	0.113	0.182	0.339
	(0.957)	(0.961)	(0.966)	(0.936)
Separation	0.027	0.027	-0.026	-0.025
	(0.301)	(0.296)	(0.516)	(0.527)
Herfindahl	4.488**	4.413**	9.842**	9.675**
	(0.037)	(0.04)	(0.014)	(0.016)
Independent director	3.37	3.393	5.142	5.028
	(0.363)	(0.357)	(0.42)	(0.429)
Constant	-47.846***	-47.543***		
	(0.000)	(0.000)		
Year effect	Yes	Yes	Yes	Yes
Observations	12,737	12,737	12,737	12,737
Wald Chi-square (FE: LR Chi-square)	85.86	86.02	296.39	296.2
p-value	0.000	0.000	0.000	0.000

Table 8: Determining the Effect of Political Connection on Hedging with a sample of POEs (PSM – IV)

This table reports results after applying propensity score matching (PSM) technique and two-stage instrumental variable (IV) analysis with the concerns of sample selection bias and endogeneity based on POE sample. By using PSM, we have a sample of 384 observations, half of which (174 observations) use hedging derivatives and the rest are similar matched group of 174 observations that do not use hedging derivatives. The two instrumental variables in question are the Chinese market index and distance between firms' headquarters and capital city of the province in which the firm is located. Panel A first column reports the results for first stage of PSM – IV model, that is, the relationship between instrumental variables and the political connection dummy with the probit model (Eq. (5)). The second and third columns report the effect of the political connection dummy on both the hedging dummy (Eq. (6)) and the hedging amount (Eq. (7)). Panel B first column reports the first stage results for the relationship between the political index and the instrumental variables with a poisson model in Eq. (8). The second and third columns in Panel B reveal the effect of the political index on hedging decisions (Eq. (9)) and hedging amount (Eq. (10)). The Variable xb in Panel A (Panel B) is the predicted value of political connection dummy (political index) obtained from first stage. Related p-values are shown in the parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Political Connection dummy			
POE	First stage	Second stage	
Dependent variable	Political connection	Derivatives dummy	Derivatives amount
Distance	0.001438		
	(0.599)		
Market index	-0.12***		
	(0.003)		
xb		-3.909***	-15.008**
		(0.009)	(0.033)
LN_Asset	0.026	0.103	1.095**
	(0.712)	(0.221)	(0.013)
ROA	1.483	1.75	9.096*
	(0.158)	(0.142)	(0.09)
Financial background	0.68***	0.709**	2.542
	(0.000)	(0.043)	(0.134)
Stock return volatility	-0.122	-2.072**	-8.881**
	(0.818)	(0.028)	(0.047)
Leverage	0.211	0.585	2.067
	(0.805)	(0.543)	(0.69)
MTB	0.231**	0.496***	1.946***
	(0.014)	(0.003)	(0.007)
Separation	0.007	0.003	-0.014
	(0.405)	(0.732)	(0.765)
Herfindahl	0.136	0.119	-0.532
	(0.835)	(0.877)	(0.889)
Independent director	-1.07	-0.828	-3.012
	(0.418)	(0.577)	(0.696)
Constant	-0.66	-1.285	-26.45**
	(0.717)	(0.572)	(0.02)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Observations	348	348	348
Pseudo R2	0.1002	0.1899	0.0511

Table 8 continued

Panel B: Political Index			
POE	First stage	Second stage	
Dependent variable	PC_Index	Derivatives dummy	Derivatives amount
Distance	0.0000545		
	(0.823)		
Market index	-0.122***		
	(0.000)		
xb		-0.562	-2.398
		(0.345)	(0.505)
LN_Asset	0.087	0.101	1.132**
	(0.214)	(0.241)	(0.014)
ROA	1.285	0.497	4.005
	(0.232)	(0.613)	(0.398)
Financial background	0.708***	0.11	0.318
	(0.000)	(0.671)	(0.826)
Stock return volatility	0.016	-1.878**	-8.362*
	(0.976)	(0.048)	(0.067)
Leverage	-0.464	0.177	-0.085
	(0.574)	(0.852)	(0.987)
MTB	0.142	0.284*	1.165*
	(0.11)	(0.065)	(0.062)
Separation	0.008	-0.003	-0.034
	(0.291)	(0.761)	(0.483)
Herfindahl	0.209	0.034	-1.165
	(0.746)	(0.964)	(0.761)
Independent director	-1.848	-0.451	-1.703
	(0.186)	(0.761)	(0.828)
Constant	-1.707	-1.132	-30.661***
	(0.335)	(0.617)	(0.007)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Observations	348	348	348
Pseudo R2	0.0633	0.1743	0.0489

Table 9: Panel Logit Regression Analysis of SOEs' Natural Political Connection Effect

In this table, the first two columns report the results of the test on whether SOEs' natural political connection has negative effect on use of derivatives hedging, with both the random effect model and the fixed effect model respectively. The test is based on full sample and the model equation if shown in Eq. (3) in Methodology section. The last two columns indicate the results of the test on whether the SOEs' natural political connection in different hierarchy has different impact on use of hedging derivatives. The model equation is shown in Eq. (4). Related p-values are shown in the parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Derivatives Dummy	Full sample		SOE sample	
	Random	Fixed	Random	Fixed
SOE	-0.065 (0.834)	2.601* (0.057)		
Municipal State-owned Enterprise			0.268 (0.762)	0.051 (0.981)
Provincial State-owned Enterprise			-0.765 (0.421)	-4.13 (0.126)
State-owned Enterprise			0.465 (0.58)	-0.275 (0.827)
LN_Asset	1.097*** (0.000)	1.111** (0.031)	1.141*** (0.000)	0.661 (0.364)
Financial Background	-0.104 (0.635)	-0.177 (0.565)	0.05 (0.884)	-0.07 (0.879)
Stock return volatility	0.228 (0.827)	0.406 (0.764)	2.489 (0.126)	1.77 (0.35)
ROA	-0.409 (0.701)	-0.713 (0.594)	1.994 (0.579)	-2.148 (0.685)
MTB	-0.123 (0.338)	-0.105 (0.556)	-0.562 (0.104)	-0.246 (0.566)
Leverage	-0.159 (0.886)	3.765 (0.142)	-0.051 (0.973)	5.369 (0.123)
Separation	0.006 (0.677)	-0.051* (0.095)	-0.053* (0.077)	-0.138** (0.031)
Herfindahl	0.89 (0.401)	5.39 (0.055)	-1.009 (0.533)	2.83 (0.55)
Independent director	1.102 (0.559)	1.893 (0.564)	-0.632 (0.812)	1.584 (0.698)
Constant	-32.768*** (0.000)		-33.558*** (0.000)	
Year	Yes	Yes	Yes	Yes
Observations	22,658	22,658	9,946	9,946
Wald Chi-square (FE: LR Chi-square)	243.44	643.27	138.01	360.29
p-value	0.000	0.000	0.000	0.000

Table 10: PSM Technique Analysis of SOEs' Natural Political Connection Effect

This table reports the results of the cross-sectional logit regression with the application of PSM technique based on full sample and SOE sample respectively. In full sample, there are 724 observations, and 362 of them use hedging derivatives and the rest are similar matched observations that do not use hedging derivatives. In SOE sample, there are 376 observations in total, and 188 of them use hedging derivatives and the similar matched group of 188 observations does not have hedging derivatives. Results in first column show whether SOEs, which have a natural political connection, have less incentive to hedge (derivatives hedging dummy used as dependent variable). The second column reveals the effect of the hierarchical difference of SOEs on hedging decisions. Four hierarchical dummies are applied. The baseline is Central Enterprise, and rest are shown in the table below as Municipal State-owned Enterprise, Provincial State-owned Enterprise and State-owned Enterprise. Related p-values are shown in the parentheses below the coefficients. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Derivatives Dummy	Full Sample	SOE sample
SOE	0.153	
	(0.511)	
Municipal State-owned Enterprise		0.257
		(0.727)
Provincial State-owned Enterprise		-0.875
		(0.253)
State-owned Enterprise		0.546
		(0.43)
LN_Asset	0.021	0.253*
	(0.816)	(0.1)
Financial Background	-0.18	-0.726**
	(0.375)	(0.036)
Stock return volatility	-0.602	0.833
	(0.582)	(0.643)
ROA	0.99	6.21
	(0.486)	(0.115)
MTB	0.0004	0.123
	(0.998)	(0.752)
Leverage	-1.019	1.4
	(0.284)	(0.349)
Separation	-0.005	-0.014
	(0.659)	(0.527)
Herfindahl	1.938	0.118
	(0.014)	(0.918)
Independent director	0.537	-3.233
	(0.716)	(0.194)
Constant	0.216	-4.584
	(0.931)	(0.262)
Year	Yes	Yes
Industry	Yes	Yes
Observations	724	376
Pseudo R2	0.3940	0.1965

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Appendix

Variables Definition Table

Variable	Definition	Source
Dependent Variables		
Derivatives Dummy	A dummy variable that equals to 1 when firms use hedging derivatives, and 0 other wise	CSMAR: China Listed Firms Research Series>Financial Statements
Derivatives Amount	A numerical variable used to measure the magnitude of derivative use	CSMAR: China Listed Firms Research Series>Financial Statements
Main Explanatory Variables		
Political Connection	A dummy variable that equals to 1 when firms have top managers or non-independent board members who has current or previous work experience in a central or local government department, the military, the People's Congress (PC), the People's Court and Procuratorate, or the Chinese People's Political Consultative Conference (CPPCC), and 0 otherwise.	http://www.stockstar.com/
PC Index	The Political Index measures the level of political connections, which ranges from 1 to 3. It equals to 3 when the politically- connected chairperson or CEO is a senior cadre or a chairperson of the PC or CPPCC, equals to 2 if he or she is a middle-level cadre, or a member of PC or CPPCC, and equals to 1 if he or she is a governmental or military officer.	http://www.stockstar.com/
Financial Background	A dummy variable that equals to 1 when firms have top managers or non-independent directors who have current or previous work experience in financial institutions, and 0 otherwise	CSMAR: Figure Characteristic Series>Listed Firm's Figure Characteristic
Firm Characteristics		
Leverage	The leverage ratio of a firm is the book value of long term debt (long-term debt plus debt included in the current liabilities) scaled by the book value of total assets	CSMAR: China Listed Firms Research Series>Financial Statements
MTB	The market to book ratio is the market value of a firm scaled by book value of total assets	CSMAR: China Listed Firms Research Series>Financial Indices
LN_Asset	Natural log of total assets	CSMAR: China Listed Firms Research Series>Financial Statements
ROA	Return on asset is calculated as net profit scaled by total assets	CSMAR: China Listed Firms Research Series>Financial Indices
Volatility of stock return	The stock return volatility is estimated according to log return of the latest 250 trading days	CSMAR: China Stock Market Series >Stock Market Derivative Index

Variables Definition Table – Continued

Variable	Definition	Source
Board Composition		
Separation of Control and Ownership	Difference between the actual controller's control and ownership	CSMAR: China Listed Firms Research Series > Equity Nature
Herfindahl Index	Sum of squares of shareholding percentage of top three shareholders	CSMAR: China Listed Firms Research Series>Shareholder
Independent directors	Percentage of independent directors scaled by total directors in the board	CSMAR: China Listed Firms Research Series>Corporate Governance
Instrumental variables		
Distance	Distance between head office of a firm and the capital city of the province in which the firm located	http://www.geopostcodes.com/
Market index	A market index measures the process of marketization in a city	https://bbs.pinggu.org/