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Financial development and the cost of equity capital: Evidence from China

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ABSTRACT

This study examines the relation between province-level financial development and the cost of equity in China. Our main findings are that (1) stock market development reduces the cost of equity in general, but the effect diminishes significantly in state-owned enterprises (SOEs) and firms with high growth potential or innovation intensity and (2) banking development only marginally lowers the cost of equity, but the effect is stronger in non-SOEs. Further analysis reveals that stock market development substitutes for such institutional factors as accounting quality, law enforcement, stock market integration and the split-share structure reform in lowering the cost of equity. We also find that lack of banking competition and banking marketization and under-development of the non-state economy partially account for the weak effect of banking development on the cost of equity.

1. Introduction

This study examines the impact of regional financial development on the cost of equity capital in China, using a large sample of Chinese firms listed on the Shanghai Stock Exchange (SHSE) and Shenzhen Stock Exchange (SZSE) over the period from 1998 to 2008. Specifically, following the approach of Jayaratne and Strahan (1996) and Guiso et al. (2004a, 2004b), we investigate whether and how regional province-level financial development within the same country is associated with the cost of equity, and how the relation is

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conditioned upon institutional infrastructures such as legal enforcement, accounting quality and other regulations.

Over the past two decades, voluminous research has extensively examined the role of financial development in lowering economy-wide uncertainty and increasing economic performance and growth in a cross-country setting.[3] Nevertheless, previous research leaves still unresolved the question of whether and how financial development, as an independent institutional factor, affects the cost of equity capital. This line of research suggests that financial development reduces the cost of equity through enhancing liquidity provision (Levine, 2005), improving risk diversification (Acemoglu and Zilibotti, 1997; King and Levine, 1993b) and constraining agency costs and information asymmetry (Grossman and Stiglitz, 1980). However, the relation between financial development and the cost of equity could be endogenous because both are likely to be affected by common institutional infrastructures such as legal enforcement, disclosure regulation or security regulations. For example, La Porta et al. (1997, 2002a) show that a country's legal institution is a key determinant of its financial market development and Rajan and Zingales (1998) and Brown et al. (2013) associate financial disclosure regulation with financial development. The cost of equity is shown to be associated with institutional factors such as security regulations (Hail and Leuz, 2006), accounting disclosure requirements (Bushman and Smith, 2001; Bushman et al., 2004) and insider trading regulations (Bhattacharya and Daouk, 2002).

Previous research also has paid relatively little attention to the impact of financial development on a firm's cost of equity in transitional economies and emerging capital markets, wherein certain unique characteristics of their banking sector and stock markets, including state or government interventions in financial markets may shape the relation in a different way. For instance, in China, the stock market is characterized by a government-controlled listing process and the dominance of state-owned and politically-connected firms with preferential bank lending (Aharony et al., 2000; Li et al., 2008; Hung et al., 2012).[4] Existing evidence suggests that financial development under this backdrop can increase the cost of capital. Particularly, using a cross-country sample, Jain et al. (2012) find that state ownership increases the cost of equity. Their finding suggests that in transitional economies like China where the stock market consists mainly of state-owned enterprises (SOEs), stock market development can possibly increase shareholders' investment risk and thus the cost of equity. David (2008) shows that stock market development, coupled with short-sale constraints, engenders a high level of liquidity and investor heterogeneity, thereby resulting in excessive speculative activities. The banking sector in China is characterized by a lack of competition, and dominance of state-owned banks, lending discrimination against non-SOEs and lending preference to SOEs. In this setting, banking development can possibly deteriorate capital allocation efficiency (Wurgler, 2000; Dinç, 2005; Wiwattanakantang et al., 2006; Claessens et al., 2008) and bank monitoring efficiency (La Porta et al., 2002b; Chen et al., 2011a).

Combined, an important implication from the above discussion is that financial development may not necessarily decrease the cost of equity, and it may increase the cost of equity in certain scenarios. Therefore, the direction of the relation between the two is, in general, an open empirical question. Examining this issue in the Chinese setting is interesting and important for the following reasons. First, it helps us gain additional insights into whether and how stock market and banking development determine the cost of equity, and how their effects in emerging and transitional economies like China differ systematically from those predicted in developed economies. Second, China is the largest transitional economy in the world and its continuous and rapid financial development since the 1980s represents features of an emerging market in general and also exhibits unique Chinese characteristics. The richness of the common and unique features of China's financial

[3] For example, King and Levine (1993a), Levine (1997), Levine and Zervos (1998), and Beck and Levine (2002) examine relations between financial development and economic growth in a *cross-country* setting; Raddatz (2006) examines relations between financial development and uncertainty in economic growth in a *cross-country* setting. A notable exception is Guiso et al. (2004b) and Hasan et al. (2009) in that both studies examine the relation in a *single country* setting of Italy and China, respectively. The consensus of these studies is that financial development accelerates economic growth and/or reduces its uncertainty by providing better financial services such as more efficient liquidity provision, better risk diversification and reduced information, agency and transaction costs.

[4] For example, in China, overseas listing regulation requires approval from various government agencies such as ministries in central and provincial governments and the China Securities Regulatory Commission (CSRC). Hung et al. (2012) report that SOEs with strong political connections are more likely to be approved to list overseas, but their post-listing performance is worse, suggesting that their approval is driven by political motivation or private benefits and may not lead to efficient capital allocation.

development, along with its large cross-sectional or cross-regional variations, allows us to examine the relation between regional (province-level) financial development and the cost of equity in a single country setting.

Third, a single country setting does not suffer from the confounding effects caused by other institutional and country-level factors in cross-country studies which are difficult to control for. As prior research shows, financial development in a country is shaped by the legal and regulatory considerations at the country level, such as corporate and security laws, bankruptcy laws and accounting rules, which may contaminate its association with the cost of equity in a cross-country setting. However, this is not a concern in a single country setting because regional financial development in each province is shaped by the same nation-wide legal and regulatory considerations. Moreover, to the best of our knowledge, data on province-level institutional characteristics are publicly available only in China. These data availability enable us to assess the moderating effect of institutional infrastructures on the within-country relation between regional financial development and the cost of equity.[5]

Finally, our evidence from a cross-province study can be generalized to cross-country research because provincial financial markets are segmented and mimic national ones. Provincial financial markets in China are normally geographically fragmented due to the informational advantages and monitoring efficiency associated with geographical proximity. They also share home bias and market segmentation similar to those in the U.S. and international settings.[6] For example, local investors have trading behaviors that differ significantly from those of other investors in China (Lei and Seasholes, 2004) and provincial branches of large banks are usually headquartered in the capital city or other large cities of a province. In addition, the level of integration of provincial and national financial markets represents an upper bound for the integration of national and international markets.

Our empirical strategy involves measurement of financial development and the cost of equity. To empirically measure financial development, we consider both stock market and banking development. Specifically, we measure stock market development as the ratio of market capitalization or market liquidity to GDP at the province level, and banking development as the ratio of total bank loans to GDP in a province. As many listed firms in China experienced relatively high growth opportunities during our sample period of 1998–2008, the *ex post realized* return is unlikely to capture the real underlying cost of equity. We therefore employ the *ex ante expected* cost of equity implied by market prices and earnings expectations to measure the cost of equity.

Our main results are summarized as follows. First, the cost of equity decreases with stock market development, consistent with the well-documented effect of stock market development mitigating economy-wide uncertainty. We find, however, that this effect is less pronounced in firms with higher growth or more intensive innovation. This finding suggests that the government-controlled listing process in China fails to provide sufficient equity financing to these firms. Second, banking development is weakly and negatively associated with the cost of equity, consistent with the notion that the lack of banking competition and state-ownership of large banks decreases banking efficiency. The association diminishes in firms with higher growth or more intensive innovation, consistent with findings in prior cross-country studies (Brown et al., 2013; Hsu et al., 2014) that banking development generally does not support firm growth and innovation. Third, stock market and banking development have virtually no impact on the cost of equity for SOEs, while they have a significant impact on reducing the cost of equity for non-SOEs. This finding suggests that government intervention in SOEs adversely affects the benefits of financial development.

We next examine the moderating effects on the negative relation between stock market development and the cost of equity of institutional factors such as earnings quality, law enforcement, stock market integration and the split-share structure reform. We find that the negative relation is stronger in regions with lower earnings quality and/or weaker law enforcement, implying that stock market development substitutes for these

[5] For example, Fan et al. (2011) provide a comprehensive database on the marketization index and sub-indexes that proxy for the institutional development in a province or provincial municipal city in China from 1998 to 2010. These measures cover the following aspects of marketization: the relation between the government and market, the development of non-state sectors, product market and factor market in the economy and the development of market intermediary and the legal environment.

[6] Petersen and Rajan (2002) find that the U.S. banks rely heavily on local deposits and lend in their business, and García-Herrero and Vazquez (2007) report substantial home bias in the international allocation of bank assets. Refer to Ivkovic and Weisbenner (2005), Pirinsky and Wang (2006) and Lee (2011) for home bias and state-level market segmentation in the U.S. stock market.

institutional infrastructures in reducing the cost of equity. We also find that the negative relation is weaker in regions with high market integration and in the period subsequent to the share-issue structure reform in 2005. The evidence supports the notion that by providing more investment freedom and risk-sharing benefits, the cost of capital effect of stock market development substitutes for those of stock market integration and the split-share structure reform. The above findings, taken together, suggest that stock market development substitutes for various institutional factors in lowering the cost of equity.

Then we explore how banking development characteristics and related institutional factors account for the weaker effect of banking development on reducing the cost of equity. We find that the cost of equity effect of banking development is weaker in regions with low banking competition, low banking distribution efficiency and a low degree of development of the non-state economy. Finally, our baseline results are robust to controlling for the moderating effects of institutional factors, potential endogeneity with respect to stock market development and banking development, and the use of alternative proxies for stock market development, banking development and the cost of equity. Overall, our findings suggest that stock market development is an independent institutional infrastructure that affects the cost of equity.

This study contributes to the existing literature in the following ways. First, it extends research on the relation between institutional and legal factors and the cost of equity. Prior studies show that the cost of equity is inversely associated with a number of institutional factors, including enforcement of insider trading regulations (Bhattacharya and Daouk, 2002), accounting disclosure rules, security regulations and cross-listing (Hail and Leuz, 2006, 2009), and effective corporate governance (Chen et al., 2009, 2011b). In contrast, Ben-Nasr et al. (2012) and Jain et al. (2012) show that the cost of equity increases in government ownership. Complementing these studies, we provide original evidence that stock market development is another independent institutional infrastructure that lowers the cost of equity, but its effect is discounted for SOEs relative to non-SOEs.

Our study is also closely related to recent research on financial development and innovation. In a cross-country setting, Brown et al. (2013) and Hsu et al. (2014) report that stock market development increases long-run growth in research and development (R&D) investment and innovation, particularly for small firms, whereas credit market development has little impact on its growth. Our finding that the inverse relation between regional stock market development and the cost of equity is weaker for growing and innovative firms in China provides counterevidence to that of Brown et al. (2013) and Hsu et al. (2014), and points to a weakness of the stock market development in China.

In addition, our study advances research on the interaction between stock market development and institutional factors in affecting the cost of equity, for which prior studies report both a substitutive and a complementary relation. Specifically, Ball (2001) argues that accounting infrastructure complements the overall economic, legal and political infrastructures in forming a disclosure system that affects the cost of equity. In contrast, Hail and Leuz (2009) show that strengthened investor protection via U.S. cross-listing substitutes for home country legal protection in decreasing equity costs. Chen et al. (2009) also report that national legal protection substitutes for firm-level governance. Extending these studies, we show that stock market development substitutes for accounting quality, legal enforcement, market integration and the national split-share structure reform in lowering the cost of equity.

Moreover, our study is relevant to the literature on financial development in China. Allen et al. (2005) show that finance is not the key driver for economic growth in China; Guariglia and Poncet (2008) and Chang et al. (2010) also find that banking development is not either. [7] In contrast, Hasan et al. (2009) document that stock market development does facilitate economic growth in China. Extending these studies, we find that banking development weakly decreases the cost of equity, while this cost-decreasing effect is significant for stock market development. Our result that the lack of banking competition accounts for the weak effect of banking development on lowering the cost of equity is also consistent with prior evidence about the negative features of the banking sector in China (e.g., Lin et al., 2012).

[7] Guariglia and Poncet (2008) and Chang et al. (2010) report that banking development decreases or is unrelated to economic growth in China, respectively.

Lastly, our evidence has policy implications to financial market regulators in China and other transitional economies. The banking system in China has been undergoing a series of regulatory reforms since the 1990s, but their effectiveness is controversial (Ho, 2012).[8] Our result about the weak equity cost effect of banking development shows the necessity and urgency of deepening the ongoing banking reforms and suggests that alleviating lending discrimination against non-SOEs, improving banking competition and developing the non-state economy may be possible reform avenues. The findings about the abated effect of stock market development on lowering the cost of equity in SOEs, innovation-intensive firms, and/or firms with high growth potential highlight the importance of reforming the IPO regulations to offer a level-playing field to these firms.

The remainder of this study is organized as follows. Section 2 presents a brief overview of the institutional background. Section 3 develops relevant theories. Section 4 describes the research design. Section 5 reports the main results. Section 6 conducts further analysis. Section 7 performs robustness checks. The final section, Section 8, concludes the paper.

2. Institutional background

The financial system in China includes a fast growing equity market and a large state-controlled banking sector. The equity market consists of two stock exchanges SHSE and SZSE, and it is the largest stock market among emerging economies in terms of the ratio of market capitalization to GDP (Allen et al., 2012). Since its establishment in 1990, the stock market in China has been growing rapidly and plays an increasingly significant role in the Chinese economy and the world economy.[9] Despite its enormous size and rapid growth, the stock market in China has some downside characteristics that constrain its capital allocation role. One of the most ominous is that the listing process favors SOEs and private firms with political connections. China's stock markets were initially used as a vehicle for privatizing SOEs rather than raising capital for firms with growth opportunities (Ayyagari et al., 2010). Since the establishment of the stock markets, there has been a split-share structure in listed SOEs—approximately two-thirds of shares owned by the state and legal persons were not tradable. [10] This predominance of non-tradable shares in listed SOEs constrains risk-sharing and stock liquidity, and posed a major problem in the Chinese stock market. In April 2005, CSRC initiated the split-share structure reform to convert all non-tradable shares into tradable shares, and most listed SOEs were required to complete the reform by the end of 2007. In spite of improvement over time, the listing process still favors SOEs, particularly those in strategic industries and in regions with stronger local political connections (Li et al., 2008). Under such circumstances, the stock market development in China implies that more equity funding resources go to SOEs; therefore, it may not lead to an overall reduction of systematic risk and improvement of capital allocation in the economy. In addition, the Chinese stock market also features excess speculation and high turnover, mainly driven by retail investors (Bailey et al., 2009; Allen et al., 2012). As of the end of 2008, the annual stock turnover ratios in SHSE and SZSE have reached 392.52% and 469.11%, respectively.

The banking system in China is much larger than its equity market and Chinese firms rely heavily on bank loans for their external financing needs. The banking sector has experienced rapid growth and consistent reforms since 1980. It was initially dominated by the big four state-owned banks, but the number of collective, private and foreign banks continues to grow. [11] However, the big four state-owned banks still dominate the

[8] These reforms in the 1990s include, for example, separating policy banks from commercial banks, transforming urban credit cooperatives into commercial banks, granting limited licenses to foreign banks and non-state banks, and introducing standard accounting and prudential norms. More reforms were implemented after China's entry into the World Trade Organization (WTO) in 2002, such as liberalizing interest rates, increasing operational freedom and partially privatizing state-owned banks.

[9] By the end of 2008, the equity market in China is the fourth largest in the world, with 1625 stocks listed on the two stock exchanges; it has total market capitalization of RMB 12136.6 billion, accounting for 40.37% of GDP in China (China Securities Regulatory Commission (CSRC), 2008).

[10] A legal person is defined as "an organization that has capacity for civil rights and capacity for civil conduct and independently enjoys civil rights and assumes civil obligations in accordance with the law." (The General Principles of Civil Law of the People's Republic of China, 1986, Chapter III).

[11] The four largest banks in China are Agricultural Bank of China (ABC), Bank of China (BOC), Industrial and Commercial Bank of China (ICBC) and People's Construction Bank of China (CBC).

banking sector and they favor SOEs and private firms with political connections in their lending decisions, discriminating against other non-SOEs such as small town and village enterprises and other private firms (Brandt and Zhu, 2000; Chang et al., 2010; Lu et al., 2012).[12] State-owned banks are the least efficient in performing banking functions, while foreign banks are the most (Berger et al., 2009). Government intervention over lending and other banking services still remains, although this intervention is decreasing over time (Ho, 2012). The banking sector also lacks competition despite continuous banking reforms such as improving bank governance, partially privatizing state-owned banks and bringing in strategic foreign investors. Lin et al. (2012) report that by the end of 2009, the big four banks have market share of 52.1% and 46.5% in terms of deposits and loans, respectively.

3. Theoretical framework

3.1. Stock market development and the cost of equity

Stock market development generally lowers the cost of equity by improving liquidity provision, information production, risk diversification and external monitoring. First, stock market development increases liquidity provision and decreases liquidity shocks for firms that rely on external financing and/or have high liquidity needs (Aghion et al., 2004; Levine, 2005; Raddatz, 2006; Hasan et al., 2009), and thus improves capital allocation efficiency in the economy (Wurgler, 2000). Recent studies of Brown et al. (2013) and Hsu et al. (2014) report that stock market development supports technical innovations and long-run R&D investment, primarily for small firms that rely more on equity financing. High liquidity, capital allocation efficiency and advanced technology decrease investment risk, and consequently, investors demand a lower required rate of return for providing capital.

Second, with the development of the stock market, market participants face more intense competition and have stronger incentives to seek private information and trade on it (Grossman and Stiglitz, 1980; Kyle, 1984; Holmstrom and Tirole, 1993). This helps lower information asymmetry between informed and uninformed investors (Holden and Subrahmanyam, 1992, 1994; Foster and Viswanathan, 1993), alleviate adverse selection problems and ultimately reduce the cost of equity. [13]

Third, stock market development expands the investor base and improves market liquidity. This facilitates cross-sectional risk diversification and inter-temporal risk-sharing, which in turn reduces the cost of equity. Idiosyncratic risk is not easily diversifiable and usually priced in reality (Merton, 1987; Ang et al., 2010; Malkiel and Xu, 2006). However, the improved risk diversification and risk-sharing in a more developed stock market help investors better diversify idiosyncratic risk, which in turn lowers the cost of equity.

Fourth, stock market development improves external monitoring over invested firms, which alleviates standard agency problems, and thus, lowers the cost of equity. It also facilitates the incorporation of firm-specific information into stock prices; as a result, previously disadvantaged outside investors are now better informed, have stronger monitoring capability and are exposed to less agency problems (Diamond and Verrecchia, 1982; Jensen and Murphy, 1990). Moreover, financial development also encourages information search by sophisticated investors and facilitates their external monitoring. Enhanced external monitoring better curbs managerial opportunism and lowers agency costs, and ultimately, the cost of equity decreases (Healy and Palepu, 2001; Ashbaugh-Skaife et al., 2006).[14] The above discussions, taken together, suggest that stock market development is inversely associated with the cost of equity.

[12] For example, Lu et al. (2012) suggest that Chinese non-SOEs can reduce lending discrimination through holding bank ownership and then they enjoy benefits of lower interest expense and better lending terms.

[13] Armstrong et al. (2010) and Akins et al. (2012) argue that information asymmetry increases the cost of equity and that this effect is magnified in illiquid and imperfect markets, suggesting that stock market development mitigates the adverse cost of capital effect of information asymmetry.

[14] Bhide (1993) posits a contrasting view that higher liquidity, which is associated with the more developed U.S. stock markets, reduces institutional investors' and other investors' monitoring incentives, because it is cheaper and easier to sell shares of poorly-performing firms. This argument implies that stock market development may increase the cost of equity. However, Ashbaugh-Skaife et al. (2006) suggest that this is not a concern since institutional investors decrease the cost of equity through undertaking careful corporate governance and reducing agency cost.

However, some unique characteristics of the Chinese stock market suggest that stock market development may increase the cost of equity. First, the initial objective of stock market development in China was not to improve capital allocation efficiency but to facilitate external financing to SOEs and politically-connected firms. Hence, unlike most developed stock markets around the world, the Chinese stock market may not provide sufficient funding to growing or innovative firms which are the drivers of economic growth. Second, the Chinese stock market has fewer institutional investors and financial analysts compared with more mature stock markets, and is dominated by individual investors who lack privileged access to inside information and often exhibit irrational trading behavior (Eccher and Healy, 2000; Yeh and Lee, 2000). Accordingly, the stock market development in China may play only a limited role in facilitating the incorporation of private information into stock prices, reducing information asymmetries or enhancing external monitoring. Lastly, the Chinese stock market is also characterized by high turnover and excessive speculation driven by retail investors (Bailey et al., 2009; Allen et al., 2012). Both features discourage investors from relying on fundamentals. In addition, external monitoring is weakened because transient investors have no incentives and power to monitor management closely (Xu and Wang, 1999).[15] Combined, the stock market development in China may not necessarily enhance, or may even possibly deteriorate, the efficiency in economy-wide capital allocation and external monitoring. This may in turn increase systematic risk, and thus, the cost of equity.

The above reasoning from both sides suggests that stock market development is a key factor in influencing the cost of equity. However, whether it decreases or increases the cost of capital in such an emerging stock market as China cannot be directly inferred from existing studies. In addition, the trade-off between the positive and negative impacts of stock market development may differ between SOEs and non-SOEs. Government ownership in SOEs brings about government interference and expropriation, and increases the cost of equity, as shown by Ben-Nasr et al. (2012) in a cross-country setting. In addition, SOEs in China may not use equity financing efficiently to maximize shareholder value even though they are favorably treated in the IPO process and have better equity funding with stock market development. In contrast, non-SOEs, though they are disadvantaged in the equity financing process, tend to make more efficient use of the funding and liquidity associated with stock market development.

3.2. Banking development and the cost of equity

Banking development in general is expected to decrease the cost of equity for several reasons. First, banks play an important role in providing liquidity and external funding to borrower firms, and higher firm liquidity generally lowers economy-wide systematic risk (Diamond and Dybvig, 1983). In addition, financial development, particularly banking development in developing economies, allows better inter-temporal risk-sharing and mitigates stock return volatility (Allen and Gale, 1995). Further, banking development facilitates private information production because banks and other financial intermediaries (e.g., credit rating agencies) are information producers and processors for borrower firms (Ramakrishnan and Thakor, 1984). Given that information production involves large fixed costs, banking development improves the economies of scale and lowers the production cost (Diamond, 1984; Veldkamp, 2006). Lastly, with privileged access to borrowers' inside information, banks are better able to monitor borrower firms at a low cost (Diamond, 1984; Fama, 1984). Banking development strengthens a bank's external monitoring over its borrowers, thereby mitigating potential moral hazard and adverse selection problems associated with the information asymmetry between potential borrowers and outside capital suppliers. The above reasoning suggests that banking development mitigates economy-wide systematic risk and reduces the cost of equity capital.

However, some unique features of the banking sector in China weaken the potential mitigating effect of banking development on the cost of equity. First, the big four state-owned banks in China have dominant market share in the banking sector and one of their primary goals is to support SOEs and politically-connected firms (Brandt and Zhu, 2000; Chang et al., 2010). Accordingly, their focus is not on traditional banking functions such as liquidity provision, information production, capital allocation, risk-sharing and external

[15] Xu and Wang (1999) provide anecdotal evidence that the effective turnover ratio in the Chinese stock market ranges from 700% to 1000%.

monitoring. Evidence shows that their liquidity provision and credit allocation are far from efficient since their lending decisions depend primarily on political motives rather than on the borrowers' credit quality (Cull and Xu, 2005; Cull et al., 2009). A variety of government interventions, such as credit and interest rate controls, state guarantees and government-directed lending policies, grant further lending privileges to SOEs. Meanwhile, they also exacerbate lending discrimination against other non-SOEs such as small town and village enterprises and private firms.

Second, state-owned banks do not have a strong motivation to produce firm-specific information and monitor borrower firms because they cannot force SOEs to repay their loans without causing political problems (Chang et al., 2010; Chen et al., 2011a). This weakness could lead to an economy-wide unfavorable effect and increase systematic risk especially for SOEs. Third, the historical market segmentation and government interference in the Chinese banking sector deter banking competition. Insufficient competition also deteriorates banking efficiency in allocating capital (Lin et al., 2012), which has an economy-wide effect and increases systematic risk. [16] Since banking development without structural reform does not alleviate and even worsens these inherent problems, it may not bring about an overall improvement of bank functionality to generate beneficial economy-wide effects and decrease the cost of equity.

Therefore, the effect of banking development on the cost of equity depends on the trade-off between the positive and negative sides of banking development in China. This trade-off may differ between SOEs and non-SOEs. Due to government interference and expropriation, SOEs in China do not utilize their privileged loan financing efficiently for shareholder value maximization, even though their privileged loan financing increases with banking development. In contrast, non-SOEs are more sensitive to, and thus more efficiently use increased funding associated with banking development, which alleviates lending discrimination against them to a certain extent.

4. Research design

4.1. Data and sample

Our accounting and stock market data are collected from the China Securities Markets and Accounting Research (CSMAR) database, and firm ownership data from the China Center for Economic Research (CCER) database. We obtain most measures for institutional factors from a database on province-level institutional development in China developed by Fan et al. (2011). We start with a sample of listed firms on SHSE and SZSE for the period of 1998–2011 to retrieve firm-level stock market and accounting data to compute measures of *ex ante* cost of equity capital, stock market development and banking development. However, calculating the *ex ante* cost of equity capital measures requires at least three-year-ahead earnings' data, and therefore, our final sample spans the period from 1998 to 2008. We also eliminate firm-years with missing data for control variables. We winsorize all variables at the 1st and 99th percentiles of their empirical distributions to mitigate the impact of outliers. Following Hail and Leuz (2006, 2009), we do not exclude firms in the financial and utility industries. Our final sample consists of 10,321 firm-years for 1281 non-financial and financial firms listed on SHSE and SZSE from 1998 to 2008.

4.2. Implied cost of equity capital measures

We use the *ex ante* implied cost of capital to measure the cost of equity capital. Both the *ex ante* implied cost of capital and the *ex post* realized stock return are two widely used cost of capital measures. Compared with the *ex ante* measure, the *ex post* measure is noisier and incurs non-trivial estimation errors because it also

[16] Specifically, the four state-owned banks have their own specialization in a designated sector of the economy, and the central bank's strict control over interest rates for deposits and loans prohibits price-based competition (Wong and Wong, 2001). The main responsibility of ABC was to receive deposits in rural areas and extend loans to agricultural production projects and township industries. The CBC focused on appropriating funds for capital construction from the state budget through the Ministry of Finance. The BOC focused on deposits and loans for foreign exchange and international transactions, and the ICBC focused on the financing of commercial and industrial activities in urban areas.

captures shocks to a firm's growth opportunities (Stulz, 1999) and incorporates differences in expected growth rates (Bekaert and Harvey, 2000; Hail and Leuz, 2006).[17] This weakness is especially severe in China's stock market where many listed firms are at the growth stage, shocks to a firm's growth opportunities are frequent and the growth rates of expected future cash flow vary substantially across investors. In contrast, the *ex ante* cost of equity measure is free from these problems because its valuation models explicitly control for both future cash flows and growth potential in the estimating process (Hail and Leuz, 2006, 2009). Therefore, the *ex ante* measure is more appropriate in capturing the underlying cost of equity for listed firms in China.

Following Hail and Leuz (2006, 2009) and Ben-Nasr et al. (2012), we adopt four implied cost of equity measures derived by the estimation methods proposed by Gebhardt, Lee and Swaminathan (GLS, 2001), Botosan and Plumlee (DIV, 2002), Easton (price-earnings-growth (PEG), 2004), and Ohlson and Juettner-Nauroth (OJN, 2005), denoted by R_{GLS}, R_{DIV}, R_{PEG}, and R_{OJN}, respectively. Different from the case in the U.S. setting, the analyst forecast data in China are unavailable for the majority of our sample years (1998–2004). We thus follow Chen et al. (2011a) and use realized one-year-ahead earnings to substitute expected future earnings for all model estimations. Although realized earnings have high volatility and add noise to our estimation to some degree, they do not systematically inflate the cost of capital estimation as do analysts' earnings forecasts in the U.S. setting. [18] Among the four measures R_{GLS}, R_{DIV}, R_{PEG} and R_{OJN}, we use R_{GLS} in most of our empirical analysis because prior studies consider it the best measure in China's capital market (Chen et al., 2011a). R_{DIV} is possibly subject to estimation error because Chinese listed firms do not often distribute dividends. R_{PEG} and R_{OJN} require positive *EPS* growth and apply to only a non-representative small subsample with consistent earnings growth, which may cause severe selection bias. For example, only 4509 and 3953 out of 10,321 observations in our final sample have R_{PEG} and R_{OJN} values, respectively. Although R_{PEG} is a preferable measure in the U.S. setting (Botosan and Plumlee, 2005), it is not the best one in China. Therefore, we employ R_{GLS} as our main measure rather than using the average of all implied cost of equity measures which is often used in the U.S. or other international studies. A description of the detailed procedures for estimating R_{GLS}, R_{DIV}, R_{PEG} and R_{OJN} is summarized in Appendix B.

4.3. Financial development measures

In our main tests, we use stock market and banking development to proxy for financial development. Following the conventional literature (e.g., Demirguc-Kunt and Levine, 1996; Wurgler, 2000), we adopt both value-based and liquidity-based measures for stock market development, that is: (i) the ratio of total market value of all shares *listed* on SHSE and SZSE at the end of a year to GDP in the same year, denoted by *MKTCAP* and (ii) the ratio of the total market value of all shares *traded* in a year to GDP in the same year, denoted by *MKTLIQ*. We also use the average of *MKTCAP* and *MKTLIQ*, denoted by FIN_{AVG} as an alternative measure. Following Wurgler (2000) and other financial development studies, we measure banking development as the ratio of annual total bank loans to GDP, denoted by *CREDIT*. We calculate these measures for each province or a province-level municipality where banks and listed firms are headquartered at the fiscal year end (Hasan et al., 2009; Ayyagari et al., 2010). Appendix C reports the mean values of these stock market and banking development measures by year and by province.

4.4. Model specification

We estimate the following ordinary least squares (OLS) regression model for our main analysis, extending Hail and Leuz (2006, 2009), Chen et al. (2011a, 2011b) and Ben-Nasr et al. (2012):

[17] Additional criticisms to the realized return measure are that it is a poor and potentially biased proxy (Elton, 1999), its standard techniques require a fairly long time-series (Stulz, 1999) and that it generates large standard errors and produces imprecise estimates (Fama and French, 1997).

[18] Specifically, in the U.S. setting, analysts forecasts are, on average, optimistically biased (e.g., O'Brien, 1988; Richardson et al., 2004) and this optimism likely leads to an upward bias in the estimated cost of capital (e.g., by 2.84% as reported in Easton and Sommers, 2007).

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 BETA_{it} + \alpha_5 MOM_{it} + \alpha_6 ROE_{it} + \alpha_7 LEV_{it} + \alpha_8 CPI + \alpha_9 CROSSLIST_{it} + \alpha_{10} ACCT_{it} + \alpha_{11} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where *CC* refers to one of the four implied cost of equity capital measures: R_{GLS}, R_{DIV}, R_{OJN} and R_{PEG}. *FIN* refers to the stock market development measures *MKTCAP*, *MKTLIQ*, FIN_{AVG}, or the banking development measure *CREDIT*. Model (1) controls for other known determinants of the cost of equity used in related studies (Hail and Leuz, 2009; Chen et al., 2011a, 2011b; Ben-Nasr et al., 2012): firm size measured as the natural logarithm of the market value of equity *SIZE*; book value to the market value of equity *MB*; market beta *BETA*; return momentum *MOM*; ratio of earnings to book value of equity *ROE*; ratio of total liabilities to total assets *LEV*; inflation rate in the future twelve months *CPI*; dummy for cross-listing *CROSSLIST*; indicator variable *ACCT* for the implementation of the new accounting standards in 2007; indicator variable *REFORM* for the split-share structure reform in 2005; and dummies *YEAR* and *IND* for fixed year and industry effects. We expect α_1 to be negative if stock market development and banking development decrease the cost of equity. Drawing on prior studies, we expect the coefficients on *SIZE*, *MB*, *MOM*, *ROE* and *ACCT* to be negative, while those on *BETA*, *LEV* and *CPI* to be positive. We do not make directional predictions for coefficients on *CROSSLIST* and *REFORM*. [19]

5. Empirical results

5.1. Descriptive statistics

Table 1 presents summary statistics for the full sample with Panel A providing descriptive statistics for all main test variables. The means (medians) of the implied cost of equity capital measures R_{GLS}, R_{DIV}, R_{PEG} and R_{OJN} are 6.873% (5.610%), 8.856% (4.850%), 11.238% (9.130%) and 14.844% (12.821%), respectively. These estimates are consistent with prior studies on Chinese, U.S. and international capital markets. Specifically, the reported mean R_{GLS} is comparable to that of 6.600% for Chinese listed firms in Chen et al. (2011a) and 7.690% for forty countries in Hail and Leuz (2009). The mean R_{DIV} of 8.856% is comparable to that of 11.40% in Botosan and Plumlee (2002). The mean R_{PEG} of 11.238% is consistent with a figure of 13.080% in an international setting in Hail and Leuz (2006). The mean R_{OJN} of 14.844% is comparable to that of 12.440% for Chinese listed firms in Shen (2007) and 13.77% in Hail and Leuz (2006). For the stock market development measures, the mean (median) of the capitalization-based measure *MKTCAP* is 0.163 (0.102) which is consistent with the reported value of 0.139 by CSRC (2008) for the same period, and the mean (median) of the liquidity-based measure *MKTLIQ* is 0.659 (0.390). The mean banking development measure *CREDIT* is 1.064, which is comparable to that of 1.010 in Wu et al. (2012).

Panel B reports the coefficients of Pearson pair-wise correlations among our main test variables. The correlation coefficients among the four cost of capital measures range from 0.348 to 0.945, consistent with Botosan and Plumlee (2005) that reports a range between 0.300 and 0.860. The evidence is also in line with the reported correlations among R_{GLS}, R_{PEG} and R_{OJN} in Hail and Leuz (2006), which is between 0.300 and 0.860, and in Ben-Nasr et al. (2012), which is between 0.549 and 0.948. These high correlations suggest that the four measures capture the same underlying construct for the cost of equity capital. In addition, the four estimates are all significantly negatively correlated with firm size, with its coefficients ranging from −0.353 to −0.083. They are also significantly negatively correlated with the *MB* ratio and return momentum *MOM*, but positively correlated with market beta when the coefficients are significant. These significant correlations between the four estimates and firm risk variables further strengthen the empirical validity for our cost of equity measures. Importantly, the four cost of equity estimates are all significantly negatively correlated with the financial development measures, with coefficients ranging from −0.217 to −0.020. Though only

[19] Chen et al. (2011a) and Hail and Leuz (2009) report mixed evidence for the coefficients on *CROSSLIST* in the China setting and international setting, respectively. The split-share structure reform in China could affect the relation between financial development and the cost of equity through its risk-sharing and price impact when more shares come to the stock market (Xin and Xu, 2007; Li et al., 2011), which have opposite effects on the cost of capital. If the risk-sharing effect (price impact effect) dominates, *REFORM* is expected to be negatively (positively) associated with the cost of equity.

Table 1
Descriptive statistics.

Variable	Mean	Median	STD	Q1	Q3
Panel A: Descriptive statistics for variables used in the empirical analysis					
R_{GLS}	6.873	5.610	5.270	3.587	8.428
R_{DIV}	8.856	4.85	12.277	0.000	15.692
R_{PEG}	11.238	9.130	8.057	5.384	14.700
R_{OJN}	14.844	12.821	7.607	9.355	18.225
MKTCAP	0.163	0.102	0.178	0.060	0.194
MKTLIQ	0.659	0.390	0.817	0.203	0.790
FIN_{AVG}	0.411	0.237	0.494	0.137	0.502
CREDIT	1.064	0.991	0.338	0.823	1.234
MTKIPO	0.169	0.018	0.886	0.007	0.052
CRTLIA	0.205	0.209	0.043	0.177	0.227
SIZE	7.768	7.659	0.911	7.134	8.255
MB	3.502	2.659	2.710	1.685	4.378
BETA	0.973	0.967	0.260	0.806	1.131
MOM	0.204	−0.033	0.737	−0.248	0.486
ROE	0.052	0.068	0.147	0.026	0.112
LEV	0.225	0.213	0.152	0.107	0.325
CPI	0.015	0.014	0.024	0.001	0.025
PATENT	8.992	4.440	10.580	1.440	11.880
EMGMT (Raw)	0.001	0.001	0.013	−0.006	0.007
LAW (Raw)	3.360	3.038	1.632	2.494	3.687
BANKMPT (Raw)	6.665	6.790	2.690	5.080	8.580
BANKMKT (Raw)	7.307	7.240	2.724	5.340	9.670
BANKDST (Raw)	7.792	8.120	3.685	5.050	10.590
PRIVECON (Raw)	7.630	7.730	3.198	5.000	10.050
PRIVEINT (Raw)	9.031	9.490	3.829	6.090	11.750
PRIVESAL (Raw)	6.654	6.460	3.241	4.400	9.400

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Panel B: Pearson correlation matrix for main testing variables and control variables												
1. R_{GLS}	**1**											
2. R_{DIV}	**0.415**	**1**										
3. R_{PEG}	**0.486**	**0.409**	**1**									
4. R_{OJN}	**0.434**	**0.348**	**0.945**	**1**								
5. *MKTCAP*	**−0.116**	**−0.217**	**−0.131**	**−0.118**	**1**							
6. *MKTLIQ*	**−0.099**	**−0.200**	**−0.097**	**−0.085**	**0.950**	**1**						
7. FIN_{AVG}	**−0.103**	**−0.205**	**−0.104**	**−0.091**	**0.966**	**0.998**	**1**					
8. *CREDIT*	**−0.020**	**−0.031**	**−0.065**	**−0.065**	**0.503**	**0.362**	**0.390**	**1**				
9. *SIZE*	**−0.177**	**−0.353**	**−0.121**	**−0.083**	**0.369**	**0.365**	**0.368**	**0.115**	**1**			
10. *MB*	**−0.296**	**−0.331**	**−0.271**	**−0.239**	**0.234**	**0.233**	**0.235**	0.016	**0.228**	**1**		
11. *BETA*	0.014	**0.042**	0.050	−0.007	−0.017	−0.009	−0.011	0.000	**−0.200**	**0.055**	**1**	
12. *MOM*	**−0.187**	**−0.320**	**−0.179**	**−0.161**	**0.280**	**0.324**	**0.318**	**−0.033**	**0.353**	**0.431**	**0.067**	**1**

Panel A in this table reports descriptive statistics for variables used in the main tests for the full sample of 10,321 firm-year observations from 1998 to 2008. Panel B reports the Pearson correlation matrix for the main testing variables wherein highlighted figures indicate that a correlation coefficient is significant at least at the 5% level.

suggestive of the underlying relation, these negative correlations provide initial evidence that in China, province-level regional financial development lowers the cost of equity capital. We next conduct multivariate analyses.

5.2. The effect of stock market development on the cost of equity

Table 2 presents the results of OLS regressions examining whether regional stock market development explains the variation in the cost of equity beyond its conventional determinants. In Table 2, the dependent variable is the cost of equity estimate R_{GLS} in all models, with Models 1–3 reporting the results for the full

Table 2
Relations between stock market development and the implied cost of equity capital proxied by R_{GLS}.

	OLS regressions for full sample						OLS regressions for non-SOE subsample						OLS regressions for SOE subsample					
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Intercept	8.673	(5.35)***	8.736	(5.37)***	8.723	(5.37)***	26.22	(3.58)***	26.261	(3.59)***	26.254	(3.58)***	6.789	(5.68)***	6.820	(5.71)***	6.813	(5.70)***
MKTCAP	**−0.116**	**(−2.94)*****					**−0.324**	**(−3.06)*****					−0.063	(−1.54)				
MKTLIQ			**−0.026**	**(−3.01)*****					**−0.070**	**(−3.05)*****					−0.015	(−1.63)		
FIN_{AVG}					**−0.043**	**(−3.00)*****					**−0.117**	**(−3.05)*****					−0.024	(−1.62)
SIZE	−0.271	(−2.06)**	−0.280	(−2.14)**	−0.278	(−2.12)**	−0.426	(−1.53)	−0.445	(−1.59)	−0.441	(−1.58)	−0.152	(−1.15)	−0.156	(−1.19)	−0.155	(−1.18)
MB	−0.335	(−5.05)***	−0.336	(−5.05)***	−0.335	(−5.05)***	−0.257	(−2.35)**	−0.262	(−2.38)**	−0.261	(−2.37)**	−0.351	(−5.27)***	−0.352	(−5.28)***	−0.352	(−5.28)***
BETA	0.044	(0.20)	0.043	(0.20)	0.043	(0.20)	0.139	(0.31)	0.147	(0.33)	0.145	(0.32)	0.032	(0.15)	0.031	(0.15)	0.031	(0.15)
MOM	−0.738	(−5.66)***	−0.734	(−5.60)***	−0.734	(−5.61)***	−0.991	(−5.15)***	−0.987	(−5.19)***	−0.986	(−5.18)***	−0.701	(−4.17)***	−0.698	(−4.12)***	−0.698	(−4.13)***
ROE	−1.410	(−1.98)**	−1.412	(−1.98)**	−1.412	(−1.98)**	−0.567	(−0.41)	−0.578	(−0.41)	−0.576	(−0.41)	−1.717	(−2.52)***	−1.719	(−2.52)***	−1.719	(−2.52)***
LEV	2.559	(4.47)***	2.562	(4.48)***	2.562	(4.47)***	3.306	(1.53)	3.295	(1.53)	3.296	(1.53)	2.362	(4.54)***	2.364	(4.55)***	2.364	(4.54)***
CPI	−5.581	(−1.11)	−5.336	(−1.06)	−5.371	(−1.07)	4.132	(0.55)	5.248	(0.66)	5.106	(0.65)	−7.304	(−1.48)	−7.176	(−1.46)	−7.196	(−1.46)
CROSSLIST	−0.154	(−0.54)	−0.172	(−0.60)	−0.168	(−0.59)	−0.984	(−1.63)	−1.117	(−1.83)*	−1.087	(−1.78)*	−0.106	(−0.36)	−0.114	(−0.39)	−0.112	(−0.38)
ACCT	−1.681	(−5.78)***	−1.596	(−5.32)***	−1.608	(−5.39)***	−1.649	(−5.45)***	−1.445	(−4.00)***	−1.471	(−4.17)***	−1.749	(−4.46)***	−1.696	(−4.31)***	−1.704	(−4.33)***
REFORM	4.388	(17.03)***	4.353	(16.77)***	4.359	(16.80)***	2.312	(3.64)***	2.330	(3.44)***	2.326	(3.47)***	4.147	(19.39)***	4.127	(19.55)***	4.130	(19.49)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	10,321		10,321		10,321		1,981		1,981		1,981		8,340		8,340		8,340	
R-sqr	33.88%		33.87%		33.87%		38.60%		38.50%		38.52%		33.23%		33.23%		33.23%	

This table presents OLS regression results for the effect of stock market development on the implied cost of equity capital using the following Model (1):

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 BETA_{it} + \alpha_5 MOM_{it} + \alpha_6 ROE_{it} + \alpha_7 LEV_{it} + \alpha_8 CPI + \alpha_9 CROSSLIST_{it} + \alpha_{10} ACCT_{it} + \alpha_{11} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where *CC* refers to the implied cost of equity capital measure R_{GLS}. *FIN* refers to stock market development measures *MKTCAP*, *MKTLIQ* and FIN_{AVG}. Control variables include firm size *SIZE*, market-to-book ratio *MB*, market beta *BETA*, momentum *MOM*, return on equity *ROE*, leverage ratio *LEV*, inflation rate *CPI*, and dummies for cross-listing *CROSSLIST*, new accounting standard *ACCT*, split-share structure reform *REFORM*, year effects *YEAR*, and industry effects *IND*. Models 1–3 report results for the full sample, Models 4–6 report results for the subsample of non-SOE firm-years, and Models 7–9 report results for the subsample of SOE firm-years. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm- and year-specific clusters.

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

sample, Models 4–6 for the subsample of non-SOEs, and Models 7–9 for the subsample of SOEs. Models 1–3 show that the three stock market development measures—the market capitalization based measure *MKTCAP*, the market liquidity based measure *MKTLIQ* and their average FIN_{AVG}—are all significantly negatively associated with the cost of equity measure R_{GLS}, with coefficients (*t*-statistics) of −0.116 (−2.94), −0.026 (−3.01) and −0.043 (−3.00), respectively. The results imply that a one standard deviation increase in *MKTCAP*, *MKTLIQ* or FIN_{AVG}, which is 0.178, 0.817 or 0.494, respectively, leads to a decrease in R_{GLS} of about 206.5, 212.4 or 212.4 basis points, respectively. Similarly, for the non-SOE subsample, these stock market development measures are also significantly negatively related to R_{GLS} in Models 4–6, with a one standard deviation increase in *MKTCAP*, *MKTLIQ* or FIN_{AVG} corresponding to 576.7, 57.7 or 578.0 basis points of decrease in R_{GLS}, respectively. In contrast, for the SOE subsample, these stock market development measures are only weakly negatively related to R_{GLS} in Models 7–8. The result suggests that for the subsample of SOEs, the negative side of stock market development in China cancels out its beneficial side; government interference and expropriation induce additional investment risk, and consequently, result in an insignificant effect of stock market development on the cost of equity. The differences in results between SOEs and non-SOEs are also consistent with our expectations, and imply that the result for the full sample is mainly driven by non-SOEs.

Table 3 presents results for the effects of stock market development on alternative estimates of the implied cost of equity, R_{DIV}, R_{PEG} and R_{OJN}, with R_{DIV} used in Models 1–3, R_{PEG} in Models 4–6 and R_{OJN} in Models 7–9. As shown in Table 3, all stock market development measures, *MKTCAP*, *MKTLIQ* and FIN_{AVG}, are significantly negatively associated with R_{DIV}, R_{PEG} and R_{OJN}, rendering further support to the findings in Table 2 and indicating our results are robust to alternative implied cost of equity measures. Results for control variables in Tables 2 and 3 are consistent with those reported in prior research: firm size, market-to-book ratio, return momentum, return on equity and the indicator for new accounting rules are all negatively related to, while market beta and leverage ratio are positively associated with, all the cost of equity estimates R_{GLS}, R_{DIV}, R_{PEG} and R_{OJN}. The coefficient of the indicator for the split-share structure reform is significantly positive, suggesting that the price impact dominates.

In summary, the results in Tables 2 and 3 show that stock market development lowers the cost of equity after controlling for all other known determinants of the cost of equity. These results suggest that investors generally charge a lower risk premium to firms located in regions with more developed stock markets. We explain that the positive side of stock market development in China such as providing liquidity, reducing information asymmetry and enhancing external monitoring dominates its negative side, and on net, leads to a lower cost of equity.

5.3. The relation between banking development and the cost of equity capital

In this subsection, we examine the relation between banking development and the cost of equity for the full sample and the subsamples of non-SOEs and SOEs, respectively. Table 4 reports the estimation results. For the full sample, the banking development measure *CREDIT* is insignificantly associated with the cost of equity measures R_{GLS}, R_{DIV} and $R_{OJN.}$ Only when R_{PEG} is used as the dependent variable is the coefficient on *CREDIT* significantly negative at the 10% level. The relatively weak effect of banking development on mitigating the cost of equity is consistent with our argument that the pervasive state ownership of the big four banks and the lack of banking competition in China constrain a bank's legitimate functions of liquidity provision, risk-sharing, monitoring and information production. Therefore, regional banking development in China plays a limited role in alleviating systematic uncertainty in the economy and is only weakly negatively associated with the cost of equity. We also split the full sample into non-SOE and SOE subsamples. In Model 2, banking development *CREDIT* is significantly negatively associated with the cost of equity R_{GLS} for the non-SOE subsample. In contrast, in Model 3, it is weakly negatively associated with R_{GLS} for the SOE subsample. The results support the argument that banking development generates more incremental benefits to non-SOEs, and thus, investors charge a lower cost of capital. However, for SOEs, the negative side of banking development dominates its cost-reducing effect, and the effect is further enhanced by the negative side of government ownership and interference in SOEs, thus resulting in an insignificant relation between banking development and the cost of equity in these firms.

Table 3
Relations between stock market development and the implied cost of equity capital proxied by R_{DIV}, R_{PEG} and R_{OJN}.

	Dependent variable: R_{DIV}						Dependent variable: R_{PEG}						Dependent variable: R_{OJN}					
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8		Model 9	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	t- stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	t- stat.
Intercept	17.259	(2.71)***	17.386	(2.73)***	17.360	(2.73)***	0.063	(4.13)***	0.065	(4.23)***	0.065	(4.21)***	11.634	(6.66)***	11.786	(6.70)***	11.751	(6.69)***
MKTCAP	**−0.237**	**(−3.05)*****					−0.003	(−3.89)***					**−0.291**	**(−4.53)*****				
MKTLIQ			−0.053	(−2.71)***					−0.001	(−3.27)***					−0.071	(**−3.82**)***		
FIN_{AVG}					−0.088	(−2.79)***					−0.001	(−3.37)***					**−0.115**	**(−3.96)*****
SIZE	−2.238	(−2.82)***	−2.256	(−2.84)***	−2.252	(−2.83)***	−0.000	(−0.05)	−0.000	(−0.15)	−0.000	(−0.13)	0.277	(1.37)	0.260	(1.27)	0.265	(1.30)
MB	−0.285	(−2.02)**	−0.287	(−2.04)**	−0.287	(−2.03)**	−0.004	(−4.32)***	−0.004	(−4.36)***	−0.004	(−4.35)***	−0.383	(−4.66)***	−0.387	(−4.71)***	−0.386	(−4.70)***
BETA	1.310	(2.21)**	1.309	(2.22)**	1.309	(2.22)**	0.006	(1.31)	0.006	(1.28)	0.006	(1.29)	0.365	(0.71)	0.360	(0.69)	0.361	(0.69)
MOM	−2.763	(−9.05)***	−2.754	(−9.18)***	−2.754	(−9.15)***	−0.011	(−6.37)***	−0.011	(−6.36)***	−0.011	(−6.35)***	−0.890	(−5.57)***	−0.870	(−5.58)***	−0.873	(−5.57)***
ROE	−3.021	(−2.55)***	−3.026	(−2.56)***	−3.026	(−2.56)***	−0.006	(−0.58)	−0.007	(−0.60)	−0.007	(−0.59)	−1.202	(−1.03)	−1.225	(−1.06)	−1.223	(−1.06)
LEV	0.756	(0.88)	0.762	(0.88)	0.760	(0.88)	0.052	(8.80)***	0.052	(8.70)***	0.052	(8.72)***	4.541	(8.21)***	4.546	(8.08)***	4.544	(8.10)***
CPI	−30.888	(−1.29)	−30.378	(−1.27)	−30.452	(−1.27)	−0.174	(−1.44)	−0.167	(−1.38)	−0.168	(−1.39)	−12.659	(−1.51)	−11.737	(−1.39)	−11.889	(−1.41)
CROSSLIST	0.516	(0.87)	0.479	(0.81)	0.488	(0.83)	0.002	(0.52)	0.002	(0.44)	0.002	(0.46)	0.205	(0.42)	0.173	(0.36)	0.181	(0.38)
ACCT	−10.372	(−5.43)***	−10.197	(−5.22)***	−10.222	(−5.26)***	−0.027	(−3.83)***	−0.025	(−3.29)***	−0.025	(−3.39)***	−2.532	(−4.94)***	−2.253	(−4.12)***	−2.300	(−4.28)***
REFORM	20.143	(21.25)***	20.069	(20.99)***	20.082	(21.04)***	0.068	(15.83)***	0.067	(14.92)***	0.068	(15.10)***	3.011	(9.19)***	2.903	(8.43)***	2.923	(8.59)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	10,321		10,321		10,321		4,509		4,509		4,509		3,953		3,953		3,953	
R-sqr	48.65%		48.64%		48.66%		23.8%		23.8%		23.82%		21.26%		21.27%		21.28%	

This table presents OLS regression results for the effect of stock market development on the implied cost of equity capital for the full sample using the following Model (1):

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 BETA_{it} + \alpha_5 MOM_{it} + \alpha_6 ROE_{it} + \alpha_7 LEV_{it} + \alpha_8 CPI + \alpha_9 CROSSLIST_{it} + \alpha_{10} ACCT_{it} + \alpha_{11} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where *CC* refers to the implied cost of equity capital measures R_{DIV}, R_{PEG} and R_{OJN}. *FIN* refers to the stock market development measures *MKTCAP*, *MKTLIQ* and FIN_{AVG}. Control variables include firm size *SIZE*, market-to-book ratio *MB*, market beta *BETA*, momentum *MOM*, return on equity *ROE*, leverage ratio *LEV*, inflation rate *CPI*, and dummies for cross-listing *CROSSLIST*, new accounting standard *ACCT*, split-share structure reform *REFORM*, year effects *YEAR*, and industry effects *IND*. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm- and year-specific clusters.

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

Table 4
Relations between banking development and the implied cost of equity capital proxied by R_{GLS}, R_{DIV}, R_{PEG} and R_{OJN}.

	Dependent variable: R_{GLS}						Dependent variable: R_{DIV}		Dependent variable: R_{PEG}		Dependent variable: R_{OJN}	
	Full sample Model 1		Non-SOE subsample Model 2		SOE subsample Model 3		Full sample Model 4		Full sample Model 5		Full sample Model 6	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Intercept	9.021	(5.48)***	25.287	(3.57)***	11.138	(7.91)***	17.470	(2.70)***	0.071	(4.48)***	12.408	(6.78)***
CREDIT	−0.389	(−1.52)	−1.412	(−2.59)***	−0.435	(−1.52)	0.128	(0.25)	−0.005	(−1.81)*	−0.454	(−1.40)
SIZE	−0.284	(−2.15)**	−0.495	(−1.78)*	−0.224	(−1.45)	−2.329	(−2.94)***	−0.001	(−0.46)	0.185	(0.89)
MB	−0.337	(−5.10)***	−0.287	(−2.54)***	−0.479	(−3.00)***	−0.295	(−2.07)**	−0.004	(−4.33)***	−0.388	(−4.67)***
BETA	0.060	(0.27)	0.154	−0.36	−0.119	(−0.57)	1.322	(2.29)**	0.006	(1.33)	0.394	(0.74)
MOM	−0.779	(−5.82)***	−1.051	(−5.90)***	−0.764	(−6.18)***	−2.832	(−9.25)***	−0.012	(−6.71)***	−0.979	(−5.94)***
ROE	−1.370	(−1.92)*	−0.462	(−0.33)	−0.75	(−0.77)	−2.946	(−2.49)***	−0.005	(−0.46)	−1.036	(−0.88)
LEV	2.571	(4.54)***	3.539	−1.61	1.716	(3.26)***	0.805	(0.94)	0.052	(8.72)***	4.553	(8.26)***
CPI	−6.441	(−1.29)	−1.03	(−0.14)	−10.699	(−1.05)	−31.816	(−1.33)	−0.193	(−1.62)	−14.730	(−1.78)*
CROSSLIST	−0.203	(−0.72)	−1.278	(−2.23)**	−0.221	(−0.60)	0.354	(0.61)	0.001	(0.27)	0.079	(0.16)
ACCT	−1.904	(−6.30)***	−1.828	(−6.16)***	−1.196	(−3.77)***	−10.733	(−5.57)***	−0.032	(−4.35)***	−3.008	(−5.75)***
REFORM	4.419	(17.81)***	2.234	(3.42)***	1.626	(3.04)***	20.135	(21.48)***	0.069	(17.07)***	3.060	(10.09)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	10,321		1,981		4,583		10,321		4,509		3,953	
R-sqr	33.83%		37.83%		38.02%		48.58%		23.8%		20.95%	

Panel A presents OLS regression results for the effect of banking development measure *CREDIT* on the implied cost of equity capital using the Model (1) below:

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 BETA_{it} + \alpha_6 ROE_{it} + \alpha_7 LEV_{it} + \alpha_8 CPI + \alpha_9 CROSSLIST_{it} + \alpha_{10} ACCT_{it} + \alpha_{11} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where *CC* refers to the implied cost of equity capital measures R_{GLS}, R_{DIV}, R_{OJN} and R_{PEG} in Models 1–4, respectively. *FIN* refers to the banking development measure *CREDIT*. Other variables are the same as in Table 2. Using R_{GLS} as the dependent variable, Model 1 reports results for the full sample and Models 2 and 3 report results for the subsamples of non-SOE firm-quarters and SOE firm-quarters, respectively. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm-specific and year-specific clusters.

* Coefficient is significant at the 10% level.
** Coefficient is significant at the 5% level.
*** Coefficient is significant at the 1% level.

5.4. Firm growth, innovation and their impact on the relation between financial development and the cost of equity

We next examine whether and how firm growth and innovation affect the relation between stock market development, banking development and the cost of equity. As mentioned earlier, the listing process in China favors state-owned (mature) firms and discriminates against fast-growing and innovation-intensive firms, especially when they are non-SOEs. This systematic bias may weaken the negative relation between stock market development and the cost of equity. We measure a firm's growth potential as the market to book ratio *MB*, following Hail and Leuz (2009). We gauge a firm's innovation intensity by the ratio of the number of patent applications to the number of researchers in a province reported in Fan et al. (2011) and denote it by *PATENT*. We then add the interactions of *MB* and *PATENT* with the three stock market development measures of *MKTCAP*, *MKTLIQ* and FIN_{AVG}, respectively, to Model (1) to examine their moderating effects on the relation between stock market development and the cost of equity.

Table 5 reports the estimation results. Panel A reports the interactions of growth potential *MB* with all stock market development and banking development measures. The coefficients on the interaction terms are all significantly positive in Models 1–3, supporting the prediction that the mitigating effect of stock market development on equity cost diminishes in firms with high growth opportunities. Similarly, the interactions of innovation intensity *PATENT* with all stock market development measures are also significantly positively associated with the cost of equity R_{GLS} across Models 5–7 in Panel B. Untabulated results reveal that the same effects still hold for the non-SOE subsample, suggesting that our results are unlikely to be driven by listing discrimination against non-SOEs. The results in Table 5, taken together, show that the negative association between stock market development and the cost of equity is weaker for firms with high growth opportunities and intensive innovation, which is consistent with our expectations.

However, the above finding is in contrast to evidence in Brown et al. (2013) and Hsu et al. (2014) where stock market financing generally leads to substantially higher long-run R&D investment. This inconsistency points to a weakness of the Chinese stock market of failing to provide sufficient equity financing to firms with high growth potential and innovation intensity. A direct policy implication is that the role of stock market development in improving capital allocation efficiency and reducing the cost of equity can be enhanced should there be stock market regulations that mitigate equity financing biases against fast-growing and innovation-intensive firms. In all models, the coefficients on *MKTCAP*, *MKTLIQ* and FIN_{AVG} per se and their sum with the corresponding interactions are still negative, indicating that the baseline result that stock market development decreases the cost of equity holds even after accounting for the moderating effects of growth potential and innovation intensity.

Models 4 and 8 of Table 5 indicate that the coefficients for the interactions of growth potential *MB* and innovation intensity *PATENT* with banking development *CREDIT* are statistically insignificant, consistent with the view that firm growth potential and innovation intensity do not alter the effect of banking development on the cost of equity. This finding is consistent with the evidence in Brown et al. (2013) and Hsu et al. (2014) that credit market development generally does not enhance innovation and growth potential. In both models, the coefficients on *CREDIT* per se and its sum with the corresponding interactions are still insignificant, indicating that the baseline result that banking development is insignificantly associated with the cost of equity holds even after incorporating the effects of growth potential and innovation intensity into our analysis.

6. Further analysis: the effects of institutional factors

6.1. Accounting quality, legal enforcement and the relation between stock market development and the cost of equity

We now examine whether and how accounting quality and legal enforcement affect the negative relation between stock market development and the cost of equity, and whether the cost of equity effect of stock market development still holds after considering these moderating effects. Existing evidence suggests that stock market development either complements or substitutes for accounting quality and legal enforcement in its relation with the cost of equity. Ball (2001) reports that high-quality accounting standard implementation at the firm level complements high-quality accounting standards and strong legal enforcement at the national

Table 5
Growth opportunities, innovation and relations between stock market development, banking development and the implied cost of equity capital proxied by R_{GLS}.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef	*t*-stat.	Coef	*t*-stat.	Coef	*t*-stat.
Intercept	8.757	(5.37)***	8.836	(5.37)***	8.821	(5.37)***	8.679	(5.20)***	8.617	(8.58)***	8.692	(8.50)***	8.536	(8.24)***	8.774	(5.26)***
MKTCAP	**−0.226**	**(−3.42)*****							**−0.151**	**(−6.01)*****						
MB * *MKTCAP*	**0.023**	**(2.51)*****														
PATENT * *MKTCAP*									**0.001**	**(5.19)*****						
MKTLIQ			**−0.053**	**(−3.14)*****							**−0.034**	**(−5.36)*****				
MB * *MKTLIQ*			**0.006**	**(2.41)****												
PATENT * *MKTLIQ*											**0.003**	**(4.49)*****				
FIN_{AVG}					**−0.087**	**(−3.20)*****							**−0.061**	**(−5.83)*****		
MB * FIN_{AVG}					**0.009**	**(2.44)****										
PATENT * FIN_{AVG}													**0.001**	**(5.70)*****		
CREDIT							0.000	(0.00)							−0.006	(−0.30)
MB * *CREDIT*							−0.115	(−1.28)								
PATENT * *CREDIT*															−0.176	(−0.51)
PATENT									−0.020	(−14.50)***	−0.022	(−11.55)***	−0.023	(−14.91)***	−0.008	(−0.32)
SIZE	−0.255	(−2.02)**	−0.266	(−2.12)**	−0.264	(−2.10)**	−0.290	(−2.17)**	−0.254	(−3.01)***	−0.263	(−3.11)***	−0.261	(−3.13)***	−0.274	(−2.09)**
MB	−0.388	(−6.12)***	−0.387	(−6.23)***	−0.388	(−6.21)***	−0.213	(−2.06)**	−0.328	(−5.94)***	−0.329	(−5.94)***	−0.329	(−5.95)***	−0.337	(−5.11)***
BETA	0.065	(0.30)	0.066	(0.30)	0.066	(0.30)	0.054	(0.25)	0.048	(0.32)	0.044	(0.29)	0.042	(0.29)	0.048	(0.22)
MOM	−0.755	(−5.62)***	−0.765	(−5.78)***	−0.763	(−5.74)***	−0.795	(−6.01)***	−0.836	(−7.21)***	−0.831	(−7.08)***	−0.822	(−7.14)***	−0.788	(−5.89)***
ROE	−1.477	(−2.12)**	−1.493	(−2.13)**	−1.491	(−2.13)**	−1.353	(−1.91)*	−1.365	(−2.33)**	−1.365	(−2.32)**	−1.367	(−2.33)**	−1.351	(−1.90)*
LEV	2.571	(4.50)***	2.587	(4.54)***	2.584	(4.53)***	2.583	(4.56)***	2.543	(6.45)***	2.545	(6.49)***	2.542	(6.46)***	2.567	(4.52)***
CPI	−5.600	(−1.18)	−5.402	(−1.14)	−5.430	(−1.15)	−6.121	(−1.18)	−5.884	(−1.14)	−5.621	(−1.09)	−6.158	(−1.23)	−7.235	(−1.48)
CROSSLIST	−0.152	(−0.54)	−0.171	(−0.60)	−0.167	(−0.59)	−0.199	(−0.70)	−0.088	(−0.76)	−0.104	(−0.90)	−0.091	(−0.79)	−0.14	(−0.50)
ACCT	−1.614	(−6.62)***	−1.483	(−6.38)***	−1.503	(−6.43)***	−1.908	(−6.31)***	−1.376	(−4.49)***	−1.211	(−3.86)***	−1.237	(−4.03)***	−1.796	(−5.74)***
REFORM	4.301	(18.37)***	4.246	(18.09)***	4.255	(18.14)***	4.414	(17.95)***	4.282	(15.15)***	4.248	(15.01)***	4.439	(15.57)***	4.582	(18.98)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	10,321		10,321		10,321		10,321		10,321		10,321		10,321		10,321	
R-sqr	33.95%		33.94%		33.94%		33.87%		33.86%		33.85%		33.86%		33.88%	

This table presents OLS regression results for the effects of growth opportunities *MB* and innovation *PATENT* on the relation between financial development and the implied cost of equity, respectively, using the following two models that extend Model (1):

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 FIN_{it} * MB_{it} + \alpha_3 SIZE_{it} + \alpha_4 MB_{it} + \alpha_5 BETA_{it} + \alpha_6 MOM_{it} + \alpha_7 ROE_{it} + \alpha_8 LEV_{it} + \alpha_9 CPI + \alpha_{10} CROSSLIST_{it} + \alpha_{11} ACCT_{it} + \alpha_{12} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it}$$

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 FIN_{it} * PATENT_{it} + \alpha_3 PATENT_{it} + \alpha_4 SIZE_{it} + \alpha_5 MB_{it} + \alpha_6 BETA_{it} + \alpha_7 MOM_{it} + \alpha_8 ROE_{it} + \alpha_9 LEV_{it} + \alpha_{10} CPI + \alpha_{11} CROSSLIST_{it} + \alpha_{12} ACCT_{it} + \alpha_{14} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it}$$

where *CC* refers to the implied cost of equity capital measure R_{GLS}. Other variables are the same as in Table 2. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm-specific and year-specific clusters.

* Coefficient is significant at the 10% level.
** Coefficient is significant at the 5% level.
*** Coefficient is significant at the 1% level.

level in reducing the cost of equity. In contrast, Hail and Leuz (2009) show that enhanced investor protection via U.S. cross-listing substitutes for strong legal protection in the home country in lowering the cost of capital. Prior research documents that accounting standards promote stock market development at the country level (Rajan and Zingales, 1998; Brown et al., 2013) and legal factors stimulate financial development (La Porta et al., 1997, 1998; Beck et al., 2003). In short, prior research suggests that stock market development could either substitute or complement accounting quality and legal enforcement in affecting the cost of equity. Under the substitution (complementary) scenario, the mitigating effect of stock market development on the cost of equity becomes weaker (stronger) for firms in regions with higher accounting quality and/or stronger law enforcement.

To test the two predictive scenarios, we add the interactions of stock market development with province-level accounting quality and law enforcement to Model (1). Extending Leuz et al. (2003), we measure accounting quality using province-level earnings management denoted by *EMGMT*, with a lower value indicating better province-level accounting quality. [20] Following the convention of Chinese studies, we measure legal enforcement by the total number of lawyers relative to the population in a province, the legal enforcement index that captures the protection of shareholders' rights in Fan et al. (2011). The index is multiplied by negative one (−1) and denoted by *LAW*, such that the higher the value of *LAW*, the worse the legal enforcement in a provincial region.

Table 6 reports the results for the moderating effect of accounting quality *EMGMT* in Models 1–3 and law enforcement *LAW* in Models 4–6. Models 1–3 reveal that the interactions of *EMGMT* with each of the three stock market development measures *MKTCAP*, *MKTLIQ* and FIN_{AVG} are negatively associated with the implied cost of equity and the associations are significant at the 10% level. The results suggest that the mitigating effect of stock market development on the cost of equity is stronger for firms with *low* province-level accounting quality, which is in line with the prediction under the substitution scenario. Models 4–6 show that the interactions between law enforcement *LAW* and each of three stock market development measures are all negatively associated with the equity cost measure R_{GLS} and the association is significant at the 10% level. This again supports the substitution scenario. Therefore, we conclude that financial development substitutes for both accounting quality and law enforcement in lowering the cost of equity. [21] The coefficients on *LAW* per se are all significantly positive, consistent with prior evidence that strong legal enforcement is inversely associated with the cost of equity (Hail and Leuz, 2006; Albuquerque and Wang, 2008; Chen et al., 2009, 2011). [22] Across Table 6, the coefficients on stock market development measures per se are significantly negative in most models, suggesting that the baseline results in Tables 2 and 3 are still preserved after considering the moderating effects of accounting quality and legal enforcement.

6.2. Market integration, split-share structure reform and the relation between stock market development and the cost of equity

We now examine whether stock market integration and the split-share structure reform substitute or complement stock market development in improving risk-sharing, and thus, in decreasing the cost of equity. Previous research suggests that integration of stock markets across different economies attracts foreign

[20] Specifically, we calculate *EMGMT* by the following procedures. We first compute performance-matched discretionary accruals for all firm-years for each province-year and then, obtain the median performance-matched discretionary accrual for each province-year. Finally, we calculate *EMGMT* as the percentile ranking value of these provincial median values for each province in a year. This measure captures the combined consequence of insiders' earnings management activities and accounting rules and thus, addresses the concern that accounting rules can be circumvented by insiders and do not reflect actual reporting practices.

[21] We also follow Leuz et al. (2003) and use the ratio of "small profits" to "small losses" in each province in a year, denoted *SPROFIT*, as an alternative measure for accounting quality. We find that the results using this alternative measure remain qualitatively unchanged. In addition, Fan et al. (2011) also use the total number of accountants in a population at the provincial level as a sub-index of legal enforcement for the protection of shareholders' rights. When using its negative value as an alternative measure for legal enforcement, the results are qualitatively the same as those reported for *LAW*.

[22] Albuquerque and Wang (2008) argue analytically that weak investor protection induces overinvestment for which investors require a higher equity premium. In a cross-country setting, Hail and Leuz (2006) and Chen et al. (2011b) document that strong country-level law enforcement and shareholders' rights decrease the cost of equity.

Table 6
Accounting quality, law enforcement and relations between stock market development and the implied cost of equity proxied by R_{GLS}.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Intercept	8.654	(7.76)***	8.733	(7.76)***	8.714	(7.76)***	8.921	(8.33)***	8.896	(8.16)***	8.917	(8.19)***
MKTCAP	−0.056	(−1.28)					−0.158	(−2.06)**				
EMGMT * *MKTCAP*	**−0.163**	(**−1.91**)*										
LAW * *MKTCAP*							**−0.019**	(**−1.89**)*				
MKTLIQ			**−0.015**	(**−1.79**)*					−0.025	(−1.92)*		
EMGMT * *MKTLIQ*			**−0.034**	(**−1.91**)*								
LAW * *MKTLIQ*									**−0.003**	(**−1.99**)**		
FIN_{AVG}					**−0.024**	(**−1.66**)*					−0.047	(−2.01)**
EMGMT * FIN_{AVG}					**−0.058**	(**−1.95**)*						
LAW * FIN_{AVG}											**−0.008**	(**−1.99**)**
EMGMT	0.035	(0.12)	−0.014	(−0.05)	−0.000	(−0.00)						
LAW							0.116	(5.38)***	0.11	(4.87)***	0.117	(5.04)***
SIZE	−0.280	(−3.10)***	−0.289	(−3.18)***	−0.287	(−3.16)***	−0.279	(−3.18)***	−0.283	(−3.23)***	−0.282	(−3.23)***
MB	−0.334	(−5.66)***	−0.335	(−5.66)***	−0.335	(−5.66)***	−0.342	(−6.01)***	−0.343	(−5.99)***	−0.343	(−6.00)***
BETA	0.035	(0.22)	0.034	(0.22)	0.034	(0.22)	−0.035	(−0.24)	−0.034	(−0.24)	−0.035	(−0.24)
MOM	−0.838	(−7.25)***	−0.832	(−7.15)***	−0.832	(−7.17)***	−0.351	(−2.60)***	−0.346	(−2.56)***	−0.346	(−2.55)***
ROE	−1.294	(−2.10)**	−1.296	(−2.10)**	−1.297	(−2.10)**	−1.493	(−2.64)***	−1.487	(−2.65)***	−1.488	(−2.65)***
LEV	2.385	(6.22)***	2.389	(6.26)***	2.388	(6.25)***	2.511	(6.08)***	2.516	(6.08)***	2.515	(6.07)***
CPI	−4.218	(−0.76)	−3.870	(−0.69)	−3.918	(−0.70)	−0.479	(−0.13)	−0.442	(−0.12)	−0.427	(−0.12)
CROSSLIST	−0.111	(−0.90)	−0.128	(−1.01)	−0.124	(−0.98)	−0.077	(−0.75)	−0.08	(−0.77)	−0.078	(−0.76)
ACCT	−1.353	(−4.50)***	−1.237	(−3.88)***	−1.255	(−3.99)***	−1.278	(−12.58)***	−1.254	(−10.76)***	−1.247	(−10.70)***
REFORM	4.403	(16.56)***	4.367	(15.95)***	4.373	(16.07)***	4.818	(19.24)***	4.837	(19.54)***	4.83	(19.39)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	9752		9752		9752		10,321		10,321		10,321	
R-sqr	35.15%		35.13%		35.14%		34.11%		34.11%		34.10%	

This table presents OLS regression results for the effects of provincial-level accounting quality and law enforcement on relations between stock market development and the implied cost of equity capital using the following model that extends Model (1):

$$CC_{it} = \alpha_0 + \alpha_2 FIN_{it} + \alpha_1 FIN_{it} * REG_{it} + \alpha_3 REG_{it} + \alpha_4 SIZE_{it} + \alpha_5 MB_{it} + \alpha_6 BETA_{it} + \alpha_7 MOM_{it} + \alpha_8 ROE_{it} + \alpha_9 LEV_{it} + \alpha_{10} CPI + \alpha_{11} CROSSLIST_{it} + \alpha_{12} ACCT_{it} + \alpha_{13} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it}$$

where *CC* refers to the implied cost of equity capital measure R_{GLS}. *FIN* refers to stock market development measures *MKTCAP* and *MKTLIQ* in Models 1 and 2, respectively, and to their average FIN_{AVG} in Model 3. *REG* refers to province-level accounting quality measure *EMGMT* in Models 1–3 and to law enforcement *LAW* in Models 4–6. Other variables are the same as in Table 2. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm-specific and year-specific clusters.

* Coefficient is significant at the 10% level.
** Coefficient is significant at the 5% level.
*** Coefficient is significant at the 1% level.

investors and enhances risk-sharing among domestic and foreign investors, which in turn decreases the cost of equity. For example, De Jong and De Roon (2005) report that stock market integration across countries decreases the cost of equity in emerging markets by improving risk-sharing. The predominance of non-tradable shares in the stock market in China poses a major problem because excess holdings of a stock expose shareholders to high idiosyncratic risk. The split-share structure reform implemented in 2005 allows holders of non-tradable shares to publicly trade and reduce their shareholdings such that their equity portfolios can be more diversified (Li et al., 2011). Therefore, the reform facilitates risk-sharing between owners of non-tradable and tradable shares and thus may reduce the cost of equity (Li et al., 2011).

Similar to the stock market integration and the split-share structure reform, stock market development improves inter-temporal risk-sharing by attracting potential investors and facilitating their risk-sharing with current investors. However, it is an empirical question whether and how this inter-temporal risk-sharing function of stock market development, the cross-sectional risk-sharing function of market integration and the split-share structure reform affect the effect of stock market development on lowering the cost of equity. Stated another way, the moderating effects of market integration and the split-share structure reform on the negative relation between stock market development and the cost of equity are empirical questions. [23]

To test the effect of stock market integration, we first construct a measure for stock market integration in a province and in other provinces by extending procedures suggested by Korajczyk and Viallet (1989) and Levine and Zervos (1998). We initially estimate the intercept a_i from the following CAPM model at the end of a calendar year for each firm. [24]

$$R_{it} = a_i + b_i P_t + \varepsilon_{it}, \quad i = 1, 2, \ldots, m; \quad t = 1, 2, \ldots, T, \tag{2}$$

where R_{it} is the excess monthly return for firm i in month t in excess of the monthly risk-free rate in the same month. P_t is the excess return on a value-weighted portfolio of A-shares in the two stock exchanges, SHSE and SZSE. Assuming that the above CAPM model is reasonable and applicable for the China setting, the absolute value of the intercept a_i estimated from Model (6) should capture market integration for each stock i. The stock market integration for each provincial market in each year is estimated as minus one (-1) times the average of the absolute value of a_i across all A-share stocks in a province in each year such that a higher value indicates higher market integration. Our market integration measure *MINTG* is an indicator for low market integration that equals one for firms that fall within the lowest quarter of market integration in the sample and zero otherwise.

We add the indicator variable, *MINTG*, and its interaction with stock market development to Model (1) to test the effect of stock market integration. As shown in Panel A, Table 7, across all models, the interaction terms of *MINTG* with all three stock market development measures *MKTCAP*, *MKTLIQ* and FIN_{AVG} are significantly negative. The results support a substitutive relation between stock market development and market integration in lowering the cost of equity. In addition, stock market development measures per se remain significantly negatively associated with the cost of equity, confirming that their relations are robust to the incorporation of the market integration effect.

To test the effect of the split-share structure reform, we add to Model (1) the interaction between stock market development and the reform indicator *REFORM* for the post-reform period, as well as the interaction term between *REFORM* and the market beta *BETA*. We keep only the same firms in the pre- and post-reform periods to control for additional factors or biases not explicitly identified in the empirical analysis. Panel B, Table 7 reports the estimated results and shows that across all models, the interactions of *REFORM* with stock market development measures are all significantly positive. This result suggests that stock market

[23] However, the split-share structure reform also produces a negative price impact by allowing more shares into the market in a short time (Xin and Xu, 2007; Li et al., 2011). Xin and Xu (2007) show that firms located in regions with better institutional development tend to offer lower compensation to owners of tradable shares in executing the reform, suggesting that the negative price effect and financial development also substitute for each other in affecting the cost of equity. Therefore, analysis from the perspective of the negative price impact of the reform also leads to the same conjecture.

[24] There are two types of market integration measures, one is time-invariant and the other is time-variant. Korajczyk and Viallet (1989), Bekaert and Harvey (1995), Stulz (1999), Rajan and Zingales (1998) and de Jong and de Roon (2005) argue or implicitly hold that market integration increases gradually over time and all use time-varying market integration measures.

Table 7
Market integration, split-share structure reform and the relations between stock market development and the implied cost of equity proxied by R_{GLS}.

	Model 1		Model 2		Model 3	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Panel A: Market integration and relations between stock market development and the implied cost of equity						
Intercept	8.646	(5.36)***	8.724	(5.39)***	8.705	(5.38)***
MKTCAP	**−0.106**	**(−3.14)*****				
MINTG * *MKTCAP*	**−0.209**	**(−2.46)*****				
MKTLIQ			**−0.024**	**(−3.17)*****		
MINTG * *MKTLIQ*			**−0.057**	**(−3.08)*****		
FIN_{AVG}					**−0.039**	**(−3.17)*****
MINTG * FIN_{AVG}					**−0.095**	**(−3.12)*****
MINTG	0.057	(0.25)	0.056	(0.25)	0.068	(0.30)
SIZE	−0.268	(−2.05)**	−0.279	(−2.13)**	−0.276	(−2.11)**
MB	−0.334	(−5.04)***	−0.335	(−5.06)***	−0.334	(−5.05)***
BETA	0.046	(0.21)	0.046	(0.21)	0.046	(0.21)
MOM	−0.741	(−5.75)***	−0.738	(−5.71)***	−0.738	(−5.72)***
ROE	−1.418	(−1.99)**	−1.421	(−1.99)**	−1.421	(−1.99)**
LEV	2.554	(4.44)***	2.556	(4.45)***	2.555	(4.45)***
CPI	−6.169	(−1.24)	−5.752	(−1.18)	−5.844	(−1.20)
CROSSLIST	−0.141	(−0.50)	−0.161	(−0.57)	−0.155	(−0.55)
ACCT	−1.703	(−5.78)***	−1.623	(−5.35)***	−1.633	(−5.42)***
REFORM	4.422	(16.97)***	4.382	(16.63)***	4.388	(16.73)***
IND and YEAR dummies	Yes		Yes		Yes	
Two−way clusters	Yes		Yes		Yes	
Obs.	10,321		10,321		10,321	
R-sqr	33.91%		33.89%		33.90%	
Panel B: Split-share structure reform and relations between stock market development and the implied cost of equity						
Intercept	9.335	(8.44)***	9.343	(8.49)***	9.344	(8.48)***
MKTCAP	**−0.252**	**(−4.45)*****				
REFORM * *MKTCAP*	**0.167**	**(2.85)*****				
MKTLIQ			**−0.088**	**(−6.35)*****		
REFORM * *MKTLIQ*			**0.069**	**(4.92)*****		
FIN_{AVG}					**−0.132**	**(−5.70)*****
REFORM * FIN_{AVG}					**0.101**	**(4.28)*****
SIZE	−0.320	(−3.38)***	−0.327	(−3.48)***	−0.325	(−3.46)***
MB	−0.375	(−4.52)***	−0.375	(−4.52)***	−0.375	(−4.52)***
BETA	0.322	(1.15)	0.323	(1.16)	0.323	(1.16)
REFORM * *BETA*	−0.670	(−2.11)**	−0.668	(−2.10)**	−0.668	(−2.11)**
MOM	−0.464	(−3.41)***	−0.461	(−3.38)***	−0.462	(−3.39)***
ROE	−1.393	(−1.94)*	−1.400	(−1.94)*	−1.398	(−1.94)*
LEV	2.208	(4.90)***	2.205	(4.91)***	2.206	(4.91)***
CPI	4.840	(0.93)	4.974	(0.97)	4.957	(0.96)
CROSSLIST	−0.132	(−0.92)	−0.148	(−1.00)	−0.144	(−0.98)
ACCT	−1.210	(−13.79)***	−1.148	(−12.81)***	−1.159	(−13.00)***
REFORM	5.147	(14.00)***	5.156	(14.33)***	5.148	(14.20)***
IND and YEAR dummies	Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes	
Obs.	8357		8358		8357	
R-sqr	35.21%		35.20%		35.20%	

Panel A of this table presents OLS regression results for the effect of stock market integration on relations between financial development and the implied cost of equity capital, using the following model that extends Model (1):

$$CC_{it} = \alpha_0 + \alpha_2 FIN_{it} + \alpha_2 FIN_{it} * MINTG_{it} + \alpha_3 MINTG_{it} + \alpha_4 SIZE_{it} + \alpha_5 MB_{it} + \alpha_6 BETA_{it} + \alpha_7 MOM_{it} + \alpha_8 ROE_{it} + \alpha_9 LEV_{it} + \alpha_{10} CPI + \alpha_{11} CROSSLIST_{it} + \alpha_{12} ACCT_{it} + \alpha_{13} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it}$$

where *CC* refers to the implied cost of equity capital measure R_{GLS}. *FIN* refers to the stock market development measure *MKTCAP* in Model 1, the stock market development measure *MKTLIQ* in Model 2, and their average FIN_{AVG} in Model 3. *MINTG* is an indicator for low market integration between the provincial stock market and the national stock market. Other control variables are the same as described in Model (1).

Panel B of this table presents OLS regression results for the effects of the split-share structure reform on relations between financial development and the implied cost of equity capital using the following model that extends Model (1):

$$CC_{it} = \alpha_0 + \alpha_2 FIN_{it} + \alpha_2 FIN_{it} * REFORM_{it} + \alpha_3 SIZE_{it} + \alpha_4 MB_{it} + \alpha_5 BETA_{it} + \alpha_6 BETA_{it} * REFORM_{it} + \alpha_7 MOM_{it} + \alpha_8 ROE_{it} + \alpha_9 LEV_{it} + \alpha_{10} CPI + \alpha_{11} CROSSLIST_{it} + \alpha_{12} ACCT_{it} + \alpha_{13} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it}$$

where *CC* refers to the implied cost of equity capital measure R_{GLS}. *FIN* refers to the stock market development measures *MKTCAP* in Model 1 and *MKTLIQ* in Model 2 and to their average FIN_{AVG} in Model 3. *REFORM* is an indicator for the period after the split-share reform in 2005 in China. Other variables are the same as described in Model (1). Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm-specific and year-specific clusters.

* Coefficient is significant at the 10% level.
** Coefficient is significant at the 5% level.
*** Coefficient is significant at the 1% level.

development substitutes for the split-share structure reform in facilitating cross-sectional risk-sharing between tradable and non-tradable shareholders, and thus lowers the cost of equity. In addition, our stock market development measures per se remain negatively associated with the cost of equity, confirming that their relation is insensitive to the moderating effects of the split-share structure reform. The interaction of *REFORM* * *BETA* is significantly negative in all models, suggesting that the enhanced risk-sharing associated with the split-share structure reform lowers the cost of equity via decreasing the covariance of firm stock returns with market returns.

6.3. Banking development features, non-state economy characteristics and the relation between banking development and the cost of equity

We now proceed to examine the institutional factors that affect the relation between banking development and the cost of equity, aiming to identify potential drivers for the weak mitigating effect of banking development on the cost of equity. We focus on banking development features and non-state economy characteristics in our analysis. We first examine the effect of banking competition, banking marketization and credit allocation efficiency, all of which are usually important features accompanying banking development. However, because the big four state-owned banks historically monopolize the banking industry, banking development in China is not accompanied by sufficient improvement in banking competition, banking marketization and capital allocation efficiency. For example, Lin et al. (2012) report that the dominance of market share of the big four banks explains the low efficiency of the banking sector. To provide further insight into the moderating effect of these banking development features, we measure the lack of banking competition *BANKCMPT*, the lack of banking marketization *BANKMKT* and the lack of credit allocation efficiency *BANKDST* using the percentile ranking of negative one (−1) times the sub-index of banking competition, banking marketization and credit allocation efficiency developed in Fan et al. (2011), respectively. Then, we add these variables as well as their interactions with *CREDIT* to Model (1) to see whether and how they affect the cost of equity. As shown in Models 1–3 of Table 8, we find that *BANKCMPT* * *CREDIT*, *BANKMKT* * *CREDIT* and *BANKDST* * *CREDIT* are significantly positively associated with the cost of equity. These results suggest that the lack of banking competition, banking marketization and credit allocation efficiency at least partially cancels out the beneficial effect of banking development on mitigating the cost of capital in China. An important implication here is that banking regulation reforms that promote banking competition, credit allocation efficiency and banking marketization enhance the mitigating effect of banking development on the cost of equity.

Then we look into the moderating effects of the underdevelopment and underinvestment of the non-state economy and the lack of sales from the non-state economy in affecting the relation between banking

Table 8
Banking development characteristics, non-state economy development and the relations between banking development and the implied cost of equity proxied by R_{GLS}.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Intercept	8.136	(7.82)***	8.182	(8.08)***	8.407	(7.90)***	8.326	(7.93)***	8.553	(7.99)***	8.603	(8.18)***
BANKMPT * *CREDIT*	**1.45**	(**3.64**)***										
BANKMKT * *CREDIT*			**1.604**	(**3.56**)***								
BANKDST * *CREDIT*					**1.316**	(**2.74**)***						
PRIVECON * *CREDIT*							**1.146**	(**2.89**)***				
PRIVEINT * *CREDIT*									**1.409**	(**2.73**)***		
PRIVESAL * *CREDIT*											**0.678**	(**2.05**)**
CREDIT	0.495	(2.39)**	0.457	(2.25)**	0.231	(0.98)	0.261	(1.10)	0.200	(0.78)	−0.002	(−0.01)
BANKMPT	−1.247	(−2.80)***										
BANKMKT			−1.542	(−2.78)***								
BANKDST					−1.226	(−2.47)***						
PRIVECON							−0.872	(−1.62)				
PRIVEINT									−1.176	(−1.89)*		
PRIVESAL											−0.604	(−1.37)
SIZE	−0.273	(−3.10)***	−0.281	(−3.16)***	−0.286	(−3.21)***	−0.274	(−3.10)***	−0.281	(−3.18)***	−0.281	(−3.15)***
MB	−0.336	(−5.93)***	−0.336	(−5.94)***	−0.336	(−5.94)***	−0.337	(−5.89)***	−0.337	(−5.91)***	−0.337	(−5.90)***
BETA	0.044	(0.30)	0.044	(0.30)	0.049	(0.33)	0.046	(0.32)	0.055	(0.37)	0.052	(0.36)
MOM	−0.781	(−5.79)***	−0.777	(−5.69)***	−0.781	(−5.85)***	−0.767	(−5.93)***	−0.77	(−5.95)***	−0.769	(−5.82)***
ROE	−1.351	(−2.26)**	−1.35	(−2.28)**	−1.343	(−2.28)**	−1.353	(−2.26)**	−1.344	(−2.24)**	−1.368	(−2.27)**
LEV	2.591	(6.80)***	2.579	(6.76)***	2.572	(6.76)***	2.574	(6.81)***	2.582	(6.74)***	2.571	(6.81)***
CPI	−7.23	(−1.35)	−7.159	(−1.40)	−6.965	(−1.41)	−7.760	(−1.45)	−7.563	(−1.45)	−7.061	(−1.32)
CROSSLIST	−0.132	(−1.16)	−0.149	(−1.29)	−0.174	(−1.48)	−0.173	(−1.31)	−0.154	(−1.26)	−0.201	(−1.56)
ACCT	−1.872	(−6.29)***	−1.892	(−6.12)***	−1.88	(−5.92)***	−1.873	(−6.38)***	−1.875	(−6.30)***	−1.905	(−6.36)***
REFORM	4.585	(17.99)***	4.516	(20.09)***	4.501	(23.34)***	4.621	(16.16)***	4.423	(20.16)***	4.499	(14.70)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	10,321		10,321		10,321		10,321		10,321		10,321	
R-sqr	33.91%		33.91%		33.88%		33.88%		33.85%		33.88%	

This table presents results for banking development and the non-state economy development characteristics on relations between banking development and the implied cost of equity using the following model that extends Model (1):

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 FIN_{it} * INT_{it} + \alpha_3 INT_{it} + \alpha_4 SIZE_{it} + \alpha_5 MB_{it} + \alpha_6 BETA_{it} + \alpha_7 MOM_{it} + \alpha_8 ROE_{it} + \alpha_9 LEV_{it} + \alpha_{10} CPI + \alpha_{11} CROSSLIST_{it} + \alpha_{12} ACCT_{it} + \alpha_{13} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where *CC* refers to the implied cost of equity measure R_{GLS}. *FIN* refers to the banking development measure *CREDIT*. *INT* refers to the lack of banking competition, banking marketization and marketization in distribution credit denoted by *BANKMPT*, *BANKMKT* and *BANKDST*, respectively, or the underdevelopment, underinvestment and lack of sale from the non-state economy, denoted by *PRIVECON*, *PRIVEINT* and *PRIVESAL*, respectively. Other variables are the same as in Model (1). Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm-specific and year-specific clusters.

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

development and the cost of equity. [25] Banks operating in regions with these features are subject to more government intervention. Consequently, more lending is allocated to SOEs and firms with political connections and there is more lending discrimination against other non-SOEs, both of which may weaken the effect of banking development on lowering the cost of equity. We gauge the underdevelopment, underinvestment and lack of sales in the non-state economy by the percentile ranking of negative one (−1) times the index of development, the investment and sales of the non-state economy in Fan et al. (2011), respectively. We add their interactions with *CREDIT* as well as their own values to Model (1). As shown in Models 4–6 of Table 8, consistent with our expectation, the coefficients of the interactions of banking development with the underdevelopment, underinvestment and lack of sales in the non-state economy (i.e., *PRIVECON* * *CREDIT*, *PRIVEINV* * *CREDIT* and *PRIVESAL* * *CREDIT*, respectively) are significantly positively associated with the cost of equity. These findings also suggest that the development of the non-state economy facilitates banking efficiency and boosts the mitigating effect of banking development on the cost of equity.

7. Robustness checks

7.1. Endogeneity between financial development, accounting quality and law enforcement

La Porta et al. (1997, 1998) and Beck et al. (2003) report that differences in legal enforcement regimes give rise to variations in financial development across countries because finance is a set of contracts affected by legal rights and enforcement mechanisms. [26] Acemoglu et al. (2003) show that financial development does not affect a country's vulnerability to economic shocks after controlling for institutional factors. The evidence collectively suggests that institutional factors such as legal enforcement regime and accounting quality may determine the cost of equity effect of financial development but not vice versa. In Table 6, we have already shown that the relation between financial development and the cost of equity remains robust after accounting for the moderating effects of legal regime strength and/or financial reporting quality. To further check whether our baseline results are robust to the potential endogeneity of financial development in relation to accounting quality and legal enforcement, we first run OLS regressions of financial development measures against the accounting quality measure *EMGMT* and the legal enforcement measure *LAW*. Then, we use the estimated residuals as alternative financial development measures to re-estimate Model (1).

Table 9 reports the regression results. Models 1–4 show that the residual stock market development measures net of the effect of financial reporting quality, denoted by *MKTCAPR1*, *MKTLIQR1* and $FINR1_{AVG}$, are significantly negatively associated with the cost of equity. The coefficient on the residual banking development net of the effect of accounting quality, *CREDITR1*, becomes significantly negative. Models 5–8 indicate that the residual stock market (banking) development measures net of the effects of legal enforcement, *MKTCAPR2*, *MKTLIQR2* and $FINR2_{AVG}$, (*CREDITR2*), remain significantly (insignificantly) negatively associated with the cost of equity. In short, our results are robust after controlling for the potential endogeneity of financial development in relation to financial reporting quality and legal enforcement strength.

7.2. Alternative measures for financial development

Following Brown et al. (2013), we alternatively measure stock market development as the ratio of total market value of initial public offerings in firms headquartered in each province to total provincial GDP at the year end, denoted by *MKTIPO*. We also follow Brown et al. (2013) to gauge banking development by the ratio of value-weighted aggregate debt to total assets for all listed firms in a province in a year, denoted by *CRTLIA*. As shown in Table 10, our major results are robust to the use of these alternative measures for

[25] The non-state economy in China includes township and village enterprises, private firms, foreigner-invested firms and other non-state owned firms.

[26] La Porta et al. (1997) show that countries with poorer investor protection measured by both the character of legal rules and the quality of law enforcement have smaller and narrower capital markets. La Porta et al. (1998) document that the concentration of ownership of shares in the largest companies is negatively related with investor protections, implying that well-developed stock markets featured by small, diversified shareholders are unlikely in countries that fail to protect their rights.

Table 9
Robustness check: endogeneity of financial development, accounting quality and law enforcement and the relation between financial development and the implied cost of equity capital proxied by R_{GLS}.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Intercept	8.529	(4.88)***	8.602	(4.92)***	8.806	(5.03)***	8.643	(4.98)***	8.682	(5.27)***	8.705	(5.28)***	8.700	(5.28)***	8.757	(5.31)***
*MKTCAP*R1	**−0.121**	**(−3.07)***														
*MKTLIQR*1			**−0.028**	**(−3.19)***												
$FINR1_{AVG}$					**−0.028**	**(−2.32)****										
*CREDIT*R1							**−0.430**	**(−1.72)***								
MKTCAPR2									**−0.066**	**(−1.81)***						
MKTLIQR2											**−0.014**	**(−1.80)***				
$FINR2_{AVG}$													**−0.024**	**(−1.81)***		
*CREDITR*2															0.018	(0.06)
EMGMT	−0.111	(−0.61)	−0.119	(−0.65)	−0.169	(−0.89)	−0.107	(−0.58)								
LAW									−0.098	(−2.18)**	−0.098	(−2.17)**	−0.098	(−2.17)**	−0.097	(−2.15)**
SIZE	−0.282	(−2.08)**	−0.291	(−2.16)**	−0.311	(−2.34)**	−0.293	(−2.16)**	−0.253	(−1.89)*	−0.254	(−1.90)*	−0.254	(−1.90)*	−0.257	(−1.93)*
MB	−0.341	(−4.95)***	−0.342	(−4.96)***	−0.343	(−4.94)***	−0.343	(−5.00)***	−0.336	(−5.04)***	−0.337	(−5.05)***	−0.336	(−5.05)***	−0.338	(−5.09)***
BETA	0.028	(0.12)	0.029	(0.12)	0.035	(0.15)	0.048	(0.21)	0.041	−0.19	0.041	−0.19	0.041	−0.19	0.044	−0.2
MOM	−0.761	(−5.68)***	−0.756	(−5.62)***	−0.766	(−5.62)***	−0.805	(−5.87)***	−0.759	(−5.53)***	−0.759	(−5.48)***	−0.759	(−5.48)***	−0.786	(−5.73)***
ROE	−1.301	(−1.79)*	−1.304	(−1.80)*	−1.298	(−1.78)*	−1.255	(−1.72)*	−1.385	(−1.96)*	−1.384	(−1.95)*	−1.385	(−1.96)*	−1.359	(−1.92)*
LEV	2.412	(4.27)***	2.414	(4.28)***	2.426	(4.32)***	2.424	(4.35)***	2.574	(4.48)***	2.577	(4.48)***	2.577	(4.48)***	2.591	(4.53)***
CPI	−4.988	(−0.92)	−4.703	(−0.86)	−4.709	(−0.90)	−5.975	(−1.12)	−6.476	(−1.32)	−6.385	(−1.30)	−6.394	(−1.30)	−6.846	(−1.35)
CROSSLIST	−0.125	(−0.42)	−0.145	(−0.48)	−0.197	(−0.64)	−0.176	(−0.59)	−0.102	(−0.37)	−0.104	(−0.38)	−0.104	(−0.38)	−0.104	(−0.38)
ACCT	−1.650	(−6.08)***	−1.558	(−5.51)***	−1.710	(−6.79)***	−1.885	(−6.63)***	−1.778	(−6.46)***	−1.74	(−6.39)***	−1.744	(−6.39)***	−1.896	(−6.35)***
REFORM	4.693	(20.64)***	4.668	(20.25)***	4.624	(21.69)***	4.724	(22.34)***	4.591	(17.99)***	4.577	(18.12)***	4.579	(18.09)***	4.604	(17.91)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	9752		9752		9752		9752		10,321		10,321		10,321		10,321	
R-sqr	35.20%		35.12%		35.12%		35.15%		33.91%		33.90%		33.91%		33.89%	

This table presents OLS estimation results for alternative financial development measures and their relations with the implied cost of equity capital using Model (1):

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 BETA_{it} + \alpha_6 ROE_{it} + \alpha_7 LEV_{it} + \alpha_8 CPI + \alpha_9 CROSSLIST_{it} + \alpha_{10} ACCT_{it} + \alpha_{11} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where the dependent variable *CC* refers to the implied cost of equity capital measure R_{GLS}. In Models 1–4, *FIN* refers to the alternative financial market development measures *MKTCAPR1*, *MKTLIQR1*, $FINR1_{AVG}$ and *CREDITR1* that orthogonalize *MKTCAP*, *MKTLIQ*, FIN_{AVG} and *CREDIT* against the provincial-level accounting quality measure *EMGMT*. In Models 5–8, *FIN* refers to the alternative financial market development measures *MKTCAPR2*, *MKTLIQR2*, $FINR2_{AVG}$ and *CREDITR2* that orthogonalize *MKTCAP*, *MKTLIQ*, FIN_{AVG} and *CREDIT* against the provincial-level law enforcement measure *Law*. Other variables are the same as in Table 2. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm-specific and year-specific clusters.

* Coefficient is significant at the 10% level.
** Coefficient is significant at the 5% level.
*** Coefficient is significant at the 1% level.

Table 10
Robustness check: alternative measures for stock market development, banking development and their relations with the implied cost of equity capital proxied by R_{GLS}.

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.	Coef.	*t*-stat.
Intercept	8.666	(5.11)***	16.408	(2.51)***	10.945	(6.61)***	0.052	(2.63)***	9.451	(5.76)***	17.397	(2.71)***	12.23	(6.20)***	0.065	(4.02)***
MKTIPO	**−0.119**	**(−2.76)*****	**−0.184**	**(−2.16)****	**−0.339**	**(−3.54)*****	**−0.003**	**(−3.66)*****								
CRTLIA									**−3.887**	**(−2.74)*****	0.865	(0.30)	−0.283	(−0.13)	0.018	(0.70)
SIZE	−0.336	(−2.48)***	−2.066	(−2.48)***	0.285	(1.32)	0.001	(0.29)	−0.307	(−2.37)**	−2.321	(−2.89)***	0.149	(0.70)	−0.001	(−0.69)
MB	−0.305	(−4.81)***	−0.302	(−1.97)**	−0.386	(−4.40)***	−0.004	(−3.86)***	−0.339	(−5.10)***	−0.294	(−2.09)**	−0.389	(−4.68)***	−0.004	(−4.37)***
BETA	0.166	(0.67)	1.268	(2.47)***	0.669	(1.48)	0.009	(2.72)***	0.035	(0.16)	1.328	(2.27)**	0.377	(0.70)	0.006	(1.33)
MOM	2.713	(4.48)***	0.845	(1.12)	4.176	(6.69)***	0.053	(5.22)***	2.671	(4.63)***	0.781	(0.91)	4.57	(8.34)***	0.052	(8.75)***
ROE	−1.746	(−2.31)**	−2.874	(−2.32)**	−1.461	(−0.91)	−0.014	(−0.83)	−1.353	(−1.91)*	−2.950	(−2.49)***	−1.022	(−0.88)	−0.005	(−0.45)
LEV	−7.377	(−1.58)	−33.777	(−1.46)	−17.007	(−1.77)*	−0.221	(−1.71)*	−6.793	(−1.27)	−31.775	(−1.33)	−14.264	(−1.72)*	−0.184	(−1.56)
CPI	−0.712	(−4.95)***	−2.667	(−8.59)***	−0.875	(−5.66)***	−0.012	(−6.09)***	−0.785	(−5.71)***	−2.831	(−9.31)***	−0.976	(−5.99)***	−0.012	(−7.04)***
CROSSLIST	−0.238	(−0.79)	0.528	(1.05)	−0.017	(−0.04)	0.000	(0.06)	−0.203	(−0.71)	0.357	(0.62)	0.063	(0.13)	0.001	(0.21)
ACCT	−2.108	(−6.59)***	−10.881	(−5.17)***	−2.924	(−4.83)***	−0.032	(−4.01)***	−1.862	(−6.06)***	−10.747	(−5.58)***	−2.948	(−5.45)***	−0.031	(−4.26)***
REFORM	4.634	(18.16)***	20.06	(21.10)***	3.142	(8.64)***	0.071	(14.36)***	4.54	(17.48)***	20.111	(21.08)***	3.037	(8.24)***	0.068	(14.42)***
IND and YEAR dummies	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Two-way clusters	Yes		Yes		Yes		Yes		Yes		Yes		Yes		Yes	
Obs.	8,523		8,532		3,132		3,586		10,321		10,321		4,509		3,953	
R-sqr	46.22%		31.66%		20.42%		23.77%		33.88%		48.57%		20.93%		23.57%	

This table presents OLS regression results for the alternative measures for stock market development and banking development on the implied cost of equity capital using the following Model (1):

$$CC_{it} = \alpha_0 + \alpha_1 FIN_{it} + \alpha_2 SIZE_{it} + \alpha_3 MB_{it} + \alpha_4 BETA_{it} + \alpha_5 MOM_{it} + \alpha_6 ROE_{it} + \alpha_7 LEV_{it} + \alpha_8 CPI + \alpha_9 CROSSLIST_{it} + \alpha_{10} ACCT_{it} + \alpha_{11} REFORM_{it} + \alpha_t \Sigma_t YEAR_t + \alpha_j \Sigma_j IND_j + \varepsilon_{it} \quad (1)$$

where *CC* refers to the implied cost of equity capital measures R_{GLS}, R_{DIV}, R_{OJN} and R_{PEG}, respectively, in Models 1–4 and Models 5–8. *FIN* refers to the alternative stock market development measure *MKTIPO* and the alternative banking development measure *CRTLIA*. Other variables are the same as in Table 2. Variable definitions are provided in Appendix A. *t*-statistics are adjusted for firm- and year-specific clusters.

* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

stock market and banking development, *MKTIPO* and *CRTLIA*, respectively. That is, the stock market (banking) development measure *MKTIPO* (*CRTLIA*) remains significantly (weakly) negatively associated with the implied cost of capital. In addition, we use an alternative measure of banking development, the ratio of total banking deposits to total GDP in each province at the year end, and the results are qualitatively unaltered.

7.3. Alternative measures for the implied cost of equity capital

As an additional robustness check, we use the average of the four cost of capital measures to re-estimate Model (1), and the results do not qualitatively change. That is, the new average measure is still significantly negatively related with stock market development. In addition, we also use a modified PEG ratio, R_{PEGA}, as an alternative measure for the implied cost of equity:

$$P_t = (EPS_{t+2} + Rpega \cdot POUT_{t+1} - EPS_{t+1})/Rpega^2 \tag{3}$$

where the variable definitions of *EPS* and *POUT* are the same as those used in calculating R_{PEG}. Our baseline results remain qualitatively unchanged when using R_{PEGA}.

7.4. The impact of entering WTO

One concern is that overall economic development reduces the cost of equity and promotes financial development simultaneously, which may induce a spurious negative relation between financial development and the cost of equity. To examine whether the relation is robust to economic development, we consider the exogenous shock of WTO entrance. China's entrance to WTO in 2002 initiates the era of rapid economic development that has profound influence on the cost of equity. After entering the WTO, many financial market reforms are implemented in China, such as liberalizing interest rates, partially privatizing state-owned banks and the split-share reform, all of which also bring about rapid economic development. We add a dummy for China's entrance to WTO in year 2002 to Model (1) and replicate the analyses in Tables 2 and 3. Untabulated results show that the negative relation between financial development and the cost of equity remains qualitatively unchanged, suggesting that the relation is robust to the effect of overall economic development.

8. Conclusion

This study examines the effect of regional (province-level) financial development on the cost of equity capital in China. We find that stock market development reduces the cost of equity capital, supporting the argument that it plays an important role in liquidity provision, information asymmetry reduction, risk diversification and corporate governance, and reduces systematic macroeconomic uncertainty. We find, however, that banking development only weakly decreases the cost of equity. This finding is consistent with the view that pervasive state ownership in large banks and lack of banking competition constrain banking efficiency in China. The effect of stock market development on lowering the cost of equity capital is weaker in firms with high growth potential or intensive innovation activities and disappears in SOEs. Further analysis reveals that the negative relation between stock market development and the cost of equity is more pronounced in regions with low accounting quality, weak law enforcement and low stock market integration as well as before the stock-split structure reform, implying that stock market development substitutes for other institutional factors in lowering the cost of equity. The above findings are robust to the potential endogeneity of financial development to accounting and legal systems, alternative measures of financial development and the cost of equity, and economic development.

This study contributes to the literature on financial development, institutional factors and the cost of equity capital by documenting that financial development is an independent institutional feature that substitutes for other legal factors in lowering the cost of equity. We also extend the banking development literature by providing direct evidence that banking development featured by the lack of banking competition, marketization and lending discrimination constrains the mitigating effect of banking development on the cost of equity. Our study also enriches the existing literature on financial development and innovation by providing counter-

evidence that stock market development in China does not benefit fast-growing and innovation-intensive firms. Our results provide useful policy implications for financial development in China and in other transitional economies.

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Appendix A. Variable definitions

This table provides the definitions of the main test and control variables in this study. The accounting and stock market data for these variables are retrieved from the CSMAR database. *CPI* data are provided by the National Bureau of Statistics of China, risk-free rate data are collected from The People's Bank of China, and data on province-level institutional infrastructure (e.g., government intervention, banking and private economic development, and law enforcement) are obtained from Fan et al. (2011).

Dependent variables

R_{GLS} Proxy for the implied cost of capital and is calculated following the industry method in GLS (2001). The valuation model is

$$P_t = BV_t + \sum_{i=1}^{11} \frac{ROE_{t+i} - R_{GLS}}{(1+R_{GLS})^i} BV_{t+i-1} + \frac{(ROE_{t+12} - R_{GLS})}{R_{GLS}(1+R_{GLS})^{11}} BV_{t+11}$$

where ROE is reported ROE for the first future five years and is forecasted using a linear interpolation to the industry median ROE of the past three years. We calculate BV_{t+i} assuming a 'clean surplus relation', that is, $BV_{t+i} = BV_{t+i-1} + ROE_{t+i} * BV_{t+i-1} * (1 - POUT_{it})$, where $POUT_{it}$ is the expected dividend payout ratio. Please refer to Appendix B for estimation details

R_{DIV} Proxy for the implied cost of capital and is calculated using the valuation model below, following Botosan and Plumlee (2002):

$$P_t = \sum_{i=1}^{4} \frac{DPS_{t+i}}{(1+R_{DIV})^i} + \frac{P_{t+5}}{(1+R_{DIV})^5}$$

where in the right-hand side, P_{t+5} is the future fifth year target price proxied by the realized stock price. The future dividend per share DPS_{t+i} is set equal to future period EPS times the industry median dividend payout ratio when missing. Please refer to Appendix B for estimation details

R_{PEG} Proxy for the implied cost of capital and is estimated following Easton (2004) using the valuation model below:

$$P_t = (EPS_{t+2} - EPS_{t+1})/Rpeg^2$$

where EPS is the one-year-ahead realized EPS as well as the two-year-ahead realized EPS to derive a measure of abnormal earnings growth. Please refer to Appendix B for estimation details

R_{OJN} Proxy for implied cost of capital and is calculated following Ohlson and Juettner-Nauroth (2005) using the valuation model below:

$$P_t = \left(\frac{FEPS_{t+1}}{R_{OJN}}\right) \cdot \left(GST + R_{OJN} \cdot \frac{DPS_{t+1}}{FEPS_{t+1}} - GLT\right) \Big/ (R_{OJN} - GLT)$$

where the asymptotic long-term growth rate GST is the short-term growth rate estimated as the realized average earnings growth rate for the future five years. GLT imposes the assumption that growth in abnormal EPS beyond year $t+1$ equals the expected inflation rate that is annualized CPI one-year-ahead collected from the National Bureau of Statistics of China. The future dividend per share DPS_{t+1} is set equal to future period EPS times the industry median dividend payout ratio when missing. Please refer to Appendix B for estimation details

Independent testing variables

MKTCAP	Proxy for stock market development and is calculated as the ratio of stock market capitalization of tradable shares at SHSE and SZSE to total GDP at year end for each province or province-level municipality
MKTLIQ	Proxy for stock market development and is calculated as the ratio of the total value of shares traded in a year to total GDP at year end for each province or province-level municipality
FIN_{AVG}	The average of the above two stock market development measures *MKTCAP* and *MKTLIQ* at year end for each province or province-level municipality
MKTIPO	Proxy for stock market development and is calculated as the ratio of the total market value of initial public offerings in firms headquartered in each province and listed on SHSE and SZSE to total GDP in each province at year end, following Brown et al. (2013)
CREDIT	Proxy for banking development and is calculated as the ratio of total bank loans to total GDP at year end for each province or province-level municipality
CRTLIA	Proxy for banking development and is calculated as the ratio of value-weighted total liabilities to total assets for all listed firms in a province, following Brown et al. (2013)

Control variables

SIZE	Proxy for firm size and is measured as the natural logarithm of a firm's market value of equity at year end
BETA	Proxy for market beta and is measured as the sensitivity of a firm's return to value-weighted market return calculated over the past three years
MB	The ratio of market value to book value of equity at year end
MOM	Proxy for return momentum and is measured as the accumulated monthly return from last month to eleven months before
LEV	Proxy for leverage ratio and is measured as the ratio of total liabilities to total assets
ROE	Proxy for profitability and is measured as the ratio of net income to total book equity at the start of a year
CPI	Proxy for inflation rate and is measured as the one-year-ahead annualized monthly *CPI* for each province in each year
ACCT	Dummy for implementation of new financial accounting standards in China starting from 2007
REFORM	Dummy for the split-share structure reform in China implemented in 2005, and it is equal to one for the period after the reform implementation in 2005, and zero otherwise
INDDUM	Dummy for industry membership following the China Securities Regulatory Commission (CSRC) Industry Code (2001)
YDUM	A year indicator that proxies for year-specific effects

Conditioning variables

PATENT	Proxy for innovation intensity in a firm and is measured as the value of the total number of patent applications to the number of researchers in a province that the firm is located (Value 24 in Fan et al., 2011). A higher value of *PATENT* indicates more intensive innovation activities
BANKMPT	Proxy for the degree of lack of province-level banking competition in China and is measured as the percentile ranked value of negative one time the bank competition index (Value 17 in Fan et al., 2011)
BANKMKT	Proxy for the degree of the lack of province-level banking marketization in China and is calculated as the percentile ranked value of negative one time the bank marketization index (Value 16 in Fan et al., 2011)
BANKDST	Proxy for the degree of the lack of province-level marketization in credit distribution in China and is calculated as the percentile ranked value of negative one time the index for marketization in credit distribution (Value 18 in Fan et al., 2011)

PRIVECON	Proxy for the degree of underdevelopment of the non-state economy in a province in China and is measured as the percentile ranked value of negative one time the index for development of the private economy (Value 8 in Fan et al., 2011)
PRIVEINT	Proxy for the degree of underinvestment in the non-state economy in a province in China and is measured as the percentile ranked value of negative one time the index for investment in the non-state economy (Value 10 in Fan et al., 2011)
PRIVESAL	Proxy for the degree of the lack of sales from the non-state economy in a province in China and is measured as the percentile ranked value of negative one time the index for development of the non-state economy (Value 9 in Fan et al., 2011)
EMGMT	Proxy for province-level accounting quality measured by the ranking of the median of performance-matched discretionary accruals for all firm-years within a province in a year. The performance-matched discretionary accruals are estimated residuals from an extended Jones (1991) model that adds earnings over total assets as an additional control, following the intuition of Kothari et al. (2005). A higher value of *EMGMT* indicates lower accounting quality
LAW	Proxy for legal enforcement for the lack of protection of shareholders' rights and is measured as negative one time the mean value of the density of lawyers in each province or province-level municipality (Value 24 in Fan et al., 2011). A higher value of *LAW* indicates worse protection of shareholders' rights
MINTG	Proxy for the degree of integration of the provincial stock market with the national market and is set to one if the degree of market integration belongs to the lowest quartile in the sample. The degree of market integration is calculated by extending Korajczyk and Viallet (1989) and Levine and Zervos (1998)

Appendix B. The implied cost of equity estimates

This appendix explains the estimation procedures for the implied cost of equity capital measures used in this study: R_{GLS}, R_{DIV}, R_{PEG} and R_{OJN}. For these measures, the estimation methods and valuation models are different in their assumptions about forecasting horizons and the incorporation of growth, industry or inflation effects. For example, GLS (2001) imposes the assumption that firm *ROE* reverts to the industry level *ROE* beyond the forecast horizon, whereas the PEG ratio method implicitly assumes zero growth of abnormal earnings beyond the forecast horizon.

R_{GLS} estimation: We estimate R_{GLS} using the Ohlson's (1995) residual income valuation model shown below, following the finite-horizon industry method in GLS (2001):

$$P_t = BV_t + \sum_{i=1}^{11} \frac{ROE_{t+i} - R_{GLS}}{(1+R_{GLS})^i} BV_{t+i-1} + \frac{(ROE_{t+12} - R_{GLS})}{R_{GLS}(1+R_{GLS})^{11}} BV_{t+11} \quad \text{(b1)}$$

where *ROE* is the reported earnings over book value of equity. Note that different from GLS (2001), we use realized earnings rather than the analyst earnings forecast due to data limitation. Earnings forecast data in China are not publicly available until 2004. We also note that if reported *ROE* is greater (less) than expected *ROE*, the R_{GLS} estimation will be biased upward (downward). According to GLS (2001), we need *ROE* for 12 future years in Model (b1). We use *ROE* in the first future five years if it is available and positive, with the missing or negative values supplemented by a linear interpolation method following Chen et al. (2011a). We then forecast future *ROE* for the remaining years using a linear interpolation to the industry median *ROE* of the past three years. In addition, we assume that the book value of equity *BV*, earnings *ROE* and dividends satisfy the clean surplus relation, that is, $BV_{t+i} = BV_{t+i-1} + ROE_{t+i} * BV_{t+i-1} * (1 - POUT_{it})$, where $POUT_{it}$ is the expected dividend payout ratio measured as the median payout ratio over the past three years. We set $POUT_{it}$ equal to its industry median when missing.

R_{DIV} estimation: We calculate R_{DIV} using the dividend discount valuation model in Botosan and Plumlee (2005) as expressed below:

$$P_t = \sum_{i=1}^{4} \frac{DPS_{t+i}}{(1+R_{DIV})^i} + \frac{P_{t+5}}{(1+R_{DIV})^5} \tag{b2}$$

where fiscal year t is set to 0–5, and when fiscal year t is set to 0, P_0 and P_5 are the current and the future fifth year target prices proxied by realized stock price, respectively. For example, for R_{DIV} of 2006, P_0 and P_5 refer to the stock price in 2006 and in 2011, respectively. The future dividend per share DPS_{t+i} is set equal to future earnings per share *EPS* times the dividend payout ratio, with the dividend payout ratio set to its industry median when missing.

R_{PEG} estimation: We estimate R_{PEG} following the Easton's (2004) PEG ratio approach. The valuation model is

$$P_t = \frac{EPS_{t+2} - EPS_{t+1}}{Rpeg^2} \tag{b3}$$

where P_t is the stock price at the end of fiscal year t, and EPS_{t+1} and EPS_{t+2} are estimated as one-year- and two-year-ahead realized *EPS*, respectively, following Chen et al. (2011a). Once again, we use realized earnings because the analyst earnings forecast data in China are not publically available until year 2004.

R_{OJN} estimation: We compute R_{OJN} using the abnormal earnings growth valuation model of OJN (2005) as follows:

$$P_t = \left(\frac{FEPS_{t+1}}{R_{OJN}}\right) \cdot \left(GST + R_{OJN} \cdot \frac{DPS_{t+1}}{FEPS_{t+1}} - GLT\right) \Big/ (R_{OJN} - GLT) \tag{b4}$$

where short-term growth rate *GST* is estimated as the realized average earnings growth rate in the future five years. Assuming that growth in abnormal *EPS* beyond year $t+1$ equals to the expected inflation rate, we measure the asymptotic long-term growth rate *GLT* as the one-year-ahead annualized *CPI* collected from the National Bureau of Statistics of China. Note that *GLT* sets a lower bound to the R_{OJN} estimates. DPS_{t+1} is specified the same as for the above R_{DIV} estimation.

Appendix C. Financial development in china by year and by province

This table reports the mean values of the stock market development measures *MKTCAP* and *MKTLIQ*, their average FIN_{AVG}, and the banking development measure *CREDIT*, by year in Panel A and by province in Panel B. Variable definitions are provided in Appendix A.

Year	*MKTCAP*	*MKTLIQ*	FIN_{AVG}	*CREDIT*
Panel A: Average financial development over time				
1998	0.098	0.421	0.260	1.039
1999	0.125	0.502	0.313	1.080
2000	0.213	0.824	0.518	1.048
2001	0.165	0.425	0.295	1.069
2002	0.130	0.300	0.215	1.143
2003	0.119	0.302	0.211	1.187
2004	0.088	0.319	0.204	1.114
2005	0.069	0.202	0.136	1.045
2006	0.141	0.505	0.323	1.041
2007	0.396	1.989	1.193	1.007
2008	0.196	1.062	0.629	0.982

(*continued on next page*)

Appendix C (*continued*)

Province	*MKTCAP*	*MKTLIQ*	FIN_{AVG}	*CREDIT*
Panel B: Financial development by province and province-level municipality				
Anhui	0.078	0.394	0.236	0.822
Beijing	0.381	1.441	0.911	1.857
Chongqing	0.091	0.405	0.248	1.109
Fujian	0.083	0.359	0.221	0.748
Gansu	0.095	0.477	0.286	1.093
Guangdong	0.181	0.614	0.398	1.022
Guangxi	0.051	0.241	0.146	0.781
Guizhou	0.129	0.413	0.271	1.088
Hainan	0.313	1.467	0.890	1.141
Hebei	0.054	0.223	0.139	0.624
Heilongjiang	0.079	0.321	0.200	0.941
Henan	0.051	0.198	0.125	0.806
Hubei	0.119	0.514	0.317	0.930
Hunan	0.085	0.349	0.217	0.714
Jiangsu	0.062	0.256	0.159	0.798
Jiangxi	0.065	0.309	0.187	0.817
Jilin	0.134	0.587	0.360	1.146
Liaoning	0.105	0.428	0.266	1.073
Neimenggu	0.089	0.376	0.233	0.784
Ningxia	0.219	0.964	0.592	1.330
Qinghai	0.244	0.919	0.582	1.224
Shaanxi	0.078	0.342	0.210	1.148
Shandong	0.072	0.280	0.176	0.750
Shanghai	0.372	1.387	0.879	1.458
Shanxi	0.117	0.479	0.298	1.096
Sichuan	0.132	0.524	0.328	0.986
Tianjin	0.127	0.544	0.335	1.171
Xinjiang	0.149	0.641	0.395	0.983
Xizang	0.250	1.298	0.773	0.702
Yunnan	0.077	0.391	0.234	1.083
Zhejiang	0.067	0.302	0.184	1.104

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Does the transformation of accounting firms' organizational form improve audit quality? Evidence from China☆

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ABSTRACT

In this study, we examine the effects of the transformation of accounting firms' organizational form on audit quality. We find that the transformation from limited liability to limited liability partnerships has a significant negative effect on the absolute value of discretionary accruals of audited companies. In particular, the transformation has a significant negative effect on positive discretionary accruals and no effect on negative discretionary accruals. We also find that CPAs are more likely to issue modified audit opinions in the year after the transformation, and that there is no evidence that accounting firm size and listed company ownership influence the relationship between the transformation and audit quality. Our conclusions provide empirical evidence for policy makers and enrich the literature on accounting firms' organizational forms.

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1. Introduction

Along with the reforms to China's economy, Chinese accounting firms have undergone rapid development. At present, there are more than 7400 accounting firms, over 8.5 million CPAs and nearly 30 million employees in China. The scopes of the audit business and accounting firms have gradually increased, along with steady improvements in the special capabilities of CPAs and the CPA industry's regulatory standards, making CPAs an indispensable force for healthy economic and social development. However, due to CPAs' weak foundations, poor audit quality has attracted attention within the rapid development of accounting firms. In recent years, CPAs' credibility has been increasingly questioned due to frequent cases of accounting fraud.

To accelerate the healthy development of China's CPA industry, in 2010 the State Council and the Ministry of Finance issued "The Notice Regarding Several Opinions on Accelerating the Development of the Chinese CPA Industry" (Guo Ban Fa [2009] No. 56) and the Ministry of Finance and the General Administration for Industry and Commerce jointly issued "The Regulation on Promoting Large and Medium Accounting Firms to Transform to Limited Liability Partnerships" (Cai Kuai [2010] No. 12), hereafter referred to together as the "Regulations." In response, large accounting firms were the first to change their organizational form from limited liability to limited liability partnerships (LLPs). This change was expected to improve audit quality by increasing the legal liability of CPAs. In this study, we examine whether this unique transformation improves audit quality.

There have been no consistent conclusions made in extant theories on the correlation between such transformations and audit quality. From a risk perspective, the transformation from limited liability to LLPs increases partners' legal risks. According to the law, an accounting firm's partners must not only compensate for audit failures through the firm's total investment, they may also need to use their personal assets to compensate for audit failures. Therefore, partners may devote more time and effort to supervising the implementation of audit procedures to improve audit quality. From an organizational perspective, accounting firms can benefit from changes in organizational form that provide for sharing and insurance for audit risks and more opportunities for CPA promotion. However, because the entire transformation process is dominated by the government, accounting firms can receive other benefits from the transformation. For example, "The Notice of Accounting Firm Commitment of Central Governance Enterprises" requires that, under the same conditions, large accounting firms that have undergone the transformation are recommended to engage in H-share business and receive priority for audit work for central government business groups. In addition, to participate in H-share business, accounting firms must be organized as LLPs. Therefore, transformation is required to obtain these benefits, which may lead to increased internal conflict of interests and reduced audit quality.[1] Due to the complicated nature of the transformation's effect on audit quality, this remains an open question to be addressed.

We use A-share listed companies from 2007 to 2012 to examine the effect of the transformation of accounting firms' organizational form on audit quality. We find that the transformation has a significant negative effect on the absolute value of discretionary accruals of audited companies. The results also show that the transformation significantly decreases the level of positive discretionary accruals, but has no significant effect on negative discretionary accruals. We also find that the transformation's positive effect on audit opinions only lasts for one year.

We also examine the transformation's effect on audit quality from the perspective of accounting and client firms' characteristics. Unfortunately, we find that accounting firm size and listed company ownership have no significant effect on the relationship between the transformation and audit quality. The transformation increases audit risk due to greater legal obligations, which makes the partners more cautious about undertaking audit work. Meanwhile, the partners are also more cautious in dealing with upward earnings management behavior, as it is more prone to audit failures. However, given the transformation regulations, the transformed accounting firms tend to be larger, but we do not find that our results differ by accounting firm size and listed company ownership.

[1] We appreciate the helpful suggestions of the chief editor, Professor Donghui Wu.

This study contributes to the literature in several ways. First, it enriches the literature on the organizational forms of accounting firms. Firth et al. (2012) study the effects of partnerships and limited liability on audit quality and find that auditors in partnership firms are more cautious than those in limited liability firms. Lennox and Li (2012) studies the effect of transformations from partnerships to LLPs on audit quality and finds that it does not reduce audit quality. In this study, we focus on the transformation from limited liability to a LLP, a transformative direction that differs significantly from those previously covered in the literature.

This study also contributes to the reform of the transformation of accounting firms in China. To meet firms' "bigger, stronger" strategy, the Ministry of Finance and Business Administration jointly issued the Regulations, requesting that larger accounting firms transform from limited liability to LLPs. Our study examines the effect that transformation has on audit quality and the results provide a theoretical reference for the improvement of the Regulations and the selection of organizational forms for accounting firms. In this study, we also make suggestions for the legal liability of CPAs that serve as a reference for situations such as the recent increase in discussions on the restricted legal liability of CPAs in Europe. In addition, the difference in difference (DID) model used here effectively estimates the Regulations' influence to ensure the robustness and reliability of the results.

The remainder of this paper proceeds as follows. Section 2 reviews the literature and develops our hypotheses. Section 3 describes the sample and presents the research design. We report the results and robustness tests in Section 4. Finally, Section 5 concludes the paper.

2. Institutional background and hypothesis development

2.1. Institutional background

Accounting firms require unity and coordination within their ranks and their main functions are realized through the intellectual input of employees. CPAs are reliant on their professional knowledge, experience and professional judgment to provide high-quality audit services. Before 1998, almost all of the accounting firms in China were state-owned, in that they belonged to the local or central government, universities or government departments (DeFond et al., 2000; Yi, 2003). In 1998, there was a reorganization in which accounting firms were required to become independent legal entities without any affiliation with their original agencies. Once this reorganization was completed in 1999, the accounting firms each chose a form of organization based on their own conditions, such as limited liability or partnership. Some scholars have argued that in limited liability accounting firms, shareholders and auditors' maximum loss is their investment in the firm. As their risk is limited, they are more likely to spend less time and effort in the audit process, or to meet the inappropriate requests of customers to keep their clients, which can lead to lower audit quality (Dye, 1993, 1995; Chan and Pae, 1998). Thus, some scholars have indicated that partnerships should be mandatory. However, this situation also has inherent defects, such as partners bearing unlimited and joint liability: any partner's negligence or malpractice in the practice leads to the punishment of all of the partners, which can result in bankruptcy. The partnership can prompt extremely mismatched gains and risks, making it unpopular among accounting firms. LLPs, however, not only avoid the risk caused by other partners' improper behavior, but also protect investors by allowing them to recover their losses from audit failures. Thus, most scholars suggest that LLPs should be promoted.

There have been many financial frauds and audit failure cases in recent years, such as Yinguangxia and Shenzhen Zhongtianqin (2001), Enron and Andersen (2002), and Kelong and Deloitte (2004). These events have not only bankrupted firms, or left them on the verge of bankruptcy, but also strongly compromised overall audit quality. These events have seriously damaged the CPA industry's reputation, prompting the Ministry of Finance and China Association of Certified Public Accountants to try and strengthen supervision, improve audit quality and enhance the protection of investors' interests. To realize the above mentioned goals, the State Council [2009] No. 56 and the Ministry of Finance [2010] No. 12 (the Regulations) explicitly require the transformation of large accounting firms from limited liability to LLPs.

The LLP, popular in the past 20 years, is a new form of business organization in the United States exclusively for professionals such as accountants, lawyers and doctors. A LLP and a partnership are approximately the same in that the auditor bears the results of audit failure by suffering losses of his own property (unlimited

liability). A LLP, however, can prevent the auditor from the joint liability caused by the faults of other auditors by overcoming the shortcomings of joint liability inherent in an unlimited liability partnership. The tentative "CPA LLP agreement" states that, "The debt of accounting firms caused by the mistake of a partner with intentional or gross negligence in the practice, should first be paid with the property of accounting firms, and accounting firms obtain the right of recourse after bearing the liability, and the partner should bear full liability for the loss of accounting firms. The debt of accounting firms caused by the mistake of a partner without intentional or gross negligence in the practice should be paid by all partners with unlimited liability." In this study, based on unique events, we examine whether the transformation affects audit quality.

2.2. Literature and research hypotheses

The transformation of an accounting firm's organizational form increases the risk faced by its partners, which can result in behavioral changes. Audit risk[2] means that an accounting firm must bear the economic and even criminal liability when mistakes in the conclusion of its audit report lead to investors or audit clients' losses. If audit failure occurs, investors are entitled to appeal to the courts to force the listed company to compensate them for their losses. They can also require the accounting firm to take joint responsibility for the audit failure. The transformation from limited liability to LLP increases the loss suffered by the partner who experiences audit failure. The partners must take responsible for the liability, which is not limited to their investment in the accounting firm, but also includes their personal property.

Some studies have found that audit quality increases with debt risk (Geiger and Raghunandan, 2001; Geiger et al., 2006; Laux and Newman, 2010; Liu and Wang, 2006; Melumad and Thoman, 1990; Venkataraman et al., 2008). Chan and Pae (1998) find that a reduction in debt risk could reduce auditors' effort, resulting in a lower level of audit quality. They argue that because the users of financial statements have no right to sue the auditor, the auditor fears nothing, resulting in a lack of demand for audit quality. Geiger and Raghunandan (2001) and Geiger et al. (2006) also find that a decline in auditors' debt risk allows them to be less cautious in issuing reports, and makes them less likely to issue a going concern audit report. The work of Firth et al. (2012), based on the special setting of China, examines whether the difference in debt risk between two forms of organization (limited liability and partnership) affects auditors' behavior. They find that the CPAs in partnerships were more cautious and more likely to issue modified audit opinions, whereas due to fixed debt risk, limited liability led to more aggressive behavior and the CPAs did not tend to issue modified audit opinions. Lennox and Li (2012) study the transformation from partnership to LLP in the United States and explore whether a reduction in debt risk changed auditors' behavior. Their results show no significant difference before and after the change in organizational form, possibly because the essence of partnership did not change and investors still had the right to recover their losses from the auditors.

Based on the transformation of accounting firms from limited liability to LLPs in China, we analyze whether an increase in auditors' debt risk improves audit quality. Debt liability generally comes from lawsuits against auditors. Legally, if the users of financial statements suffer losses due to improper audit opinions issued by auditors, they have the right to require compensation from the auditors. Thus, the debt risk is also closely associated with the national legal system. Studies have found that accounting firms in China actually assume a lower legal risk (Liu and Xu, 2002) because the Chinese audit market is mainly formed by government regulation (Liu and Lin, 2000). Meanwhile, the provisions on CPAs' legal liability are still relatively vague in China and the operability is also poor, such as the lack of clear audit quality requirements. In seeking economic interests, some accounting firms do not adequately investigate the audited entity when facing fierce competition. Although some accounting firms are warned about, ordered to address, or reprimanded for corporate financial reporting irregularities, the processes are limited to administrative penalties, which makes the CPAs' violation costs very low. As long as the accounting firms are not withdrawn, the firms can still earn money through IPO and annual audits. Lu and Chen (2005) analyze the relationship between legal risk and audit quality using a sequential game mode and find that legal risk has no significant effect on audit quality, possibly due to the defects in the Chinese judicial system. However, with the improvement of the environment of Chinese laws

[2] Chen (2006) suggested that audit risk has nine definitions, and we use the fourth interpretation here to define audit risk.

and regulations, the legal risk faced by auditors is also increasing. To avoid the risk of litigation and financial losses occurred by audit failure, auditors attempt to advance their own audit quality control, invest more resources and work more carefully in the auditing process to reduce the likelihood of audit failures and thereby reduce litigation risks. Especially when there are changes in an accounting firm's organizational form, the partners face greater debt service obligations when audit failure occurs, which increases audit quality requirements.

In addition, from an organizational form perspective, the transformation from limited liability to LLP is more suited to accounting firms because the integration of human and money capital is better, which helps improve their internal governance structure and provides a better organizational guarantee for risk management and employee promotion. However, because the entire transformation process is basically dominated by the government and the transformed firms gain additional benefits, "The Notice of Accounting Firm Commitment of Central Governance Enterprises" requires that, under the same conditions, large accounting firms that have undergone transformation are recommended to engage in H-share business and are prioritized to undertake audit work for central government business groups. In addition, to engage in H-share business, accounting firms must become LLPs. Accounting firms must transform to obtain these benefits, which may lead to increased internal conflict of interests and reduce audit quality. Thus, we obtain our first hypothesis (H1).

H1. The transformation of accounting firms' organizational form is unrelated to audit quality.

Although the development of the CPA industry in China is rapid, problems remain, such as a large number of small-scale accounting firms, extremely low audit fees, and even "low balling." The literature has shown that firm size correlates with independence and audit quality (DeAngelo, 1981; Subramanian, 1996; Zhang and Liu, 2002; Qi et al., 2004), such that the larger the accounting firm, the more independent the auditors and the higher the audit quality. However, the transformation starts among medium and large accounting firms and it may affect audit quality due to the high audit quality of these transformed accounting firms. Therefore, we argue that the size of the audit firm may have a positive effect on the level of audit quality.

H2. If the transformed accounting firm is a Big Four international accounting firm, the level of audit quality is higher.

The audit clients' characteristics might also effect audit quality. Most of the listed companies in the Chinese capital market are state-owned, which is a crucial factor for us to consider. Wang et al. (2008) suggest that state-owned listed companies have an advantage when dealing with financial difficulties due to governmental support. As listed companies that were once state-owned show signs of bankruptcy, the government makes an effort to support the listed companies so they can overcome their difficulties. Similarly, auditors face lower audit risk with state-owned listed companies than with other listed companies, because the probability of audit failure for the former is low. The transformation changes the debt liability faced by the partners in audit failure. The characteristics of state-owned listed companies mean that the transformation of accounting firms has a limited effect on the audit services for state-owned listed companies. Therefore, we obtain H3.

H3. The effect that the transformation of accounting firms has on audit quality is more positive for non-state-owned listed companies than state-owned listed companies.

3. Research design

3.1. Variable definitions and models

3.1.1. Accounting firm transformations

We define an accounting firm that has changed its organizational form from limited liability to LLP as a transformed firm (Change, equal to 1). An accounting firm whose organizational form has not been transformed is a non-transformed firm (Change, equal to 0). We also define variables to examine the subsequent effects of accounting firm transformations, such as the transformed year (Post0), one year after transformation (Post1), and two years after transformation (Post2). Given that the current observations only go to 2012, the

span from 2010 to 2012 is just two years, we find that Post0, Post1 and Post2 are sufficient to cover the effect of accounting firm transformations on audit quality.

3.1.2. Audit quality

We use the performance-matched Jones model advanced by Kothari et al. (2005) to find the paired company with the most similar performance for each sample company, with discretionary accruals (DA) gained through the following regression cross-sectionally within each year and industry. We consider DA as the proxy for audit quality. The model specification is as follows:

$$TA_{i,t} = \delta_0 + \delta_1(\Delta Sales_{i,t} - \Delta AR_{i,t}) + \delta_2 PPE_{i,t} + \delta_3 Roa_{i,t} + \varepsilon_{i,t} \quad (1)$$

where total accruals ($TA_{i,t}$) equal net profit minus net cash flow from operations, the change in sales ($\Delta Sales_{i,t}$) equals the sales for the current year minus those for the previous year, the change in accounts receivable ($\Delta AR_{i,t}$) equals the accounts receivable for the current year minus those for the previous year, ($PPE_{i,t}$) is the net amount of property, plant and equipment (PPE) for the current year, with each variable standardized by total assets for the previous year, and ($Roa_{i,t}$) is the return on assets for the current year. In addition, based on previous research on audit quality, we use the audit opinion as another proxy for audit quality.

3.1.3. Models

According to Lennox and Li (2012), we use the DID model to examine whether the transformation of accounting firms affects audit quality. We focus on the relationship between the transformation (Change) and DA and further examine the subsequent effects of the transformation event on DA in the current and post-transformation years. The model specifications are as follows:

$$DA_{ijt} = \beta_0 + \delta_1 Change_{jt} + \beta_1 Lta_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 Invrec_{it} + \beta_5 Roa_{it} + \beta_6 Loss_{it} + \beta_7 CFO_{it} + \beta_8 Tobinq_{it} + \mu_j + a_i + e_{ijt} \quad (2)$$

$$DA_{ijt} = \beta_0 + \delta_1 Post0_{jt} + \delta_2 Post1_{jt} + \delta_3 Post2_{jt} + \beta_1 Lta_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 Invrec_{it} + \beta_5 Roa_{it} + \beta_6 Loss_{it} + \beta_7 CFO_{it} + \beta_8 Tobinq_{it} + \mu_j + a_i + e_{ijt} \quad (3)$$

Following Lennox and Li (2012), we control for accounting firm fixed effects (μ_j) and listed companies fixed effects (α_i), and examine the difference in pre- and post-transformation audit quality to ensure that the result is more robust and reliable.

Following Ashbaugh et al. (2003) and Wang et al. (2010), our study includes several control variables, such as the total accruals for the previous year (*Lta*), firm size (*Size*), debt ratio (*Lev*), inventories and receivables ratio (*Invrec*), profitability (*Roa*), loss (*Loss*), cash ratio (*CFO*) and growth opportunities (*Tobinq*).

Model (2) is our basic model and is used to examine H1. We also add some relevant variables to model (2) to create models (4) and (5), which we use to examine H2 and H3. Model (4) tests whether an accounting firm's status as a Big Four accounting firm influences the relationship between the transformation and audit quality. Model (5) tests whether the clients' status as a state-owned listed company influenced the relationship between the transformation and audit quality. The model specifications are as follows:

$$DA_{ijt} = \beta_0 + \delta_1 Change_{jt} + \delta_2 Big4_{jt} + \delta_3 Change_{jt} * Big4_{jt} + \beta_1 Lta_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 Invrec_{it} + \beta_5 Roa_{it} + \beta_6 Loss_{it} + \beta_7 CFO_{it} + \beta_8 Tobinq_{it} + \mu_j + a_i + e_{ijt} \quad (4)$$

$$DA_{ijt} = \beta_0 + \delta_1 Change_{jt} + \delta_2 State_{it} + \delta_3 Change_{jt} * State_{it} + \beta_1 Lta_{it} + \beta_2 Size_{it} + \beta_3 Lev_{it} + \beta_4 Invrec_{it} + \beta_5 Roa_{it} + \beta_6 Loss_{it} + \beta_7 CFO_{it} + \beta_8 Tobinq_{it} + \mu_j + a_i + e_{ijt} \quad (5)$$

The variables' specific definitions and calculations are detailed in Table 1.

3.2. Sample selection

Our study uses all of the A-share listed companies from 2007 to 2012 as our sample. The main variable (Change) is based on accounting firm transformations taken from the American Institute of CPAs' website, where accounting firms whose names have changed to LLPs are defined as transformed accounting firms, with

Table 1
Variable definitions.

Variables	Definitions
DA	Discretionary accruals as a proxy for audit quality, calculated from the model developed by Kothari et al. (2005)
Opinion	Audit opinion as a proxy for audit quality. The variable *Opinion* is coded from 0 to 3 for clean, unqualified by explanatory notes, qualified and disclaimed/adverse opinions, respectively
Change	Dummy variable that equals 1 if the accounting firm has been transformed and 0 otherwise
*Post*0	Dummy variable that equals 1 if the transformation occurs in the current year and 0 otherwise
*Post*1	Dummy variable that equals 1 if the year is one year after the transformation and 0 otherwise
*Post*2	Dummy variable that equals 1 if the year is two years after the transformation and 0 otherwise
*Big*4	Dummy variable that equals 1 if the accounting firm is a Big Four international accounting firm and 0 otherwise
State	Dummy variable that equals 1 for state-owned listed companies and 0 otherwise
Lta	Total accruals of the previous year, calculated as total accruals divided by total assets
Lop	Audit opinion of the previous year
Size	The size of the company, calculated as the logarithm of total assets
Lev	Debt ratio, calculated as total liabilities divided by total assets
Invrec	Inventories and receivables ratio, calculated as inventory and accounts receivable divided by total assets
Roa	Profitability, calculated as net profit divided by total assets
Loss	Dummy variable that equals 1 if the client makes a loss and 0 otherwise
CFO	Cash ratio, calculated as net cash flow from operating activities divided by total assets
Tobinq	Growth opportunities, calculated as follows: (tradable shares * closing price at the end of the year + non-tradable shares * net assets per share + book value of debt)/book value of assets
μ	Dummy variable for accounting firm fixed effects
α	Dummy variables for listed company fixed effects

all others defined as non-transformed accounting firms. The financial data of listed companies are sourced from the China Stock Market and Accounting Research and WIND (Wind Information Co., Ltd) databases.

We remove financial companies from our sample, along with newly listed companies, specially treated firms and firms with missing variables. We obtain 8705 observations. As many of the variables are the estimated values of the model that are influenced by outliers, all of the continuous variables are winsorized at the 1% and 99% levels to ensure the robustness of the results. Table 2 displays details of the accounting firm transformations by the end of 2012.

The distribution of the final sample is shown in Table 3.

4. Empirical results and analysis

4.1. Descriptive statistics

Panel A of Table 4 reports the descriptive statistics for the full sample. The mean and median of DA are 0.001 and −0.002, respectively, indicating that there is no systematic bias in the observations. The mean and

Table 2
Transformed accounting firms.

Transformed accounting firms	Transformation time
RSM China Certified Public Accountants	November 29, 2010
BDO China Shu Lun Pan Certified Public Accountants	December 31, 2010
Crowe Horwath China Certified Public Accountants	February 15, 2011
Pan-China Certified Public Accountants	July 7, 2011
PKF Daxin Certified Public Accountants	January 1, 2012
Da Hua Certified Public Accountants	February 16, 2012
Grant Thornton Certified Public Accountants	June 18, 2012
ShineWing Certified Public Accountants	June 21, 2012
Baker Tilly China Certified Public Accountants	June 29, 2012
CHY Certified Public Accountants	July 5, 2012
KPMG Certified Public Accountants	August 1, 2012
Ernst & Young Certified Public Accountants	September 11, 2012
Deloitte & Touche Certified Public Accountants	October 19, 2012

Table 3
Annual distribution of transformed and non-transformed observations.

Year	Non-transformed	Transformed	Total
2007	1209		1209
2008	1253		1253
2009	1351		1351
2010	1249	204	1453
2011	1068	476	1544
2012	804	1091	1895
Total	6934	1771	8705

median of audit opinion (Opinion) are 0.064 and 0, respectively. The mean and median of the explanatory variable (Change) are 0.203 and 0, which is consistent with our sample because a minority of accounting firms transformed during the sample period.

Panel B of Table 4 reports the descriptive statistics for the transformed (Change = 1) and non-transformed (Change = 0) accounting firms. The mean and median of the absolute value of DA (|DA|) for the transformed

Table 4
Descriptive statistics.

Variable name	*N*	Mean	Sd	Min	Median	Max
Panel A: Descriptive statistics of the full sample						
DA	8705	0.001	0.086	−0.436	−0.002	0.492
Opinion	8703	0.064	0.357	0	0	3
Change	8705	0.203	0.403	0	0	1
*Post*0	8705	0.084	0.277	0	0	1
*Post*1	8705	0.073	0.260	0	0	1
*Post*2	8705	0.047	0.211	0	0	1
Top 4	8703	0.063	0.243	0	0	1
State	8705	0.585	0.493	0	1	1
Lta	8705	−0.007	0.085	−0.314	−0.010	0.330
Size	8705	21.835	1.241	19.124	21.699	25.878
Lev	8705	0.493	0.197	0.047	0.505	0.917
Invrec	8705	0.268	0.181	0.002	0.242	0.824
Roa	8705	0.040	0.068	−2.746	0.035	0.532
Loss	8705	0.081	0.273	0	0	1
CFO	8705	0.048	0.081	−0.235	0.046	0.307
Tobinq	8705	2.037	1.248	0.896	1.635	10.726
	Mean			Median		
	Change = 1	Change = 0		Change = 1	Change = 0	
	(1)	(2)	(1)–(2)	(3)	(4)	(3)–(4)
Panel B: Descriptive statistics for the transformed and non-transformed groups						
|*DA*|	0.053	0.060	−0.007***	0.038	0.043	−0.005***
Opinion	0.036	0.064	−0.028***	0	0	0***
*Big*4	0.040	0.063	−0.023***	0	0	0***
State	0.518	0.585	−0.067***	1	1	0***
Lta	0.012	−0.007	0.019***	0.008	−0.010	0.018***
Size	22.015	21.835	0.180***	21.849	21.699	0.150***
Lev	0.472	0.493	−0.021***	0.486	0.505	−0.019***
Invrec	0.280	0.268	0.012***	0.254	0.242	0.012***
Roa	0.041	0.040	0.002	0.034	0.035	−0.001
Loss	0.076	0.081	−0.005	0	0	0
CFO	0.042	0.048	−0.006***	0.041	0.046	−0.005***
Tobinq	1.836	2.037	−0.201***	1.460	1.635	−0.175***

Note: The third and sixth columns in Panel B are *t*-tests for the mean and non-parametric tests for the median, respectively.

Table 5
The effect of accounting firm transformations on audit quality.

Variable	(1)	(2)	(3)	(4)
Panel A: Regression results for full sample				
Change	−0.009***		−0.010***	
	(−4.19)		(−4.48)	
*Post*0		−0.005**		−0.007***
		(−2.08)		(−2.63)
*Post*1		−0.012***		−0.014***
		(−3.93)		(−4.20)
*Post*2		−0.018***		−0.019***
		(−4.23)		(−4.32)
Lta			0.013	0.013
			(0.79)	(0.80)
Size			0.005**	0.006***
			(2.43)	(2.66)
Lev			0.041***	0.040***
			(4.26)	(4.16)
Invrec			−0.017	−0.017
			(−1.64)	(−1.63)
Roa			0.095***	0.094***
			(6.49)	(6.41)
Loss			0.003	0.004
			(1.16)	(1.18)
CFO			0.021	0.021
			(1.19)	(1.16)
Tobinq			0.003***	0.003***
			(3.52)	(3.44)
Constant	0.051***	0.051***	−0.090*	−0.101**
	(7.97)	(7.97)	(−1.96)	(−2.18)
CPA firm fixed effect	Control	Control	Control	Control
Firm fixed effect	Control	Control	Control	Control
Observations	8608	8608	8608	8608
Adjusted *R*-squared	0.0157	0.0169	0.0282	0.0293
	DA > 0		DA < 0	
	(1)	(2)	(3)	(4)
Panel B: Regression results for signed discretionary accruals				
Change	−0.017***		−0.002	
	(−4.16)		(−0.63)	
*Post*0		−0.015***		−0.000
		(−3.13)		(−0.011)
*Post*1		−0.020***		−0.005
		(−3.52)		(−0.99)
*Post*2		−0.022***		−0.006
		(−2.80)		(−1.02)
Lta	−0.024	−0.024	0.051**	0.050**
	(−0.86)	(−0.84)	(2.03)	(2.01)
Size	0.013***	0.014***	−0.008**	−0.007**
	(3.63)	(3.69)	(−2.52)	(−2.38)
Lev	0.007	0.007	0.075***	0.074***
	(0.43)	(0.42)	(5.35)	(5.30)
Invrec	0.033*	0.033*	−0.100***	−0.100***
	(1.88)	(1.89)	(−6.24)	(−6.23)
Roa	0.089***	0.089***	0.118***	0.117***
	(4.27)	(4.26)	(4.22)	(4.21)
Loss	0.001	0.001	0.007	0.007
	(0.20)	(0.24)	(1.52)	(1.53)

(*continued on next page*)

Table 5 (*continued*)

Variable	(1)	(2)	(3)	(4)
CFO	0.081***	0.081***	−0.043*	−0.044*
	(2.61)	(2.60)	(−1.65)	(−1.67)
Tobinq	0.003	0.003	0.003***	0.003***
	(1.64)	(1.60)	(3.14)	(3.09)
Constant	−0.258***	−0.265***	0.193***	0.185***
	(−3.14)	(−3.20)	(2.87)	(2.74)
CPA firm fixed effect	Control	Control	Control	Control
Firm fixed effect	Control	Control	Control	Control
Observations	4181	4181	4427	4427
Adjusted *R*-squared	0.0603	0.0607	0.0538	0.0542

Note: The dependent variable is |*DA*|. The *t*-statistics are presented in brackets below the coefficients.
* Significance at the 10% level, using two-tailed tests.
** Significance at the 5% level, using two-tailed tests.
*** Significance at the 1% level, using two-tailed tests.

Table 6
The effect of accounting firm transformations on audit opinions.

Variable	(1)	(2)
Change	−0.001	
	(−0.12)	
*Post*0		−0.014
		(−1.12)
*Post*1		0.026*
		(1.69)
*Post*2		−0.007
		(−0.33)
Lta	0.151***	0.152***
	(13.4)	(13.5)
Size	−0.042***	−0.042***
	(−4.27)	(−4.31)
Lev	0.292***	0.293***
	(6.60)	(6.61)
Invrec	−0.250***	−0.249***
	(−5.17)	(−5.16)
Roa	−0.646***	−0.646***
	(−9.40)	(−9.40)
Loss	0.035**	0.035**
	(2.50)	(2.54)
CFO	0.075	0.077
	(1.58)	(1.62)
Tobinq	0.007*	0.007*
	(1.79)	(1.87)
Constant	1.007***	1.019***
	(4.66)	(4.70)
CPA firm fixed effect	Control	Control
Firm fixed effect	Control	Control
Observations	8607	8607
Adjusted *R*-squared	0.0989	0.0998

Note: The dependent variable is Opinion. The *t*-statistics are presented in brackets below the coefficients.
* Significance at the 10% level, using two-tailed tests.
** Significance at the 5% level, using two-tailed tests.
*** Significance at the 1% level, using two-tailed tests.

Table 7
The effect of the accounting firm size.

Variable	(1) All	(2) DA > 0	(3) DA < 0
Change	−0.010***	−0.017***	−0.002
	(−4.26)	(−4.07)	(−0.63)
*Big*4	0.000	0.022	−0.009
	(0.015)	(0.60)	(−0.40)
Change * *Big*4	−0.002	0.000	0.001
	(−0.24)	(0.026)	(0.099)
Lta	0.013	−0.025	0.051**
	(0.79)	(−0.88)	(2.03)
Size	0.005**	0.013***	−0.008**
	(2.42)	(3.62)	(−2.51)
Lev	0.041***	0.007	0.075***
	(4.25)	(0.43)	(5.36)
Invrec	−0.017	0.033*	−0.100***
	(−1.64)	(1.88)	(−6.23)
Roa	0.095***	0.089***	0.118***
	(6.48)	(4.26)	(4.23)
Loss	0.004	0.001	0.007
	(1.17)	(0.20)	(1.52)
CFO	0.021	0.081***	−0.043
	(1.19)	(2.59)	(−1.65)
Tobinq	0.003***	0.003	0.003***
	(3.52)	(1.63)	(3.14)
Constant	−0.090*	−0.257***	0.192***
	(−1.95)	(−3.13)	(2.86)
CPA firm fixed effect	Control	Control	Control
Firm fixed effect	Control	Control	Control
Observations	8608	4181	4427
Adjusted *R*-squared	0.0282	0.0605	0.0539

Note: The dependent variable is |*DA*|. The *t*-statistics are presented in brackets below the coefficients.
* Significance at the 10% level, using two-tailed tests.
** Significance at the 5% level, using two-tailed tests.
*** Significance at the 1% level, using two-tailed tests.

group are significantly lower than the non-transformed group, which supports our hypothesis that accounting firm transformation improves audit quality. In the analysis of the dummy variable (Big4), the transformed group is significantly lower than the non-transformed group, which is due to the late transformation of the Big Four accounting firms in 2011, and thus there are fewer observations. Similarly, the dummy variable (State) of the transformed group is also significantly lower than the non-transformed group.

4.2. Empirical results and analysis

4.2.1. The effect of accounting firm transformations on audit quality

Panel A of Table 5 presents the results of the effect of accounting firm transformations on absolute DA. Columns (1) and (2) of Panel A are the regression results without the control variables. The variable (Change) is negative and significant (the coefficients are −0.009 and −0.010, and the *t*-statistics are −4.19 and −4.48, respectively) in columns (1) and (3) of Panel A. Accounting firm transformations are thus significantly negatively related to the absolute value of DA, supporting H1. We suggest that the transformation of accounting firms increases the audit and debt risks faced by partners of accounting firms, which urges the partners to be more cautious and prudent in the auditing process, improving audit quality. We further analyze the post-transformation effects among accounting firms. The variable (Post0) is negative and significant (the coefficients are −0.005 and −0.007, and the *t*-statistics equal −2.18 and −2.63) in columns (2) and (4), which indicates that the transformation of accounting firms has a positive effect on audit quality in the transformation year. Like-

Table 8
The effect of listed company ownership.

Variable	(1) All	(2) DA > 0	(3) DA < 0
Change	−0.012***	−0.022***	0.001
	(−3.53)	(−3.50)	(0.12)
State	0.002	0.004	0.001
	(0.72)	(0.61)	(0.24)
*Change * State*	0.002	0.007	−0.004
	(0.62)	(1.03)	(−0.81)
Lta	0.013	−0.024	0.050**
	(0.80)	(−0.85)	(2.01)
Size	0.005**	0.013***	−0.008**
	(2.41)	(3.59)	(−2.51)
Lev	0.041***	0.007	0.075***
	(4.24)	(0.43)	(5.37)
Invrec	−0.017	0.034*	−0.101***
	(−1.63)	(1.91)	(−6.25)
Roa	0.095***	0.089***	0.119***
	(6.47)	(4.27)	(4.26)
Loss	0.003	0.001	0.007
	(1.12)	(0.17)	(1.56)
CFO	0.021	0.081***	−0.043*
	(1.20)	(2.60)	(−1.66)
Tobinq	0.003***	0.003*	0.003***
	(3.54)	(1.65)	(3.15)
Constant	−0.091**	−0.257***	0.191***
	(−1.97)	(−3.13)	(2.84)
CPA firm fixed effect	Control	Control	Control
Firm fixed effect	Control	Control	Control
Observations	8608	4181	4427
Adjusted *R*-squared	0.0284	0.0610	0.0540

Note: The dependent variable is |*DA*|. The *t*-statistics are presented in brackets below the coefficients.
* Significance at the 10% level, using two-tailed tests.
** Significance at the 5% level, using two-tailed tests.
*** Significance at the 1% level, using two-tailed tests.

wise, the variables (Post1) and (Post2) are also significantly negatively related to |DA|, suggesting that the transformation of accounting firms still has positive effects on audit quality one and two years after the transformation. Further, the above results show that the coefficients of the variables are Post2 < Post1 < Post0, which indicates that the transformation year's effect is weaker than that of one and two years after the transformation. We argue that the partners of transformed accounting firms fully realize the possible increase in audit risk, and thus they are more cautious in the audit process, resulting in improved audit quality.

Panel B of Table 5 presents the results for signed DA. The coefficient of the variable (Change) is −0.017 and significant at the 1% level in column (1). However, the coefficient of the variable (Change) is −0.002 and insignificant in column (3). The above results show that improvements in audit quality are mainly due to a reduction in upward earnings management, with no effect on downward earnings management. Further, the variables (Post1) and (Post2) are consistent with the above results.

To test the direct effect of accounting firm transformations on audit quality, we also use audit opinions as a proxy for audit quality. Column (1) of Table 6 shows that the coefficient of the variable (Change) is −0.001, but is not significant.[3] The coefficient of the variable (Post1) is 0.026 and significant at the 10% level in column

[3] DeFond and Zhang (2014) indicate that, because the proxies in each category reflect different dimensions of audit quality, they cannot entirely reflect audit quality. Our research question is whether the transformation of accounting firms improves audit quality given their increased audit risk. The auditors usually issue modified audit opinions when listed companies have major uncertainty in their operations, or when the companies obey the accounting principles and occur significant accounting errors. Therefore, the use of audit opinions to proxy for audit quality might ignore the tiny differences in the audit process.

Table 9
The effect of accounting firm size and listed company ownership on the relationship between transformation and audit quality.

Variable	(1) All	(2) DA > 0	(3) DA < 0
Change	−0.012***	−0.022***	0.000
	(−3.48)	(−3.47)	(0.096)
*Big*4	0.000	0.022	−0.010
	(0.027)	(0.60)	(−0.41)
*Change * Big*4	−0.003	−0.001	0.002
	(−0.32)	(−0.048)	(0.23)
State	0.002	0.004	0.001
	(0.71)	(0.61)	(0.25)
*Change * State*	0.003	0.007	−0.005
	(0.65)	(1.02)	(−0.84)
Lta	0.013	−0.025	0.050**
	(0.79)	(−0.88)	(2.01)
Size	0.005**	0.013***	−0.008**
	(2.41)	(3.57)	(−2.49)
Lev	0.041***	0.007	0.076***
	(4.24)	(0.43)	(5.38)
Invrec	−0.017	0.034*	−0.100***
	(−1.63)	(1.91)	(−6.24)
Roa	0.095***	0.089***	0.119***
	(6.47)	(4.26)	(4.27)
Loss	0.003	0.001	0.007
	(1.13)	(0.17)	(1.55)
CFO	0.021	0.081***	−0.043*
	(1.19)	(2.59)	(−1.66)
Tobinq	0.003***	0.003	0.003***
	(3.54)	(1.64)	(3.14)
Constant	−0.091**	−0.256***	0.190***
	(−1.96)	(−3.11)	(2.83)
CPA firm fixed effect	Control	Control	Control
Firm fixed effect	Control	Control	Control
Observations	8608	4181	4427
Adjusted *R*-squared	0.0284	0.0612	0.0541

Note: The dependent variable is |*DA*|. The *t*-statistics are presented in brackets below the coefficients.
* Significance at the 10% level, using two-tailed tests.
** Significance at the 5% level, using two-tailed tests.
*** Significance at the 1% level, using two-tailed tests.

(2). These results mean that accounting firm transformations still affect audit opinions one year after the transformation, possibly because accounting firms must take time to address post-transformation quality control, thereby enhancing the audit quality of the audit services provided for listed companies.

4.2.2. The effect of accounting firm size

Table 7 presents the results of the relationship between transformation and audit quality by dividing the sample into two groups: Big Four and non-Big Four. The coefficients of the interact terms (Change * Big4) are all insignificant in columns (1)–(3), which indicate that there is no incremental effect of accounting firm transformations on audit quality when distinguishing by firm size. One possible reason is that the audit quality of Big Four accounting firms is always higher and therefore the potential for further improvement is limited. Therefore, even though the audit risk faced by the partners increases after the transformation, there is no significant incremental effect on audit quality.

4.2.3. The effect of listed company ownership

Table 8 presents the results of the relationship between the transformations and audit quality after dividing the sample into two groups, state-owned and non-state-owned. The coefficients of the interaction term (Change * State) are all insignificant in columns (1)–(3), which indicate that there is no incremental effect of accounting firm transformations on audit quality when distinguishing by the nature of ownership of listed companies.

4.3. Robustness tests

4.3.1. Different estimations of discretionary accruals

To ensure that the conclusions of this study are not influenced by the estimation of DA, we also use the performance-matched Jones model, the median-adjusted Jones model and the modified Jones model to estimate DA. After repeating the above regression analysis, the results are still robust, indicating that the conclusions of this study are not influenced by the estimation of DA.

4.3.2. Different definitions of audit opinion

To ensure that our conclusions are not affected by the definition of audit opinions, we also define clean audit opinions as 0 and modified audit opinions as 1. The results are still robust, indicating that our conclusions are not affected by the definition of audit opinions.

4.3.3. Different model specifications

We also simultaneously examine the effects of accounting firm size and listed company ownership nature on the relationship between transformations and audit quality. We find that the results are the same (see Table 9), indicating that the conclusions do not change.

5. Conclusions

We use Chinese A-share listed companies from 2007 to 2012 to examine the effects of accounting firm transformations on audit quality. We find that accounting firm transformations are negatively related to the absolute value of DA. The results of signed DA show that when DA is positive, accounting firm transformations significantly reduce the level of DA, whereas the effect is not significant when DA is negative. We also find that accounting firm transformations only have a positive effect on audit opinions one year after the transformation.

We examine the effects of accounting firm transformations on audit quality from the characteristics of each accounting firm and each client, to explore the research question more deeply. However, we do not find that accounting firm size and listed company ownership significantly affect the relationship between transformations and audit quality. The transformation from limited liability to LLP increases the audit risk faced by the partners of accounting firms, especially in lawsuits after audit failure, as the partners must compensate for the loss with all of their investments and their personal assets. Therefore, faced with an increasing debt risk, the partners tend to focus more on implementing audit procedures and using audit tools, which improve audit quality. Partners are more cautious in dealing with upward earnings management behavior because it is more prone to audit failures. Due to the policy, transformed accounting firms are generally larger in size and their clients are of a higher quality. Therefore, we did not find differences based on accounting firm size and listed company ownership.

In this study, we find that accounting firm transformations improve audit quality, providing policymakers with important empirical evidence. Likewise, the continual implementation of the policy can have a positive effect, urging auditors to provide higher quality audit services that make the capital market more transparent. With the increase in transformed accounting firms, future studies will have more reliable data to work with. These transformations will affect the insurance functions of audits, audit fees and audit client choice, etc., which can also form future directions for research on the topic of accounting firm transformations.

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Monetary policy, accounting conservatism and trade credit☆

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ABSTRACT

Using a sample of A-share listed firms in China during the 2003–2012 period, this paper investigates the effect of accounting conservatism on trade credit, taking changes in monetary policy into account. We find that corporations with higher accounting conservatism obtain more trade credit and that accounting conservatism has a greater influence on trade credit under tight monetary policy. Furthermore, the backgrounds of the supplier and customer influence the positive relationship between accounting conservatism and trade credit. This influence is more evident when a company is privately owned and has greater market power, and less evident when the supplier or customer is the controlling shareholder.

1. Introduction

As a basic feature of accounting reporting, the main role of accounting conservatism is to promote the signing of debt contracts by preventing an enterprise from over-reporting its assets and thus damaging the interests of creditors (Watts, 2003; Jiang and Zhang, 2007). The creditors of an enterprise are mainly banks and trading partners (i.e. suppliers and customers), so two types of debt contracts exist: bank credit contracts and trade credit contracts.

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Previous studies focus on the effect of accounting conservatism on bank credit (Zhang, 2008; Rao and Jiang, 2011; Zhu, 2011; Cheng and Liu, 2013), with less attention being paid to trade credit (Hui et al., 2012). However, trade credit is widely used in both developed and developing countries. In the UK, for example, trade credit accounts for 70% of short-term debt and 55% of credit loans (Kohler et al., 2000). Rajan and Zingales (1995) show that on average, trade credit accounted for 17.8% of the total assets of American companies in 1991, and for over 25% of those of their German, Italian and French counterparts. Although China's financial system is not sound, trade credit plays a decisive role in its national economy.

Focusing on accounting conservatism and changes in monetary policy, we investigate how these two elements affect trade credit and discuss the different effects of accounting conservatism on trade credit for trading parties with different backgrounds.

Specifically, we aim to answer the following questions. First, do accounting conservatism policies affect trade credit financing? The literature on trade credit is currently based mainly on the theories of alternative financing and market power. From the perspective of demand, the theory of alternative financing holds that credit rationing prevents some companies from obtaining sufficient bank lending. They therefore turn to trade credit financing, despite having to bear the higher costs of trade credit (Petersen and Rajan, 1997; Biais and Gollier, 1997). From the supply perspective, market power theory considers that due to market power, suppliers (customers) will take the initiative to provide a large amount of low-cost trade credit to a company to promote sales (supplies) (Summers and Wilson, 1999; Fisman and Raturi, 2004; Van Horen, 2005). Regardless of what theory applies, a company seeking trade credit needs to sign a debt contract with a supplier or a customer. Hui et al. (2012) argue that as accounting conservatism can recognize losses in a timely fashion, it can protect the interests of customers and suppliers when signing contracts and reduce potential losses from such transactions. We therefore examine whether companies with higher accounting conservatism obtain more trade credit.

Second, how does accounting conservatism influence trade credit when monetary policy changes? In a period of tight monetary policy, the problem of credit discrimination, or credit rationing, becomes worse and it becomes harder for companies to obtain bank loans. Meanwhile, suppliers or customers become more cautious about providing trade credit because of increasing uncertainty in the economic environment. We therefore investigate whether accounting conservatism has a greater effect on obtaining trade credit when the demand for trade credit increases and the supply reduces. Third, does accounting conservatism have different effects on trade credit for trading parties with different backgrounds? Previous studies find that enterprises with different levels of market power and different types of ownership obtain trade credit differently (Lu and Yang, 2011; Zhang et al., 2012), and that the contractual relationship in transactions between related parties can affect the choice of trade credit mode (Liu et al., 2009). We therefore investigate whether the different backgrounds of companies and their suppliers or customers affect the relationship between accounting conservatism and trade credit.

To test these research questions, we use data for Chinese listed companies during 2003–2012. First, we find that companies with higher accounting conservatism obtain more trade credit. Second, accounting conservatism has a greater effect on trade credit under tight monetary policy. Third, the positive relationship between accounting conservatism and trade credit is related to the backgrounds of the supplier and the customer. The influence on this positive relationship is most marked when a company is privately owned and has greater market power, and less evident when a supplier or customer is the controlling shareholder.

The contributions of this paper are as follows. First, previous research on trade credit focuses on the motives for trade credit, but we explore the operational mechanism of accounting conservatism, a factor in obtaining trade credit, from the perspective of debt contracting. Second, with respect to monetary policy, we investigate the effect of accounting conservatism on trade credit under different monetary policies, which enriches the literature on macro-economic policy and micro-enterprise behavior. Finally, taking the different backgrounds of the parties into account, we discuss the joint effect of corporate characteristics, associated relationships and accounting conservatism in the contracting process, which expands the research on trade credit.

The rest of this paper is structured as follows. The second section briefly outlines the previous research with respect to trade credit and accounting conservatism, and outlines our research hypotheses; the third section explains the process of sample selection and the establishment of the model; the fourth section presents the

research results and empirical analysis; the fifth section further discusses the results of sub-samples according to the different backgrounds of trading parties; and the sixth section provides the conclusions.

2. Literature review and research hypotheses

2.1. Accounting conservatism and trade credit

Accounting earnings information plays an important role in the process of signing contracts between enterprises and suppliers or customers. According to Williamson (1979), transactions can be divided into discrete transactions, long-term transactions and relational transactions. A discrete transaction involves a one-time contract, and the rights and obligations of the parties to the contract can be clearly defined. In a long-term transaction the contract is long-term and incomplete, and cannot cover all future uncertainties. In a relational transaction the contract is also long-term and involves special investment. From the perspective of reducing transaction costs, transactions between enterprises and suppliers or customers are usually long-term or relational transactions. Due to the incompleteness of long-term contracts, firms are more likely to adopt opportunistic behavior. In particular, in relational transactions in which the suppliers and customers often require special asset investment, if the company cancels the transaction because of financial difficulties or other reasons, the suppliers and customers will incur high switching costs (Hui et al., 2012). Suppliers and customers are able to observe very recent changes in the operating conditions of a company through their business dealings, so have information advantages over banks and other credit institutions (Lu and Yang, 2011). However, with respect to opportunity costs and sunk costs in long-term transactions, suppliers and customers still consider a company's overall profitability when judging the prospects for long-term cooperation with that enterprise and when deciding whether or not to trade with a particular company or what type of transaction to provide to that company.

As suppliers and customers, unlike shareholders, are the main creditors in trade credit transactions, their profit function is asymmetric. That is, they bear the risk of enterprise bankruptcy but do not gain any appreciation in the value of assets, which leads them to pay greater attention to bad news regarding a company's performance than to good news. Meanwhile, company managers have an information advantage over other stakeholders and tend to hide any bad news for reasons of self-interest. The interests of suppliers and customers will thus be damaged through information asymmetry when managers report relatively little relating to bad news for a company.

How, then, can the interests of suppliers and customers be protected in a transaction? Hui et al. (2012) confirm that accounting conservatism is one feasible mechanism for providing such protection. The conservatism principle stipulates that an enterprise cannot recognize a potential benefit, but should recognize a potential loss in a timely fashion (Basu, 1997). Accordingly, the interests of suppliers and customers can be protected through the following two mechanisms.

First, by inhibiting excessive investment and insufficient investment, accounting conservatism can improve the future profitability of a company, ensuring long-term cooperation with its suppliers and customers. Accounting conservatism results in investment losses being reflected in management reporting as soon as possible, so that shareholders receive timely signals that the net present value of an investment project is negative, which inhibits excessive investment (Ball and Shivakumar, 2005). At the same time, accounting conservatism can help to alleviate underinvestment by reducing the financing costs of the enterprise (Garcia Lara et al., 2011). As a result, the higher the accounting conservatism of a company, the higher the company's future profitability, and the lower the possibility of future special project expenditure (Ahmed and Duellman, 2011). A higher profitability for a company can ensure sustainable cooperation relationships with suppliers and customers, who are then willing to provide more trade credit to that company based on the expectation of future long-term cooperation.

Second, accounting conservatism can help suppliers and customers to promptly identify poor performance by a company. Taking loan contracts as the object of study, Zhang (2008) concludes that higher accounting conservatism makes it easier for companies to violate restrictive clauses in debt contracts, and helps creditors to promptly enforce or re-sign contracts. Therefore, the higher the accounting conservatism, the lower the loan interest rate paid by the company. Similarly, accounting conservatism can also reduce information asymmetry,

protect the interests of suppliers and customers to a greater extent, and help both parties to a contract to establish cooperative relations with mutual trust, such that suppliers and customers are willing to accept a certain degree of risk and provide more trade credit. Conversely, if a company's accounting reports are less conservative and the interests of suppliers and customers cannot be protected, the payment terms required by the suppliers and customers will be more stringent because they wish to protect their own interests and safely control risk. Accordingly, they will not provide a large amount of trade credit.

Based on the above analysis, we propose the following hypothesis:

H1. Corporations with higher accounting conservatism obtain more trade credit.

2.2. Monetary policy, accounting conservatism and trade credit

Monetary policy is important to governments as a means of intervening in and adjusting the macroeconomy. When monetary policy changes from loose to tight, enterprises face a different macroeconomic environment. The behavior of enterprises, creditors and shareholders may therefore also change (Gertler and Gilchrist, 1994). The effect of monetary policy on a micro-enterprise is first reflected in changes in the information environment. During a period of monetary tightening, the degree of future information uncertainty that companies will face increases. Using panel data for listed companies in the UK for 1970–1990, Beaudry et al. (2001) find that in the 1980s, frequent changes in monetary policy led to the total variance of investment in listed corporations being significantly smaller than that in the 1970s. This reflects the characteristic that enterprise investment behavior tends to be uniform when facing uncertainty due to monetary policy.

Due to imperfections in the capital market, the problem of information asymmetry and related contract cost is common within actual economic operations. Banks play an irreplaceable role in alleviating information asymmetry, dispersing risk and reducing transaction costs in the credit market. Monetary policy can influence the availability of bank credit, and accordingly affect the behavior of enterprises, creditors and shareholders. Much empirical literature provides evidence that a tight monetary policy affects corporate financing. The literature indicates that a tight monetary policy reduces the funds available to banks to loan out, increases the difficulty of obtaining loans and as a result affects the investments made by enterprises (Kashyap et al., 1993; Ye and Zhu, 2009). In addition, increasing loan interest rates raises the capital cost to the enterprise (Mojon et al., 2002). In China, financing channels for enterprises are relatively less common than in other countries, and bank loans represent the main financing channel. At the same time, banking in China is very vulnerable to the actions and regulations of the government. As the People's Bank of China tightens monetary policy by raising the deposit reserve rate, the benchmark interest rate and the discount rate, the real economy is affected through the credit channel, reflected specifically in a significant reduction in the amount of corporate credit financing (Ye and Zhu, 2009). Accordingly, under a tight monetary policy, an enterprise's external financing costs increase, the scale of external financing is limited and the problem of credit rationing worsens.

The worsening of credit rationing makes it difficult for an enterprise to obtain bank credit financing, and it becomes more dependent on trade credit financing. As the demand for trade credit increases while the funds available decrease due to the tight monetary policy, trade credit becomes a scarce resource. In such a period of monetary tightening, suppliers and customers, as providers of trade credit, will be more concerned about whether the assets of the enterprise can pay off debt. They will thus require a more conservative corporate accounting policy to enable them to adjust credit policies sooner. Under this premise, relative to a period of monetary easing, suppliers and customers in a period of monetary tightening will be more willing to provide trade credit for enterprises with higher accounting conservatism, and trade credit will then flow more intensively into these enterprises.

Based on the above analysis, we propose the following hypothesis:

H2. During a period of monetary tightening, corporations with higher accounting conservatism obtain more trade credit.

3. Research design

3.1. Sample and data

Using A-share listed companies in China during 2003–2012 as the basis and after removing companies in the financial industry and companies with missing data, the sample comprises 12,121 firm-year observations of 1880 companies. Data on corporate governance are from the CCER database and other data are from the CSMAR database. All observations in the top 1% and bottom 1% for continuous variables are winsorized to control for outliers, and *t*-values are clustered at the firm level.

3.2. Research design

3.2.1. Trade credit (TC)

With reference to Lu and Yang (2011) and Zhang et al. (2012), the following formula is used to calculate TC: TC = (accounts payable + notes payable + advances from customers)/total assets.

3.2.2. Accounting conservatism (C-Score)

New or improved methods have appeared regularly since Basu (1997) used the inverse regression method to measure accounting conservatism, such as the accruals/cash-flows regression method of Ball and Shivakumar (2005), the accrual measure of Givoly and Hayn (2000), the measure of Beaver and Ryan (2000) based on the book-to-market ratio, and the C-Score method of Khan and Watts (2009). As our analysis requires a firm-year measure of accounting conservatism, the C-Score method is adopted. The C-Score is calculated as follows:

$$\begin{aligned}\frac{X_{i,t}}{P_{i,t-1}} &= \beta_0 + \beta_1 \mathrm{DR}_{i,t} + (\mu_1 + \mu_2 \mathrm{SIZE}_{i,t} + \mu_3 \mathrm{MB}_{i,t} + \mu_4 \mathrm{LEV}_{i,t}) \times \mathrm{RET}_{i,t} \\ &\quad + (\lambda_1 + \lambda_2 \mathrm{SIZE}_{i,t} + \lambda_3 \mathrm{MB}_{i,t} + \lambda_4 \mathrm{LEV}_{i,t}) \times \mathrm{DR}_{i,t} \times \mathrm{RET}_{i,t} + \beta_4 \mathrm{SIZE}_{i,t} + \beta_5 \mathrm{MB}_{i,t} + \beta_6 \mathrm{LEV}_{i,t} \\ &\quad + \beta_7 \mathrm{DR}_{i,t} \times \mathrm{SIZE}_{i,t} + \beta_8 \mathrm{DR}_{i,t} \times \mathrm{MB}_{i,t} + \beta_9 \mathrm{DR}_{i,t} \times \mathrm{LEV}_{i,t} \\ \text{G-Score} &= \beta_2 = \mu_1 + \mu_2 \mathrm{SIZE}_{i,t} + \mu_3 \mathrm{MB}_{i,t} + \mu_4 \mathrm{LEV}_{i,t} \\ \text{C-Score} &= \beta_3 = \lambda_1 + \lambda_2 \mathrm{SIZE}_{i,t} + \lambda_3 \mathrm{MB}_{i,t} + \lambda_4 \mathrm{LEV}_{i,t}\end{aligned}$$

$\frac{X_{i,t}}{P_{i,t-1}}$ is firm *i*'s earnings per share divided by its stock price at the beginning of year *t*, adjusted by the annual mean of the sample. $\mathrm{RET}_{i,t}$ is the stock return of firm *i* minus the market return in year *t* (from May in year *t* to April in year $t+1$). $\mathrm{DR}_{i,t}$ is a dummy for the stock return of firm *i* in year *t*, which equals 1 when $\mathrm{RET}_{i,t} \geqslant 0$, and 0 otherwise. $\mathrm{SIZE}_{i,t}$ is the logarithm of total assets. $\mathrm{MB}_{i,t}$ is the book-to-market ratio, which is firm *i*'s total market value divided by its book value for owners' equity at the end of year *t*. $\mathrm{LEV}_{i,t}$ is the ratio of total liabilities to total assets.

C-Score measures the timeliness of bad news (i.e. the level of conservatism). The higher the value of C-Score, the higher the degree of accounting conservatism.

3.2.3. Tight monetary policy (MP)

Based on the work of the Macro Group, CCER, PKU (2008), monetary liquidity can be measured on three bases: excess money, money stock and the interest rate in the short-term lending market. The measures based on excess money include the situation in which the money growth rate exceeds the nominal GDP growth rate (Baks and Kramer, 1999), and that in which the money growth rate exceeds the actual GDP growth rate and the price increase rate (Yi, 1991). The measures based on money stock include the growth rate of *M*2, the difference in the growth rates of *M*1 and *M*2 and the ratio of *M*1/*M*2. The measures based on the interest rate in the short-term lending market include the one-year lending rate (Li and Wang, 2011), the bond spread and so on.

Of these measurement bases, only the first takes money demand into account. According to a general economic analysis, there will be excess monetary liquidity if the supply of money is greater than the demand, and a shortage of money liquidity when the supply of money is less than the demand. Accordingly, the first measurement basis is adopted here.

We use the nominal GDP growth rate to measure the currency required for economic development, and the *M*2 growth rate to measure the supply of money. Thus, the difference between the nominal GDP growth rate and the *M*2 growth rate reflects the degree of monetary liquidity shortage. If the difference is positive, this indicates that the current money supply is insufficient and a period of monetary tightening applies, and MP = 1; if the difference is negative, this indicates that the current money supply is adequate and a period of monetary easing applies, and MP = 0 (Li and Wang, 2011). The differences between the nominal GDP growth rate and the *M*2 growth rate are −0.079, 0.033, −0.023, 0.013, 0.061, 0.004, −0.199, −0.012, 0.005 and −0.045 from 2003 to 2012. Therefore, 2004, 2006, 2007, 2008 and 2011 are defined as monetary tightening periods, while the other years are defined as monetary easing periods.

3.2.4. Control variables

The control variables are CFO, LIQ, LOAN, AGE, SIZE, EBIT, GROWTH, MPOWER, STATE and GOVINDEX.

For those demanding trade credit, the adequacy of internal cash flows and the availability of bank loans are important factors affecting trade credit financing, according to pecking order theory and alternative financing theory. Therefore, we use CFO (net cash flow from operating activities/total assets) to measure an enterprise's ability to generate cash, LIQ (current assets/total assets) to measure the liquidity ratio and LOAN (bank loans/total assets) to measure the proportion of bank loans to total assets.

Those supplying trade credit will take a firm's establishment age (AGE), size (SIZE), profitability (EBIT) and growth ability (GROWTH) into account when providing trade credit.

In addition, the amount of trade credit that an enterprise obtains reflects its bargaining power in the industry. The stronger the market position, the more trade credit may be obtained (Fisman and Raturi, 2004; Zhang et al., 2012). MPOWER is used to measure the market position of an enterprise. If the market share of the enterprise, that is, the ratio of the firm's sales revenue to the industry's sales revenue, is greater than the industry median, then MPOWER equals 1, and 0 otherwise.

The existing literature shows that the amount of trade credit obtained by state-owned enterprises is significantly higher than for non-state-owned enterprises, because state-owned enterprises have good credit ratings and no constraints on financing (Liu et al., 2009; Lu and Yang, 2011). Thus, STATE is used to control for the effect of the nature of firm ownership, which equals 1 if a firm is state-owned, and 0 otherwise.

Finally, the effect of corporate governance is also controlled for in our analysis. With reference to the approach of Bai et al. (2005) and Zhang and Lu (2012), we use the shareholding ratio of the first major shareholder (TOP1), the ownership concentration from the second to the tenth shareholders (Cstr2_10), the shareholding ratio of senior management (Mana), whether the board chairman and the CEO are the same person (Dual), the proportion of independent directors on the board (Indratio), whether there is a listing in the B-share or H-share market at the same time (HB_share, which equals 1 if listed at the same time, and 0 otherwise) and whether there is ownership by a parent company (Parent, which equals 1 if owned, and 0 otherwise) to construct a corporate governance index through the method of principal component analysis.[1] The first principal component obtained from the analysis is defined as an indicator of corporate governance level, GOVINDEX. Specific definitions of the variables are given in Table 1.

3.3. The empirical model

To analyze whether accounting conservatism affects an enterprise's trade credit financing behavior, and to test the effect of accounting conservatism on trade credit under different monetary policies, we use the following models[2]:

[1] Bai et al. (2005) also consider the nature of firm ownership when constructing a corporate governance index. Previous studies find that the amount of trade credit obtained by state-owned enterprises is significantly higher than for non-state-owned enterprises, and the direction of this influence is not consistent with the directions of the other corporate governance factors for trade credit; thus, we examine the nature of firm ownership alone.

[2] To avoid the problem of endogeneity, we use lagged C-Score values in the model to measure accounting conservatism. The results are not affected if current C-Score values are used.

Table 1
Variable definitions.

Type	Symbol	Name	Definition
Explained variable	TC	Trade credit	(Accounts payable + notes payable + advances from customers)/ total assets
Explanatory variable	C-Score	Accounting conservatism	Measured using the C-Score method (Khan and Watts, 2009)
	MP	Tight monetary policy	If $\triangle GDP/GDP_{t-1} - \triangle M2/M2_{t-1} > 0$, then MP = 1; otherwise MP = 0
Controlled variable	MPOWER	Market power	If a company's market share (sales revenue/entire industry sales revenue) is greater than the industry median, MPOWER = 1. Otherwise, MPOWER = 0
	STATE	Nature of firm ownership	If a company is state-owned, STATE = 1. Otherwise, STATE = 0
	LOAN	Bank loan	(Short-term loans + long-term loans)/total assets
	AGE	Age of the company	The natural logarithm of the years since the company was established
	SIZE	Scale of the company	The natural logarithm of total assets at the end of the year
	CFO	Cash flows of operating	Net cash flows from operating activities/total assets
	LIQ	Current assets	Current assets/total assets
	EBIT	Profitability	Earnings before interest and tax/total assets
	GROWTH	Growth rate	(Operating income for the year − operating income for the previous year)/operating income for the previous year
	GOVINDEX	Index of corporate governance	The first principal component obtained through the method of principal component analysis using the following seven variables: the shareholding ratio of the first major shareholder (TOP1), the ownership concentration from the second to the tenth shareholders (Cstr2_10), the shareholding ratio of senior management (Mana), whether the board chairman and the CEO are the same person (Dual), the proportion of independent directors on the board (Indratio), whether there is a listing in the B-share or H-share market at the same time (HB_share) and whether or not there is ownership by a parent company (Parent).
	YEAR	Year	Year dummy variables
	IND	Industry	Industry dummy variables

$$TC_{i,t} = \beta_0 + \beta_1 \text{C-Score}_{i,t-1} + \sum \beta_n \text{Controlvariables}_{i,t} + \varepsilon_{i,t} \quad (1)$$

$$TC_{i,t} = \beta_0 + \beta_1 \text{C-Score}_{i,t-1} + \beta_2 MP_{i,t} + \beta_3 MP_{i,t} \times \text{C-Score}_{i,t-1} + \sum \beta_n \text{Controlvariables}_{i,t} + \varepsilon_{i,t} \quad (2)$$

If H1 is supported, the coefficient for C-Score, β_1, should be significantly positive. In addition, β_3 should also be significantly positive if H2 is supported.

4. Empirical analysis

4.1. Descriptive statistics

Table 2 lists the descriptive statistics for all of the variables. The mean of trade credit is 16.9% and the median is 13.8%. The mean and median of C-Score are 0.043 and 0.030 respectively, implying that the sample companies implemented conservative accounting policies during 2003–2012. The mean of monetary policy (MP) is 48.1% and the standard deviation is 50%, showing that the observations are relatively uniform under tight monetary policy and loose monetary policy. The maximum and minimum of SIZE are 25.33 and 19.41 respectively, and the maximum and minimum of EBIT are 0.232 and −0.275 respectively, which are reasonable.

Table 3 gives the correlations between the variables. There is a significant positive correlation between TC and C-Score, showing that the higher an enterprise's accounting conservatism, the more trade credit it obtains. The relationship between TC and C-Score is consistent with our expectations. The correlations of TC with

Table 2
Descriptive statistics.

Variables	N	Mean	Min	$Q1$	Median	$Q3$	Max	Std
TC	12,121	0.169	0.005	0.074	0.138	0.232	0.581	0.125
C-Score	12,121	0.043	−0.114	−0.002	0.030	0.078	0.286	0.077
MP	12,121	0.481	0	0	0	1	1	0.500
MPOWER	12,121	0.555	0	0	1	1	1	0.497
STATE	12,121	0.652	0	0	1	1	1	0.477
LOAN	12,121	0.218	0	0.091	0.211	0.324	0.641	0.154
AGE	12,121	2.808	1.099	2.639	2.833	2.996	3.555	0.273
SIZE	12,121	21.70	19.41	20.89	21.57	22.33	25.33	1.145
CFO	12,121	0.050	−0.201	0.007	0.049	0.094	0.265	0.079
LIQ	12,121	0.526	0.081	0.368	0.533	0.684	0.956	0.211
EBIT	12,121	0.051	−0.275	0.028	0.051	0.080	0.232	0.069
GROWTH	12,121	0.196	−0.671	−0.007	0.140	0.313	2.726	0.433
GOVINDEX	12,121	−0.222	−2.309	−1.012	−0.375	0.357	4.637	1.219

MPOWER and STATE are also significantly positive, indicating that companies with a strong market position or state ownership obtain more trade credit. The relationship between LOAN and TC is significantly negative, implying that if an enterprise can obtain more loans from banks, it will reduce its demand for trade credit, thus confirming financing substitution theory.

4.2. Regression analysis

4.2.1. Accounting conservatism and trade credit

First, we investigate the effect of accounting conservatism on trade credit, with the results of the regression analysis provided in Table 4.

In regression (1), we use TC_t, i.e. (accounts payable + notes payable + advances from customers)/total assets, as the dependent variable. The coefficient for C-$Score_{t-1}$ is 0.379, which is significantly positive at the 1% level, suggesting that the higher the accounting conservatism, the more trade credit is obtained from the supplier and the customer. High accounting conservatism can reduce the degree of information asymmetry to more effectively protect the interests of suppliers and customers, and help trading parties to establish cooperative relations with mutual trust, such that the supplier and the customer are willing to accept a certain degree of risk and provide more trade credit. Thus, hypothesis 1 is confirmed.

The coefficient for $MPOWER_t$ is significantly positive, indicating that enterprises with stronger market positions can obtain more trade credit. The coefficient for $STATE_t$ is significantly positive, indicating that state-owned enterprises can obtain significantly more trade credit than private enterprises. The relationship between LOAN and TC is significantly negative, showing that the more bank credit obtained, the less trade credit obtained. There is a specific substitution relationship between bank credit and trade credit, in line with the theory of financing substitution.

4.2.2. Monetary policy, accounting conservatism and trade credit

We further investigate the effect of accounting conservatism on trade credit in the context of monetary policy changes. The results of this regression analysis after adding $MP_t \times$ C-$Score_{t-1}$ to the model are provided in Table 4.

The results of regression (2) show that C-$Score_{t-1}$ is still significantly positive and $MP_t \times$ C-$Score_{t-1}$ is too, indicating that accounting conservatism is more important under tight monetary policy. In a period of monetary tightening, trade credit becomes a type of scarce resource. Thus, suppliers or customers become more cautious about providing trade credit due to increasing uncertainty in the economic environment. In this situation, an enterprise with a higher level of accounting conservatism has more advantages in terms of obtaining trade credit provided by suppliers or customers. That is, relative to a period of monetary easing, suppliers and customers are more willing to provide trade credit to enterprises with higher accounting conservatism in a period of monetary tightening. Thus, hypothesis 2 is confirmed.

Table 3
Correlation matrix.

	TC	C-Score	MP	MPOWER	STATE	LOAN	AGE	SIZE	CFO	LIQ	EBIT	GROWTH	GOVINDEX
TC		0.129***	0	0.276***	0.030***	−0.133***	−0.026***	0.159***	−0.038***	0.451***	−0.074***	0.112***	−0.031***
C-Score	0.133***		0.206***	−0.030***	0	0.264***	0.127***	−0.128***	−0.081***	0.048***	−0.170***	−0.037***	0.028***
MP	0	0.160***		0.008	0.033***	0.041***	0.045***	−0.036***	−0.021**	−0.028***	0.035***	0.073***	−0.014
MPOWER	0.264***	−0.054***	0.008		0.182***	0.071***	0.001	0.641***	0.110***	0.041***	0.198***	0.182***	−0.218***
STATE	0.045***	−0.012	0.033***	0.182***		0.036***	0.075***	0.219***	0.049***	−0.170***	−0.052***	0.041***	−0.732***
LOAN	−0.195***	0.277***	0.037***	0.059***	0.035***		0.124***	0.142***	−0.189***	−0.265***	−0.237***	0	−0.032***
AGE	−0.004	0.146***	0.074***	0.027***	0.117***	0.149***		−0.003	−0.031***	−0.072***	−0.106***	−0.075***	−0.041***
SIZE	0.168***	−0.157***	−0.043***	0.596***	0.226***	0.123***	−0.027***		0.055***	−0.079***	0.176***	0.140***	−0.260***
CFO	−0.003	−0.078***	−0.023**	0.099***	0.054***	−0.204***	−0.029***	0.050***		−0.232***	0.407***	0.119***	−0.041***
LIQ	0.462***	0.054***	−0.027***	0.041***	−0.174***	−0.264***	−0.081***	−0.090***	−0.224***		−0.007	0.045***	0.137***
EBIT	−0.051***	−0.207***	0.021**	0.197***	−0.016*	−0.296***	−0.112***	0.189***	0.376***	0.029***		0.327***	0.037***
GROWTH	0.094***	−0.043***	0.043***	0.136***	0.008	−0.009	−0.027***	0.113***	0.083***	0.063***	0.263***		−0.035***
GOVINDEX	−0.033***	−0.005	−0.036***	−0.203***	−0.671***	−0.067***	−0.221***	−0.236***	−0.043***	0.152***	0.029***	−0.012	

Spearman correlations are provided in the upper right of the table and Pearson correlations to the lower left.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

Table 4
Monetary policy, accounting conservatism and trade credit.

Variables	TC_t (1)	TC_t (2)
C-Score$_{t-1}$	0.379***	0.178***
	(17.97)	(10.71)
MP$_t$ × C-Score$_{t-1}$		0.162***
		(8.56)
MP$_t$		−0.007***
		(−5.09)
MPOWER$_t$	0.047***	0.043***
	(10.79)	(10.00)
STATE$_t$	0.013***	0.012**
	(2.60)	(2.46)
LOAN$_t$	−0.167***	−0.156***
	(−11.91)	(−11.38)
AGE	0.009	0.008
	(1.29)	(1.15)
SIZE$_t$	0.018***	0.019***
	(7.16)	(8.73)
CFO$_t$	0.162***	0.160***
	(9.46)	(9.29)
LIQ$_t$	0.250***	0.256***
	(22.15)	(22.24)
EBIT$_t$	−0.392***	−0.373***
	(−15.66)	(−14.88)
GROWTH$_t$	0.023***	0.024***
	(9.50)	(10.08)
GOVINDEX$_t$	−0.001	0.000
	(−0.52)	(0.16)
Year	Yes	No
Industry	Yes	Yes
Cluster at firm level	Yes	Yes
N	12,121	12,121
Adj. R^2	0.449	0.432

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-statistics are provided in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

5. Further discussion

5.1. Different company types: according to ownership and market position

Based on the alternative financing theory, companies that cannot obtain bank loans have to turn to trade credit, which mainly occurs for private enterprises in China. The existing research shows that China's banks exhibit clear "credit discrimination" against enterprises on the basis of ownership, with state-owned

enterprises enjoying more preferential credit policies (Lu et al., 2009; Jiang and Li, 2006). Even setting "ownership discrimination" aside, financial institutions demand higher interest rates or impose stiffer conditions for small and medium enterprises, and may even refuse to provide loans to avoid adverse selection and moral hazard, because the financial institutions are unable to fully appreciate the true situation of these enterprises. A survey suggests that guarantees, mortgages, financial transparency, corporate operating performance and other practical problems continue to restrict the financing of small businesses (Research Group of Center for Chinese Banking Studies in Central University of Finance and Economics, 2007). This prompts private enterprises to turn to suppliers or customers. Suppliers are willing to provide trade credit because they can detect changes in a company's operation and credit situation in a timely fashion, and are able to encourage the company to abide by a contract through taking control of raw materials. However, in this case the cost of trade credit is generally high, most likely because the supplier requires the company to pay an insurance premium and a default premium to alleviate risk (Cunat, 2007). Thus, relative to state-owned enterprises, improving accounting conservatism may help a private enterprise to obtain trade credit.

Based on the market power theory, a company with a stronger market position will encourage suppliers or customers to take the initiative to provide trade credit, to promote sales or obtain supplies. However, suppliers or customers have no control over the company's products or channels due to the company's buyer market power over suppliers and seller market power over customers. In addition, individual suppliers or customers are unable to detect changes in the company's operating conditions because the individual business volumes are too small. Therefore, suppliers and customers take advantage of accounting conservatism to provide protection for a trade credit contract. For a company with a strong market position, therefore, higher accounting conservatism provides greater benefits for suppliers and customers and makes more trade credit available to the company.

The overall sample is divided into four according to ownership and market position: state-owned enterprises with a weak market position, private enterprises with a weak market position, state-owned enterprises with a strong market position, and private enterprises with a strong market position. Using state-owned enterprises with a weak market position as the benchmark, the importance of accounting conservatism for different ownership and market position is examined.

In Table 5, $\text{COMPANY}_{\text{MPOWERt=0,STATEt=0}}$ represents private enterprises with a weak market position, $\text{COMPANY}_{\text{MPOWERt=1,STATEt=1}}$ represents state-owned enterprises with a strong market position and $\text{COMPANY}_{\text{MPOWERt=1,STATEt=0}}$ represents private enterprises with a strong market position. The coefficient for C-Score_{t-1} indicates the effect of accounting conservatism on trade credit for state-owned enterprises with a weak market position. The coefficients for the three interactions with C-Score_{t-1} indicate, relative to state-owned enterprises with a weak market position, the incremental effects of accounting conservatism on trade credit for the other three company types.

The results show that the coefficient for C-Score_{t-1} is significantly positive, as are the coefficients for $\text{COMPANY}_{\text{MPOWERt=1,STATEt}=1} \times \text{C-Score}_{t-1}$ and $\text{COMPANY}_{\text{MPOWERt=1,STATEt=0}} \times \text{C-Score}_{t-1}$, in a period of monetary easing. Conversely, in a period of monetary tightening, only the coefficients for C-Score_{t-1} and $\text{COMPANY}_{\text{MPOWERt=1,STATEt=0}} \times \text{C-Score}_{t-1}$ are significantly positive. This shows that even for state-owned enterprises with a weak market position, accounting conservatism is also significantly positive with respect to trade credit, and this positive correlation is particularly significant for private enterprises with a strong market position, especially under tight monetary policy.

5.2. Relationship between trading parties: related party vs. non-related party

In both alternative financing theory and market power theory, it is implicitly assumed that an independent relationship exists between a company and its suppliers or customers. Therefore, when suppliers or customers provide trade credit to the company, they will consider the company's size, profitability, development prospects, ownership type, accounting information quality and so on, to ensure the protection of their interests. In practice, the company may have an associated relationship with the counterparty. A supplier may be the company's parent company or subsidiary, or be controlled by the same parent company. Given the existence of such a relationship, the trading parties may have different motives when providing trade credit to the company.

Table 5
Monetary policy, accounting conservatism and trade credit: different company types.

Variables	TC_t Full sample (1)	TC_t Under loose monetary policy (2)	TC_t Under tight monetary policy (3)
$C\text{-}Score_{t-1}$	0.325***	0.281***	0.411***
	(10.67)	(8.46)	(9.28)
$COMPANY_{MPOWERt=0,STATEt=0} \times C\text{-}Score_{t-1}$	−0.010	−0.026	−0.009
	(−0.27)	(−0.62)	(−0.17)
$COMPANY_{MPOWERt=1,STATEt=1} \times C\text{-}Score_{t-1}$	0.106***	0.120***	0.080
	(2.85)	(2.91)	(1.59)
$COMPANY_{MPOWERt=1,STATEt=0} \times C\text{-}Score_{t-1}$	0.175***	0.170***	0.148**
	(3.31)	(2.70)	(2.05)
$MPOWER_t$	0.041***	0.040***	0.043***
	(9.13)	(8.56)	(8.43)
$STATE_t$	0.014***	0.015***	0.012**
	(2.69)	(2.90)	(2.08)
$LOAN_t$	−0.167***	−0.161***	−0.178***
	(−11.93)	(−11.34)	(−11.16)
AGE_t	0.009	0.014**	−0.001
	(1.35)	(2.20)	(−0.12)
$SIZE_t$	0.018***	0.019***	0.017***
	(7.26)	(7.54)	(6.20)
CFO_t	0.163***	0.185***	0.141***
	(9.53)	(8.42)	(6.18)
LIQ_t	0.249***	0.245***	0.251***
	(22.16)	(21.60)	(20.06)
$EBIT_t$	−0.395***	−0.413***	−0.376***
	(−15.85)	(−14.06)	(−12.52)
$GROWTH_t$	0.023***	0.022***	0.024***
	(9.48)	(6.58)	(7.00)
$GOVINDEX_t$	−0.001	−0.001	−0.000
	(−0.54)	(−0.73)	(−0.02)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Cluster at firm level	Yes	Yes	Yes
N	12,121	6286	5835
Adj. R^2	0.451	0.448	0.456

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-statistics are provided in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

Liu et al. (2009) contend that it is easy to develop trust between related enterprises through a contractual relationship, and that this type of relational trust may affect the choice of trade credit mode. Hong and Fang (2005) and Tong and Cheng (2007) also hold that the controlling shareholder of a listed corporation may exhibit supportive or tunneling behavior depending on the circumstances. By making supportive decisions, controlling shareholders can improve the stability of the company's earnings and thus improve the value of the

company. Therefore, based on a trust relationship, suppliers or customers may place less value on accounting conservatism and other operating features when providing trade credit. They may even offer trade credit to the company for supportive purposes, such as to help the company get through a period of financial strain.

Hence, we examine the effect of related transactions on the acquisition of trade credit. From the full sample we identify 7460 firm-year observations involved in related transactions, and divide trade credit into controlling shareholder trade credit, other related party trade credit and non-related party trade credit.[3] Descriptive statistics show that the mean of overall trade credit is 18.4%, and the means of non-related party trade credit and related party trade credit are 17.1% and 1.3%, respectively. For related party trade credit, trade credit obtained from controlling shareholders and from other related parties averages 0.2% and 0.9%, respectively. With respect to scale, the amount of related party trade credit is far less than that of non-related party trade credit, and the amount of controlling shareholder trade credit is also lower than that of other related party trade credit.

Through regression analysis, we find significantly different results for controlling shareholder trade credit, related party trade credit and non-related party trade credit. In Table 6, the results are similar to Table 4 when non-related party trade credit is used as the dependent variable. The coefficients for C-Score$_{t-1}$ and MP$_t$ × C-Score$_{t-1}$ are significantly positive, while that for MP$_t$ is negative. These results indicate that the higher the accounting conservatism, the more trade credit is available from non-related parties, and this is especially significant in a period of monetary tightening. When related party trade credit is used as the dependent variable, the coefficient for C-Score$_{t-1}$ is still significantly positive while those for MP$_t$ × C-Score$_{t-1}$ and MP$_t$ are not significant, indicating that although accounting conservatism has an effect on the trade credit available from other related parties, this effect is not pronounced in a period of monetary tightening. When controlling shareholder trade credit is used as the dependent variable, the coefficients for C-Score$_{t-1}$ and MP$_t$ - × C-Score$_{t-1}$ are not significant and that for MP$_t$ is significantly positive at the 10% level. These results show that controlling shareholders do not focus on accounting conservatism, and even enhance their support of the company by loosening their credit policy during periods of monetary tightening.

5.3. Sensitivity testing

5.3.1. Endogeneity problem

In Hui et al. (2012), the bargaining power of an enterprise with respect to a supplier decides the level of accounting conservatism, but our results show that accounting conservatism influences trade credit provided by the supplier. This finding may indicate that there is a bi-directional association between accounting conservatism and trade credit, namely that accounting conservatism may be related to the residual term. As a company's accounting conservatism may remain stable over a period, merely lagging accounting conservatism may not solve the problem completely. To control for this endogeneity problem relating to accounting conservatism in H1, a company's short-term debt-paying ability (CR) is used as an instrumental variable to carry out two-stage least-squares regression and the results continue to support H1.

The instrumental variable is selected according to Petersen and Rajan (1997). They hold that when a supplier provides business credit, the main consideration is the actual operating conditions and the capacity for long-term development, and current solvency is not especially important. However, if company debt ratios greatly increase, banks will require companies to adopt more prudent accounting policies to protect the banks' own interests (Guay and Verrecchia, 2007). Therefore, we use short-term solvency as an instrumental variable, and carry out the under-identification test (Anderson canon. corr. LM statistic) and the weak-identification test (Cragg–Donald Wald *F* statistic). The results show that the instrumental variable is correlated with the endogenous variable.

[3] According to the CSMAR related transaction database, other related parties that provide trade credit in the A-share market are mainly other enterprises controlled by the same parent company as the listed company (accounting for 62% of the total), associated enterprises of the listed company (4%), joint ventures of the listed company (2%) and investors who can exert a significant influence on the listed company (2%).

Table 6
Monetary policy, accounting conservatism and trade credit: related party transactions.

Variables	TC_t (controlling shareholder trade credit)		TC_t (other related-party trade credit)		TC_t (non-related party trade credit)	
	(1)	(2)	(3)	(4)	(5)	(6)
C-Score$_{t-1}$	0.002	0.003	0.020***	0.016***	0.377***	0.182***
	(0.88)	(1.51)	(4.23)	(3.54)	(15.08)	(8.97)
MP$_t$ × C-Score$_{t-1}$		−0.003		−0.003		0.176***
		(−1.10)		(−0.54)		(7.27)
MP$_t$		0.000*		0.000		−0.008***
		(1.88)		(0.95)		(−4.83)
MPOWER$_t$	0.000	0.000	0.003***	0.003***	0.040***	0.037***
	(0.02)	(0.35)	(2.95)	(3.14)	(7.54)	(7.15)
STATE$_t$	0.001**	0.001**	0.000	0.000	0.012**	0.012*
	(2.31)	(2.41)	(0.15)	(0.24)	(1.96)	(1.96)
LOAN$_t$	−0.002**	−0.002**	−0.015***	−0.013***	−0.169***	−0.157***
	(−2.30)	(−2.09)	(−4.63)	(−4.34)	(−10.05)	(−9.49)
AGE	−0.001	−0.001	0.003**	0.003**	0.007	0.006
	(−1.41)	(−1.09)	(2.02)	(2.24)	(0.80)	(0.71)
SIZE$_t$	0.000	0.000	0.001	0.001	0.016***	0.017***
	(1.37)	(0.92)	(1.23)	(1.06)	(5.46)	(6.54)
CFO$_t$	0.001	0.001	0.010**	0.010**	0.128***	0.122***
	(0.38)	(0.68)	(2.20)	(2.27)	(6.15)	(5.82)
LIQ$_t$	0.001	0.001	0.009***	0.010***	0.266***	0.272***
	(0.86)	(0.82)	(3.75)	(3.82)	(19.01)	(19.10)
EBIT$_t$	−0.003	−0.003*	−0.038***	−0.038***	−0.404***	−0.385***
	(−1.52)	(−1.74)	(−6.81)	(−6.72)	(−13.75)	(−13.10)
GROWTH$_t$	0.001**	0.001**	0.001	0.001	0.022***	0.024***
	(2.21)	(2.37)	(1.34)	(1.59)	(7.09)	(7.72)
GOVINDEX$_t$	−0.001***	−0.001***	−0.001***	−0.001***	0.002	0.003
	(−4.82)	(−4.96)	(−3.01)	(−3.01)	(0.89)	(1.42)
Year	Yes	No	Yes	No	Yes	No
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Cluster at firm level	Yes	Yes	Yes	Yes	Yes	Yes
N	7,460	7,460	7,460	7,460	7,460	7,460
Adj. R^2	0.037	0.036	0.052	0.050	0.468	0.454

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-statistics are provided in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

5.3.2. Alternative variables for trade credit

To avoid industry factors affecting the results, the industry mean is subtracted from each company's trade credit in a sensitivity test, with the results provided in Table 7. The coefficient for C-Score$_{t-1}$ is still significantly positive and that for MP$_t$ × C-Score$_{t-1}$ is also positive, which supports the hypotheses.

Although accounting conservatism is an annual variable, trade credit may include accounts payable and advances from customers from previous years. Therefore, in a sensitivity test, the sum of accounts payable, notes payable and advances from customers within a year is used to represent trade credit, standardized by

Table 7
Alternative variables for trade credit: adjusted by industry mean or within one year.

Variables	TC (trade credit adjusted by industry mean) (1)	TC (trade credit adjusted by industry mean) (2)	TC (trade credit within one year) (3)	TC (trade credit within one year) (4)
C-Score$_{t-1}$	0.375***	0.205***	0.186***	0.049***
	(18.07)	(12.54)	(8.58)	(2.62)
MP$_t$ × C-Score$_{t-1}$		0.090***		0.081***
		(4.84)		(3.35)
MP$_t$		−0.006***		−0.003
		(−4.31)		(−1.46)
MPOWER$_t$	0.049***	0.047***	0.028***	0.025***
	(11.46)	(11.26)	(6.36)	(5.79)
STATE$_t$	0.013**	0.013**	0.019***	0.020***
	(2.57)	(2.56)	(3.95)	(3.95)
LOAN$_t$	−0.166***	−0.148***	−0.128***	−0.120***
	(−12.00)	(−11.07)	(−10.26)	(−9.96)
AGE	0.007	0.010	0.005	0.003
	(1.08)	(1.43)	(0.76)	(0.57)
SIZE$_t$	0.016***	0.015***	0.011***	0.013***
	(6.70)	(7.09)	(4.12)	(5.39)
CFO$_t$	0.157***	0.154***	0.157***	0.155***
	(9.24)	(9.02)	(8.44)	(8.22)
LIQ$_t$	0.244***	0.251***	0.146***	0.150***
	(22.05)	(22.28)	(13.56)	(13.76)
EBIT$_t$	−0.383***	−0.374***	−0.191***	−0.170***
	(−15.56)	(−15.15)	(−7.97)	(−7.10)
GROWTH$_t$	0.022***	0.024***	0.011***	0.011***
	(8.92)	(10.07)	(4.20)	(4.48)
GOVINDEX$_t$	−0.001	−0.001	0.001	0.002
	(−0.39)	(−0.33)	(0.48)	(1.19)
Year	Yes	No	Yes	No
Industry	Yes	Yes	Yes	Yes
Cluster at firm level	Yes	Yes	Yes	Yes
N	12,121	12,121	5392	5392
Adj. R^2	0.344	0.331	0.385	0.366

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-statistics are provided in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

total assets. The results are shown in Table 7. The coefficients for C-Score$_{t-1}$ and MP$_t$ × C-Score$_{t-1}$ are still significantly positive, which supports the hypotheses.

5.3.3. Alternative variables for tight monetary policy

Since the first quarter of 2004, the website of the People's Bank of China has published a quarterly "national banker survey report" on systematic investigations carried out jointly by the People's Bank of China and the National Bureau of Statistics. About 3000 banking institutions are investigated through a

Table 8
Alternative variables for tight monetary policy: monetary policy tightness index..

Variables	TC (original MPINDEX) (1)	TC (original MPINDEX) (2)	TC (dummy MPINDEX) (3)	TC (dummy MPINDEX) (4)
C-Score$_{t-1}$	0.500***	0.209***	0.500***	0.271***
	(18.73)	(7.32)	(18.73)	(13.73)
MP$_t$ × C-Score$_{t-1}$		0.387***		0.070***
		(4.25)		(2.61)
MP$_t$		−0.052***		−0.004**
		(−8.84)		(−2.25)
MPOWER$_t$	0.048***	0.044***	0.048***	0.044***
	(9.80)	(8.79)	(9.80)	(8.68)
STATE$_t$	0.005	0.006	0.005	0.005
	(0.94)	(0.93)	(0.94)	(0.91)
LOAN$_t$	−0.203***	−0.170***	−0.203***	−0.168***
	(−11.87)	(−10.30)	(−11.87)	(−10.13)
AGE	−0.010	−0.009	−0.010	−0.010
	(−0.97)	(−0.83)	(−0.97)	(−0.98)
SIZE$_t$	0.022***	0.022***	0.022***	0.022***
	(7.44)	(7.58)	(7.44)	(7.60)
CFO$_t$	0.128***	0.124***	0.128***	0.131***
	(6.29)	(5.91)	(6.29)	(6.24)
LIQ$_t$	0.237***	0.249***	0.237***	0.252***
	(18.92)	(19.09)	(18.92)	(19.20)
EBIT$_t$	−0.291***	−0.287***	−0.291***	−0.289***
	(−10.75)	(−10.41)	(−10.75)	(−10.48)
GROWTH$_t$	0.023***	0.025***	0.023***	0.023***
	(6.71)	(7.25)	(6.71)	(6.85)
GOVINDEX$_t$	−0.000	0.002	−0.000	0.002
	(−0.03)	(0.63)	(−0.03)	(0.79)
Year	Yes	No	Yes	No
Industry	Yes	Yes	Yes	Yes
Cluster at firm level	Yes	Yes	Yes	Yes
N	6743	6743	6743	6743
Adj. R^2	0.472	0.447	0.472	0.444

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-statistics are provided in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

combination of overall investigation and sampling surveys. The overall investigation is used for all types of institutions at municipal level or above, while a stratified PPS sampling survey (proportional to the scale of each credit cooperative) is used to investigate rural credit cooperatives. The respondents include directors of headquarters and presidents and vice presidents in charge of credit at provincial and secondary-level branch institutions in various banking institutions (including foreign commercial banks). The report gives the proportion of investigated bankers who believe that current monetary policy is "loose," "moderate" or "tight." Here,

Table 9
Alternative variable for accounting conservatism: average C-Score.

Variables	Coefficient	Adjusted *t*-statistic
MEAN_C-Score	0.954***	(15.53)
MEAN_MPOWER	0.059***	(10.17)
MEAN_STATE	0.021***	(4.48)
MEAN_LOAN	−0.144***	(−7.31)
MEAN_AGE	0.010**	(2.14)
MEAN_SIZE	0.004	(1.43)
MEAN_CFO	0.194***	(3.12)
MEAN_LIQ	0.213***	(15.27)
MEAN_EBIT	−0.361***	(−5.18)
MEAN_GROWTH	0.000	(0.23)
MEAN_GOVINDEX	−0.002	(−1.48)
Industry	Yes	
N	2134	
Adj. R^2	0.501	

Note: All of the coefficient estimates are adjusted using heteroskedasticity to obtain robust standard errors.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

a "tightness" index (MPINDEX) is used to measure the tightness of monetary policy rather than indicators based on monetary liquidity.[4]

For each year between 2004 and 2009, the monetary policy tightness index is 37.53%, 18.95%, 18.98%, 39.63%, 51.03% and 5.03%, respectively. Based on the original value of the monetary policy tightness index (MPINDEX), we define 2004, 2007 and 2008 as years with tightening monetary policy and 2005, 2006 and 2009 as years with easing monetary policy, substituting a dummy variable into the regression equation.

The results are shown in Table 8. The coefficients for C-Score$_{t-1}$ and MPINDEX$_t$ × C-Score$_{t-1}$ are significantly positive, confirming the hypotheses.

5.3.4. Alternative variable for accounting conservatism

To avoid error in measuring accounting conservatism, we average the values for C-Score in 2003–2012 to obtain an average conservatism index. To maintain unity, the average values of the other variables are also calculated, giving data for 2134 companies. The results of the regression analysis using these values are shown in Table 9. The coefficient for MEAN_C-Score is significantly positive, indicating that H1 is still supported.

6. Conclusions

Using a sample of A-share listed firms in China during 2003–2012, we investigate the effect of accounting conservatism on trade credit, taking the effect of monetary policy into account. The results show that corporations with higher accounting conservatism obtain more trade credit, and this relationship becomes more positive under tight monetary policy.

After grouping the enterprises by market position and ownership type, the positive correlation between accounting conservatism and trade credit is most significant for a private company with a strong market position. However, when the suppliers and customers are grouped according to transaction relationships, the positive correlation between accounting conservatism and trade credit is no longer significant if the trading party is a controlling shareholder.

[4] Between the first quarter of 2004 and the third quarter of 2006, the report categorizes beliefs about current monetary policy into "too loose," "loose," "moderate," "tight" or "too tight." It drops the "too tight" category from the fourth quarter of 2006, and reports beliefs only as "moderate" since the first quarter of 2010. Hence, a "tightness" index is used to measure the degree of monetary tightening, and the sample window is narrowed to 2004–2009.

The conclusions show that accounting conservatism can reduce the degree of information asymmetry, protect the interests of suppliers and customers more effectively, and help both parties to contract to establish cooperative relations with mutual trust, such that suppliers and customers are willing to accept a certain degree of risk and provide more trade credit. These effects are particularly significant in private enterprises with a strong market position.

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Audit mode change, corporate governance and audit effort☆

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ABSTRACT

This study investigates changes in audit strategy in China following the introduction of risk-based auditing standards rather than an internal control-based audit mode. Specifically, we examine whether auditors are implementing the risk-based audit mode to evaluate corporate governance before distributing audit resources. The results show that under the internal control-based audit mode, the relationship between audit effort and corporate governance was weak. However, implementation of the risk-based mode required by the new auditing standards has significantly enhanced the relationship between audit effort and corporate governance. Since the change in audit mode, the Big Ten have demonstrated a significantly better grasp of governance risk and allocated their audit effort accordingly, relative to smaller firms. The empirical evidence indicates that auditors have adjusted their audit strategy to meet the regulations, risk-based auditing is being achieved to a degree, reasonable and effective corporate governance helps to optimize audit resource allocation, and smaller auditing firms in particular should urgently strengthen their risk-based auditing capability. Overall, our findings imply that the mandatory switch to risk-based auditing has optimized audit effort in China.

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1. Introduction

The information asymmetry between a principal (shareholder) and agent (management) may lead to adverse selection and moral hazard. When an enterprise constitutes a series of linked contracts (Jensen and Meckling, 1976), managers are motivated to manipulate accounting policies and accounting choices to meet contract demands (Dechow et al., 2010). The question is how to effectively alleviate and control such managerial behavior. Theoretically, effective and reasonable internal controls can suppress management's manipulation of financial information to some extent because one of the functions of internal controls is to provide reasonable assurance of the reliability of financial reporting. Of course, auditing is also an external mechanism designed to mitigate agency problems, and, when applied using the internal control-based audit mode, the auditor must thoroughly understand the internal controls related to the financial statements in question to be able to identify material misstatements by the company.

Unfortunately, the frequent cases of financial and management fraud and false accounting information seen in recent years have raised awareness that internal controls are not effective in preventing these practices (Cao and Qian, 2011). Internal controls fail to reduce audit risk to an acceptable level because corporate governance is the main factor in audit risk, with effective controls depending on the rationality of corporate governance mechanisms. Reflective and reasonable corporate governance mechanisms are effective in mitigating and controlling the manipulation of financial information and adverse selection by management. Regular and effective mechanisms can also monitor, motivate and evaluate management, thereby reducing the probability of managers failing to meet their contractual obligations (and thus manipulating financial information) and increasing the reliability of that information.

As a key principle, the financial reporting and behavior of auditors is directly related to the reliability of accounting information (Watts and Zimmerman, 1983). External auditing, as an important part of external monitoring, provides reasonable assurance that financial reporting is fair and lawful in all material respects (Choi and Wong, 2007). Effective corporate governance can provide reasonable assurance of the quality of financial information and reduce audit risk, thus influencing auditor resources and effort. The revised auditing standards introduced by the U.S. Sarbanes–Oxley Act require the implementation of risk-based auditing, necessitating that auditors become thoroughly familiar with corporate governance mechanisms. The new audit guidelines implemented in China from 1 January 2007 also require such familiarity of auditors to enable them to assess the risk of material misstatements and configure their auditing efforts accordingly.

Because the audit mode in China did not change as a spontaneous response of auditors to fraud risk, but rather was mandated by the government, this study investigates whether auditors have actually changed to the risk-based mode and now evaluate corporate governance before they configure their audit effort. The results show that under the old regulations, when auditors applied the internal control-based audit mode, the relationship between audit effort and corporate governance was weak. Since implementation of the new risk-based mode required by the new auditing standards, that relationship has become significantly stronger. Further analysis reveals that the Big Ten auditing firms have demonstrated a significantly better grasp of governance risk, and allocate their auditing resources accordingly, in the wake of the changes relative to their smaller counterparts. The empirical evidence suggests that the higher the degree of corporate governance in a firm, the greater the assurance of its financial statements, which can save audit effort. Our findings also indicate that auditors have adjusted their audit strategies to meet the new regulations, that risk-based auditing is being achieved to a certain degree, that reasonable and effective corporate governance helps to optimize audit resource allocation and that smaller auditing firms, in particular, need to strengthen their risk-based auditing capability as a matter of urgency. In sum, the risk-based audit mode has helped considerably to optimize auditing effort in China.

The main contributions of this study are as follows. First, audit quality refers to the joint probability of an auditor finding and reporting a client's material misstatements. Appropriate audit effort is not only important to the auditor fulfilling the audit contract, but also to the allocation of infrastructure to identify material misstatements. Despite the requirement for auditors to report such misstatements, research in this area is rare in China, and this study thus provides important empirical evidence.

Second, regarding the regulatory change in audit mode, this study is the first to examine the relationship between corporate governance and audit effort. It confirms the positive role of the risk-oriented audit mode in linking audit effort to corporate governance mechanisms, thus enriching the literature on auditing standards, auditing theory and corporate governance, and serving as a reference for policymakers in setting accounting policy.

Third, this study provides an empirical evidence to show that China's auditors have adjusted their audit strategies in accordance with the 2007 regulations. Despite much discussion of the risk-based audit mode, empirical knowledge of its use is scarce. Hence, this study's examination of its application in practice is of great significance in helping practitioners to understand the mode's importance.

The remainder of this paper is organized as follows. Section 2 presents the literature review. Section 3 provides the study's institutional background, theoretical analysis and hypotheses. The study design is set out in Section 4 and the results of the empirical analysis in Section 5. Conclusions are drawn in Section 6.

2. Literature review

There is an important practical and academic value in identifying and configuring the main risks affecting audit effort to reduce audit risk and improve audit efficiency and effectiveness. Simunic (1980) views audit risk as a loss in present value to third parties due to audited financial reports, and argues that investment in auditing resources reduces that risk. Houston et al. (1999) expand Simunic's (1980) definition of audit risk, viewing it as comprising of two parts: undiscovered material misstatements and immaterial (irrelevant) misstatements. They suggest that an auditor should first assess the business risk and then determine his or her audit effort in accordance with it. Although Houston et al. (1999) propose that audit effort be based on business risk, they offer no clear definition of what constitutes business risk. Empirical research carried out by O'Keefe et al. (1994) to characterize business risk shows that audit effort is significantly affected by firm size, complexity, debt risk, internal control risk and firm listing status. With advances in practical and academic research, subsequent studies have expanded the definition of business risk to include corporate governance. Bedard and Johnstone (2004) studies corporate governance risk, earnings management and audit effort pricing, and finds that a company's earnings management risk and governance risk increase with the rate of increase in an auditor's hourly wage. The evidence from the aforementioned overseas studies suggests that understanding of the business risk arising from audit risk has shifted from a vague understanding of specific risks to an understanding of internal control risk, and then expanded to encompass corporate governance risk.

Although researchers have investigated the corporate governance and auditing practices of China's main listed firms in the areas of audit quality, audit opinions, audit fees, information disclosure and internal governance, none to date has examined audit modes or audit effort in relation to corporate governance. This study differs from overseas research in the following ways. First, it uses data from companies listed in China. Relatively few studies have examined audit effort in developing countries, primarily because of limited data availability. Those that have been carried out are generally based on small samples and use questionnaire data from a single auditing firm or from clients audited by one of the Big Four. In contrast, the data used in this study cover the entire A-share market, and are thus widely applicable. Second, the corporate governance index used in this study is more comprehensive and objective than that used in Bedard and Johnstone (2004). As China's corporate governance mechanisms differ from those of other countries, this study not only enriches the global literature on audit effort and risk-based auditing, but also provides evidence to support the regulation of the auditing market. Third, its focus on China's change to risk-based auditing and the link between corporate governance and audit effort, an area of interest since the work of Bedard and Johnstone (2004), enriches audit theory and the theory of auditing standards.

3. System background, theoretical analysis and hypotheses

3.1. Institutional audit mode change

Traditional audit theory views independent auditing as necessary because of the separation between ownership and management rights. Its ultimate goal is to reduce the agency problem, capital market information

asymmetry and transaction costs while increasing the efficiency of resource allocation (Wallace, 1987). To achieve these objectives, auditors have to adopt a particular audit mode, or methodology, during the audit. However, with economic development and changes in the auditing environment, the prevailing audit mode has required a change.

Until the late 1930s, audit procedures were central to the formulation of U.S. auditing standards, the main goal being troubleshooting using a variety of measures. This early auditing mode was characterized by detailed accounts auditing without risk sampling, and audit effort was applied according to the volume of business accounts and business complexity. From the 1930s to the late-1970s, along with economic development, growing business sizes, the expansion of transactions and the increased complexity of internal management, company accounting became more complex, and the use of a variety of troubleshooting measures became uneconomical. Because management was responsible for financial reports, there was a close relationship between internal control and the quality of financial information. Changes also occurred in the audit mode in this period, with the application of sampling techniques adopted and a greater need for practitioners to understand business risk. The earlier detailed audit mode thus shifted to an internal control-based mode that required the auditor to understand the internal controls relevant to a firm's financial statements, and then estimate the risk of material misstatements in accordance with the design of the firm's internal controls, for example, whether they were operational, and finally allocate resources and determine the nature and scope of the audit based on that risk.

Despite the influence of laws and regulations on audit demand and supply, subsequent prominent cases of management fraud litigation and audit failures led auditors to realize that assessing the relevance of financial statements and internal controls was insufficient to effectively prevent and reduce audit risk, as management has an incentive to manipulate accounting policies and choose self-seeking options. However, the degree of such manipulation depends on the corporate governance mechanisms in place. Reasonable and effective corporate governance arrangements serve to constrain and incentivize management effectively, thereby reducing the likelihood of the company's financial information being manipulated. It was in this context that the risk-based audit mode emerged. Risk-based auditing requires the auditor to assess a company's internal controls and accounting books, estimate the likelihood of a material misstatement based on the company's corporate governance mechanisms, and then determine the audit scope, priorities and effort required accordingly.

The risk-based audit mode, which is an improved version of the traditional internal control-based mode, was an inevitable development (Wang and Wu, 2005) in helping to analyze and discover material misstatements. The risk-based audit system in the United States developed gradually from the late-1970s to the 1990s. In 1983, the U.S. General Accounting Standards Board (GASB) issued its Statement on Auditing Standards No. 47, covering audit risk and importance, followed by further audit guidelines. As the U.S. risk-based mode matured, the International Auditing and Assurance Standards Board (IAASB) began to study and learn from the United States. In 2000, the IAASB and GASB established a joint risk analysis group, which concluded that the new method could improve audit effectiveness. The serious economic consequences of the Enron scandal led the IAASB to accelerate the introduction of risk-based auditing. In October 2003, it issued International Standard on Auditing ISA 315 entitled "Identifying and assessing the risks of material misstatement through understanding the entity and its environment" and ISA 330, "The auditor's responses to assessed risks," which emphasized the importance of auditor familiarity with the corporate governance of clients.

3.2. Audit mode change in China

To align with international practice, in February 2006 China's Ministry of Finance issued new audit practice guidelines that came into effect on 1 January 2007. The new standards require auditors to implement the risk-based audit mode and familiarize themselves with clients' corporate governance mechanisms to be able to identify and assess the risk of material misstatements in financial statements before determining the appropriate audit nature, timeframe and effort.

Before 2007, China's auditing standards were internal control-based and auditors assessed audit risk by evaluating the internal controls on financial reporting. Provided that auditors acted in accordance with the standards of practice, were familiar with the internal controls related to financial statements and collected

appropriate evidence to prove that they had followed the auditing standards, they could avoid any corresponding legal and regulatory responsibility even if audit failure or management fraud was subsequently uncovered. However, in 2007, regulators implemented revised auditing standards to meet the requirements of China's economic development and secure convergence with international auditing practices.

The old and new auditing standards differ significantly. First, the new standards require reasonable assurance from auditors that financial statements are free of material misstatements on the whole, regardless of whether such misstatements are the result of fraud or error (Auditing Standards No. 1141, 16). This requirement increases the auditor's liability and risk. Second, because of the risk that corporate governance is the source of audit risk, the new auditing standards require auditors to understand and evaluate a client's corporate governance practices and environment, and thereby identifying and assessing the risk of material misstatements as a basis for determining audit effort, procedures and scope. Third, because the new auditing standards increase auditor responsibility in cases of fraud, and because the degree and effectiveness of corporate governance is a fundamental cause of concentrated business risk, auditors are required to use the risk-based audit mode when auditing listed companies.

As China's revised auditing standards were introduced as a mandatory change, not in response to audit failure and fraud risk, and to adapt to the country's market economy and allow convergence with international auditing practices, the increased legal liability and risk for auditors have forced them to pay attention to and evaluate corporate governance to reduce audit risk.

3.3. Theoretical analysis and hypotheses

A major objective of internal control is to ensure that financial information is reliable and effective. A range of business control activities such as authorization requirements, separation of incompatible duties, systematic accounting, property protection and budget controls helps to detect unintentional errors within a company contract (Ashbaugh-Skaife et al., 2008; Doyle et al., 2007), internal control deficiencies and poor-quality financial information (Doyle et al., 2007). Effective internal controls can also improve the quality of earnings. Auditing is a significant external governance mechanism that helps to explicate the internal control of financial statements and establish the risk of material misstatements by enterprises.

However, as internal control mechanisms are affected by corporate governance, the supervision and encouragement of corporate governance are important to ensure the effective operation of those mechanisms. According to agency theory, one of the purposes of corporate governance is to guarantee the effective operation of financial controls in the following ways. First, management directly supervises daily financial controls through its internal control activities and takes responsibility for the veracity and reliability of financial information. Second, corporate governance supervises management's financial control activities, as the board and audit committee are required to monitor the reliability of its financial reporting (Beasley et al., 1997; Johnstone et al., 2001). The lack of an audit committee (Dechow et al., 1996; McMullen, 1996) and a small proportion of independent directors and audit committee members on the board both increase the likelihood of false financial reports (Beasley, 1996; Abbott et al., 2000; Beasley et al., 2000). Studies have shown internal controls to be weak and ineffective in monitoring management when the above corporate governance measures are absent or defective. Because efficient corporate governance is able to control and reduce a company's agency problem, it has the ability to evaluate, inspire and motivate management, which can effectively prevent the manipulation of financial information and fraud (Cai, 2007).

Compared with the internal control-based audit mode, the risk-based mode, if implemented effectively, can identify risks more scientifically, assess the risk of material misstatements more rationally, and thus determine the key risk areas and appropriate audit effort more accurately. To reduce the level of audit risk, auditors need to increase their effort in key areas and reduce their effort in non-priority areas, rendering the overall audit effort allocation more rational, saving overall effort and improving the efficiency of resource allocation.

However, the change in audit method in China occurred for reasons of socioeconomic development and international convergence. The risk-based audit method did not arise as a spontaneous response to audit risk, but rather through government decree. Due to the consequent change in liability and the requirement for auditors to have a thorough understanding and assessment of corporate governance, auditors who fail to examine a material misstatement that is related to governance bear legal responsibility for that misstatement.

To meet the new regulatory requirements and reduce their legal and regulatory risks, auditors must apply the new audit mode to evaluate corporate governance, leading to a change in audit effort. The literature shows that in 1994, after detailed standards were issued for non-standard audit opinions in response to a regulatory requirement to reduce audit risk, auditors exhibited a significant increase in non-standard audit opinions (e.g., DeFond et al., 2000).

Based on the above analysis and discussion, we hypothesize that before implementation of the new audit practice guidelines in China, auditors complied with the old internal control-based auditing standards and tended to lack motivation, or the necessary guidance, to evaluate corporate governance. Thus, the correlation between corporate governance and audit resources was weak in that period.

After implementation of the new audit practice guidelines, auditors had to adjust their audit strategy to meet regulatory requirements, and thus became concerned with the assessment of governance-related factors, leading to a change in audit effort. The change also led to more effective corporate governance, which reduced the risk of material misstatements and was more conducive to saving audit effort. Accordingly, we propose the following hypothesis.

Hypothesis 1. Since the change to the risk-based audit mode in China, the negative correlation between corporate governance and audit effort has been significantly enhanced.

Independent auditing is an important aspect of external oversight, and is carried out by allocating audit effort. According to DeAngelo (1981), audit quality refers to the joint probability of a material misstatement in a client's financial statements being found and reported by the auditor and the auditor's ability to detect such a misstatement due to professional competence, including audit experience, audit mode (method) and audit effort.

Although the risk-based audit mode requires auditors to gain competence in identifying the risk of material misstatements, and then to decide the audit scope, procedure and effort accordingly, auditing firms of different size have differing levels of ability to implement that mode and evaluate corporate governance risk. First, large audit firms have more extensive experience and more talented staff, and can thus more quickly grasp and apply the risk-based audit mode and assess corporate governance risk, and their allocation of audit effort is thus more competitive than that of smaller audit firms. Second, unlike smaller firms, the international Big Four and the larger domestic auditing firms were actively involved in drafting the new auditing standards (Pan, 2008). Hence, the Big Ten – the 10 largest audit firms in the American Institute of CPAs' (AICPA's) top 100 firms – were exposed to the risk-based audit mode and the theory behind it earlier than their smaller counterparts, and they may thus have greater mastery of the new system and be more sensitive to corporate governance risk and better able to adjust their audit effort accordingly. Based on the above analysis, we propose the following hypothesis.

Hypothesis 2. Since China's change to the risk-based audit mode, the Big Ten have demonstrated a significantly better grasp of governance risk and audit effort than smaller firms.

4. Study design

4.1. Sample data

The implementation of the new practice guidelines marked the standardization of the risk-based audit mode in China. Taking 2007 as the starting point of institutional change, we select a sample of the listed companies from 2004 to 2011. Audit effort data come from the China Association of Certified Public Accountants, and include auditor tenure, auditor conversion from manual risk-based collation and other data from the GTA database. The sample is filtered by the following criteria: (1) excluding financial companies; (2) excluding ST and PT companies; (3) excluding observations with missing financial and corporate governance information; and (4) winsorizing the main continuous variables at the 1% level to eliminate the effect of outlying values. The sample selection process is illustrated in Table 1.

Table 1
Sample selection.

Sample selection	Total sample	Before audit mode change	After audit mode change
Initial sample	11,844	3332	8512
Financial sector (–)	317	52	265
ST and PT companies (–)	1044	294	750
Missing financial data (–)	1997	744	1253
Final sample	8486	2242	6244

4.2. Model set and variable definitions

According to the above theoretical analysis, and with reference to Bedard and Johnstone (2004), we construct the following regression model to test our hypotheses.

$$\begin{aligned}\text{Effort} = {} & \beta_0 + \beta_1\text{Gov} + \beta_2\text{After} + \beta_3\text{Gov}^*\text{After} + \beta_4\text{Big10} + \beta_5\text{Tenure} + \beta_6\text{Switch} + \beta_7\text{Size} \\ & + \beta_8\text{Debt} + \beta_9\text{Loss} + \beta_{10}\text{Growth} + \beta_{11}\text{Cro\_list} + \beta_{12}\text{Rec\_inv} + \beta_{13}\text{Liquidity} + \beta_{14}\text{RPT} \\ & + \beta_{15}\text{Opinion\_1} + \beta_{16}\text{Punish\_1} + \beta_{17}\text{Fee} + \beta_{18}\text{Marketindex} + \beta_{19}\text{Year} + \beta_{20}\text{Industry} + \mu \qquad (1)\end{aligned}$$

In Model (1), the interaction term between corporate governance and a change in audit mode, Gov*After, is expected to have a negative coefficient.

To test Hypothesis 2, we construct Model (2) based on Model (1). In this model, the interaction term, Gov*Big10[1], examines whether the Big Ten are significantly different from smaller firms in their grasp of corporate governance risk and application of audit effort following the change in audit mode. We expect the coefficient of Gov*Big10 to be negative.

$$\begin{aligned}\text{Effort} = {} & \beta_0 + \beta_1\text{Gov} + \beta_2\text{Big10} + \beta_3\text{Gov}^*\text{Big10} + \beta_4\text{Tenure} + \beta_5\text{Switch} + \beta_6\text{Size} + \beta_7\text{Debt} \\ & + \beta_8\text{Loss} + \beta_9\text{Growth} + \beta_{10}\text{Cro\_list} + \beta_{11}\text{Rec\_inv} + \beta_{12}\text{Liquidity} + \beta_{13}\text{RPT} \\ & + \beta_{14}\text{Opinion\_1} + \beta_{15}\text{Punish\_1} + \beta_{16}\text{Fee} + \beta_{17}\text{Marketindex} + \beta_{18}\text{Year} + \beta_{19}\text{Industry} + \mu \qquad (2)\end{aligned}$$

The main model variables and control variables are defined as follows.

4.2.1. Audit effort

The literature defines audit effort as the number of days spent by the audit team (e.g., Caramanis and Lennox, 2008; Palmrose, 1984; Davidson and Gist, 1996). Audit days refer to the number of days taken to complete the entire audit process, including audit planning, fieldwork and review. The research data in most overseas work in this area are obtained through questionnaires covering the entire audit process. Audit effort in this study is defined as the log of the product of the number of audit fieldwork days and audit team size. We use fieldwork days rather than the time taken to complete the entire audit process because fieldwork is a core part of an independent audit, a key component of audit effort and a key step in constraining management, and is thus a representative of overall audit effort.

4.2.2. Corporate governance

Corporate governance is an important mechanism for alleviating the agency problem, its core purpose being to encourage internal employees to act in accordance with the interests of shareholders, and constrain them from doing otherwise. Governance research covers the early stages of corporate governance through analysis of specific corporate governance mechanisms, including ownership structures, boards of directors, management incentives and other features. In this study, we construct a corporate governance index as a measure of the overall quality of corporate governance (Gompers et al., 2003; Bai et al., 2005; Li and Zhang, 2005; Liao et al., 2008; Zhang and Liao, 2010). We follow Bai et al. (2005) and Zhang and Liao (2010) in using

[1] The test sample for Hypothesis 2 includes only data from the period after the audit mode change, and thus cross-multiplication is not included for the variable After.

Table 2
Corporate governance index.

Governance indicator	Variable	Explanation
Shareholding structure and shareholder equity	Largest shareholder ownership	Percentage ownership of the largest shareholder
	Shareholder concentration	Total shareholding of the second largest to the tenth largest shareholder divided by the shareholding of the largest shareholder
	Proportion of state-owned shares	State-owned shares divided by total shares
	Proportion of board shareholding	Proportion of shares held by the board
	Proportion of supervisory committee shareholding	Proportion of shares held by the supervisory committee
Management governance	Managerial ownership	Proportion of shares held by the management
	CEO duality	Chairman and CEO in part-time roles
Directors, supervisors, and other forms of governance	Board size	Number of board directors
	Proportion of independent directors	Number of independent directors divided by the number of board directors
	Board meeting frequency	Number of meetings of the board of directors
	Supervisory board meeting frequency	Number of supervisory board meetings
	Number of committees	Number of committees established, such as audit committee and remuneration committee

principal component analysis (PCA) to find a linear combination of all indicators to define the corporate governance index (Gov), combining a few of the top principal components from PCA. The construction of our corporate governance index is shown in Table 2, and the factor loading table and discussion of PCA are provided in the Appendix.

4.2.3. Big Ten

Big Ten (Big10) refer to the 10 largest audit firms in the AICPA's top 100 firms. DeAngelo (1981) considers large audit firms that obtain long-term quasi-rents to be more independent than smaller firms, and they should thus be more active in exerting adequate audit effort to reduce earnings management and control audit risk (Caramanis and Lennox, 2008). In China, however, much research has confirmed that the audit quality of neither the large domestic audit firms nor the international Big Four is high. Given the country's lack of demand for high-quality auditing, large audit firms have little motivation to invest in the effort needed to provide such auditing, and the expected sign on Big10 is thus uncertain.

4.2.4. Control variables

With reference to Bedard and Johnstone (2004) and other studies, and in consideration of China's special institutional background, we select the following control variables to control for other factors that may affect audit effort.

When auditor tenure (Tenure) is longer, auditors are more familiar with the client's corporate governance and financial situation, and the degree of information asymmetry is lower than with new clients, which should help to conserve audit effort. Nevertheless, despite the theoretical expectations of this study, Caramanis and Lennox (2008) find auditor tenure to be positively correlated with audit effort. Hence, we do not predict the sign between Tenure and audit effort.

A change in auditor (Switch) increases the information asymmetry between auditors and clients. The successive auditor needs more time to understand and become familiar with the client and to carefully assess the risk of a material misstatement to correlate it with audit effort. However, according to DeAngelo's (1981) theory of quasi-rents, auditors usually attract clients with low prices initially. In China, an auditor's ability to obtain future quasi-rents is uncertain, as the audit division is likely to reduce the necessary audit effort after

the first audit. Because of the differing circumstances of individual audit firms, the expected sign on Switch is uncertain.

The larger the company (Size), the more audit effort needed (O'Keefe et al., 1994; Palmrose, 1989). A positive association is thus expected between company size and audit effort.

The asset-liability ratio (Debt) reflects the ability of companies to repay their loans. The higher the ratio, the greater both the debt risk and audit risk (O'Keefe et al., 1994). A positive association between Debt and audit effort is thus expected.

O'Keefe et al. (1994) claim that when an audited client is operating at a loss, auditors need to pay special attention to the business risk and be aware of the potential for business failure or shareholder litigation arising from the discontinuation of operations. In addition, the management of such a company may have a strong incentive to engage in a "whitewash," meaning that auditors would be wise to increase their audit effort to control audit risk. We thus expect operating loss (Loss) to be positively associated with audit effort.

As company growth (Growth) is directly related to a company's future profitability and ability to expand production, we expect it to be negatively correlated with audit effort (O'Keefe et al., 1994).

When domestic listed companies are also listed overseas (Cro_list), the various financial reporting requirements in the overseas jurisdictions can affect the quality of their data (Ball et al., 2000), a possibility that needs to be taken into account with regard to investment in audit effort if a cross-listed company's financial reporting and audit reports are intended for both domestic and overseas use. Hence, we expect a positive association between Cro_list and audit effort.

The inventory-accounts receivable ratio (Rec_inv) is used to measure the complexity of a client's business, with greater complexity requiring more audit effort. We thus expect it to have a positive association with audit effort.

The current ratio (Liquidity) reflects a company's ability to use corporate cash to repay short-term borrowings. The higher the current ratio, the lower both the debt and audit risk. Hence, we expect Liquidity to have a negative relationship with audit effort.

Related party loans (RPT) represent the proportion of company debt comprising direct or indirect debt. Loans from related parties reduce transaction costs, optimize capital structure and improve capital utilization. However, they are also associated with the way in which related parties or major shareholders take up company funds. As the circumstances differ for different companies, the expected sign is uncertain.

Prior year audit opinion (Opinion_1) represents a non-standard audit opinion, indicating that the previous annual financial statements contained a material misstatement or did not reflect fair value in some significant respect. To reduce audit risk, auditors need to invest greater audit effort. Hence, we expect that effort to have a positive association with Opinion_1.

If a client was punished (Punish_1) by the regulatory authorities for the quality of its financial information in the previous year, we predict that both audit risk and regulatory risk are high, and auditors need to be more prudent. Thus, we expect a positive association between audit effort and Punish_1.

Palmrose (1989) considers the audit contract fee (Fee) to have two models: fixed cost and cost plus. Fixed costs are often ascertained before the initial audit, and remain unchanged over a given period (often several years), whereas the cost-plus model is generally based on audit effort, and is usually determined at the end of the audit. We speculate that a fixed-cost contract is likely to be an important variable in investment in audit effort, whereas a cost-plus contract is unlikely to exert any influence. Because of the two types of fee contracts, "low-balling" has some effect on audit effort. DeAngelo (1981) claims that low-balling does not harm auditor independence because auditor switching has transaction costs, and auditors can thus recover their initial pricing discount through future audits. However, in 1998, the China Securities Regulatory Commission stated that low-balling and the payment of kickbacks or commissions greatly reduce an audit firm's profit margin, leading some firms to reduce their audit effort considerably (China Securities Regulatory Commission, 1998). In summary, the expected sign of the relationship between audit fee and audit effort is uncertain.

Market process (Marketindex) refers to the level of economic development in a region or area. The more economically developed the region/area, the better the legal environment it enjoys and the greater the regulatory and litigation risks for auditors. A positive association between Marketindex and audit effort is thus expected.

Finally, we also control for industry and year effects. All of the variables used in the models are defined in Table 3.

5. Empirical testing

5.1. Descriptive statistics

Table 4 presents the descriptive statistics for all of the variables. The average audit effort is 5.6, indicating that auditors devote some effort to searching for material misstatements to fulfill their contractual obligations. The maximum corporate governance index value is 10.77, the minimum is −1.52 and the mean is −0.06, with the standard deviation of 0.6 indicating significant differences across companies.

Table 5 reports the mean and median differences in the main and control variables before and after the audit mode change. The majority of the variables exhibit significant differences after the change. For example, the mean and median for corporate governance (Gov) shift from negative to positive, significant at the 1% level, indicating improvement in the extent of sound and effective corporate governance in the post-change period. In addition, the results in Table 5 also indicate the need to control for these factors in relation to audit effort.

5.2. Empirical results and analysis

Table 6 reports the testing of Hypothesis 1. The coefficient for the main effect of Gov is 0.109, and the coefficient for the interaction term, Gov*After, is −0.277 (T value = −4.98), significant at the 1% level, suggesting that better corporate governance did not save audit effort before the mode change, but reduced it significantly after it. Keeping other factors constant, a one unit increase in the corporate governance index is associated with a reduction in the number of field days by 18.3%. Regarding economic significance, marginal effect analysis shows that after the audit mode change (i.e., After = 1), a corporate governance index increase from the 25th to the 50th percentile (−0.43 to −0.13) is equal to a reduction of 26 days (equivalent to a 10.4% median change) in audit effort. Thus, these findings are both statistically and economically significant. Overall, when auditor decision-making considers internal controls alone to be relevant to financial statements, investment in audit effort does not reflect corporate governance risk, whereas risk-based auditing encourages auditors to consider corporate governance factors more fully. The regression results in Table 6 support Hypothesis 1, and show that the objectives of the risk-based audit mode have been fulfilled to a certain extent.

Table 7 reports the test results for Hypothesis 2. The coefficients for Gov*Big10 are significant at the 1% level (T = −4.93), supporting the hypothesis that the Big Ten are better able than their smaller counterparts to recognize improved corporate governance and adjust their audit effort accordingly. This result also indicates that the risk-based audit mode improves practice and risk control to some extent. It also implies that smaller firms need to strengthen their grasp of risk-based auditing and that the Chinese Institute of CPAs needs to improve its supervision and inspection regime and apply more effective controls to ensure that small firms implement the risk-based mode.

To seek further evidence for Hypothesis 2, we also test the sample in the period before implementation of the new auditing standards. As shown in Table 8, a positive but not significant relationship is found between corporate governance and audit effort, but the regression results are inconsistent with those after the audit mode change. The coefficient of Gov*Big10 is positive but not significant, and does not match the assumption, providing further evidence for Hypothesis 2.

5.3. Robustness tests

5.3.1. Addition and deletion of transition sample

The foregoing tests used 2007 as the start of the research window, but it is possible that auditors may already have been affected by the new auditing standards in 2006. We thus also test fiscal year 2006 as the date of the change in auditing practice, but our conclusions remain unchanged. The results also remain unchanged when we remove 2006 from the sample. (The results of these tests are not reported due to space limitations.)

Table 3
Variable definitions.

Variable type	Variable	Variable description
Dependent	Effort	Log of the product of audit fieldwork days and audit team size
Independent	Gov	Calculated using principal component analysis
	Gov_1	Log of Gov
	After	Dummy, assigned 1 when fiscal year is 2007 or later; otherwise 0
	Big10	Dummy, assigned 1 when audit firm was assessed as being in the top 10 by the AICPA; otherwise 0
Control	Tenure	Number of years of continuous auditing
	Switch	Dummy, assigned 1 when auditor has changed; otherwise 0
	Size	Natural log of total assets at year end
	Debt	Total liabilities/total assets
	Loss	Dummy, assigned 1 when business profit is negative; otherwise 0
	Growth	Growth rate of main business revenue (rate of change)
	Cro_list	Dummy, assigned 1 when company is cross-listed; otherwise 0
	Rec_inv	(Accounts receivable + inventory)/total assets at start of year
	Liquidity	Current assets/current liabilities
	RPT	Proportion of liabilities accounted for by related party loans
	Opinion_1	Dummy, assigned 1 when audit opinion is unqualified; otherwise 0
	Punish_1	Dummy, assigned 1 when subject to regulatory penalty[a]; otherwise 0
	Fee	Log of audit fee
	Marketindex	Refer to Annual Report of China Market Index: Relative Process in 2011 (Fan and Wang, 2011), the marketization index
	Lawindex	Refer to Annual Report of China Market Index: Relative Process in 2011 (Fan and Wang, 2011), the legal environment index
	Year	Year dummy variables
	Industry	Industry dummy variables

[a] The decision-making body includes the Punishment Commission, Ministry of Finance and stock exchange. Punishment results when a listed company's financial reports or financial information violate China's securities law, stock listing rules, enterprise accounting standards, various requirements regarding external guarantees and funds between related parties or other relevant laws and regulations.

Table 4
Descriptive statistics.

Variable	Sample	Mean	Stdev	Min	Max
Effort	8486	5.6	1.2	0.69	11.68
Gov	8486	−0.06	0.6	−1.52	10.77
Big10	8486	0.32	0.47	0	1
Tenure	8486	5.06	3.02	1	17
Switch	8486	0.09	0.29	0	1
Size	8486	21.63	1.2	17.12	28.28
Debt	8486	0.49	0.2	0.05	0.95
Loss	8486	0.14	0.35	0	1
Growth	8486	0.03	0.08	−1.68	0.46
Cro_list	8486	0.09	0.29	0	1
Rec_inv	8486	0.28	0.18	0	0.94
Liquidity	8486	1.8	1.99	0.24	15.49
RPT	8486	0.21	5.07	0	200
Opinion_1	8486	0.03	0.17	0	1
Punish_1	8486	0.04	0.21	0	1
Fee	8486	13.22	0.68	10.31	17.81
Marketindex	8486	8.56	2.04	0.29	11.8
Lawindex	8486	10.2	5.27	0.18	19.89

Table 5
Univariate tests.

Variable	Before audit mode change		After audit mode change		Difference in T/Z value	
	Mean	Median	Mean	Median	Mean	Median
Effort	5.62	5.52	5.61	5.53	0.618	0.434
Gov	−0.37	−0.39	0.04	−0.04	−29.421***	−31.10***
Big10	0.23	0	0.35	0	−10.26***	−10.20***
Tenure	4.39	4	5.29	5	−12.25***	−8.75***
Switch	0.09	0	0.1	0	−1.73*	−1.73*
Size	21.41	21.31	21.7	21.54	−9.94***	−8.96***
Debt	0.5	0.51	0.49	0.5	3.22***	2.75***
Loss	0.15	0	0.14	0	1.96**	1.96**
Growth	0.02	0.03	0.03	0.03	−4.74***	1.16
Cro_list	0.1	0	0.09	0	1.50	1.50
Rec_inv	0.3	0.28	0.27	0.25	5.39***	6.35***
Liquidity	1.55	1.18	1.89	1.29	−6.86***	−7.44***
RPT	0	0	0.29	0	−2.32**	−2.54**
Opinion_1	0.04	0	0.03	0	3.39***	3.39***
Punish_1	0.04	0	0.05	0	−1.14	−1.14
Fee	13.08	13.02	13.27	13.12	−11.57***	−11.80***
Marketindex	7.59	7.87	8.9	9.02	−27.27***	−27.43***
Lawindex	7.31	6.2	11.23	8.46	−31.93***	−31.30***

Note: T/Z value differences are based on T-tests and nonparametric Wilcoxon tests.
* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

5.3.2. Controlling for the legal environment

During the period in which the audit mode changed, the legal environment also changed, which may have affected the relationship between audit effort and corporate governance. Hence, we re-examine the legal environment after the change (because the market process and legal environment are highly correlated, we no longer control for the marketization index when we control for the legal environment). The regression results, shown in Table 9, leave our conclusions unchanged, further supporting our hypotheses.

Table 6
Audit mode change, corporate governance and audit effort.

Variable	Expected sign	Effort	Effort	Effort
Gov	−	−0.126***	−0.124***	0.109**
		(−6.03)	(−5.84)	(2.12)
After	?		−0.036	−0.068
			(−0.72)	(−1.34)
Gov*After	−			−0.277***
				(−4.98)
Big10	?	0.085***	0.086***	0.086***
		(3.32)	(3.36)	(3.37)
Tenure	?	−0.002	−0.002	−0.003
		(−0.63)	(−0.47)	(−0.79)
Switch	?	0.070*	0.073*	0.067
		(1.67)	(1.73)	(1.61)
Size	+	0.206***	0.207***	0.209***
		(13.77)	(13.79)	(13.99)
Debt	+	−0.010	−0.010	−0.023
		(−0.13)	(−0.13)	(−0.29)
Loss	+	0.033	0.033	0.031
		(0.92)	(0.92)	(0.85)
Growth	−	0.212	0.205	0.182
		(1.40)	(1.34)	(1.19)
Cro_list	+	0.174***	0.172***	0.166***
		(4.17)	(4.12)	(3.97)
Rec_inv	+	0.081	0.079	0.075
		(1.14)	(1.11)	(1.05)
Liquidity	−	−0.022***	−0.022***	−0.020***
		(−3.22)	(−3.15)	(−2.83)
RPT	?	0.001	0.001	0.001
		(0.52)	(0.53)	(0.48)
Opinion_1	+	0.015	0.017	0.021
		(0.24)	(0.27)	(0.34)
Punish_1	+	0.052	0.053	0.060
		(0.99)	(0.99)	(1.14)
Fee	?	0.578***	0.578***	0.579***
		(23.07)	(23.08)	(23.12)
Marketindex	+	0.015**	0.015***	0.016***
		(2.56)	(2.64)	(2.83)
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		−6.530***	−6.539***	−6.568***
		(−23.87)	(−23.88)	(−24.02)
N		8486	8486	8486
Adj-R2		0.31	0.31	0.31

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Table 7
Audit firm size, corporate governance and audit effort after audit mode change.

Variable	Expected sign	After audit mode change		
		Effort	Effort	Effort
Gov	−	−0.162***	−0.164***	−0.094***
		(−6.92)	(−7.02)	(−3.47)
Big10	?		0.068**	0.088***
			(2.37)	(3.03)
Gov*Big10	?			−0.219***
				(−4.93)
Tenure	?	−0.008*	−0.007	−0.007
		(−1.80)	(−1.57)	(−1.58)
Switch	?	0.081*	0.078	0.078
		(1.69)	(1.62)	(1.63)
Size	+	0.211***	0.211***	0.211***
		(12.27)	(12.27)	(12.31)
Debt	+	0.005	0.0104	0.001
		(0.06)	(0.11)	(0.02)
Loss	+	0.008	0.010	0.012
		(0.20)	(0.24)	(0.29)
Growth	−	0.260	0.260	0.239
		(1.52)	(1.52)	(1.40)
Cro_list	+	0.205***	0.196***	0.181***
		(4.11)	(3.93)	(3.61)
Rec_inv	+	0.068	0.068	0.076
		(0.83)	(0.84)	(0.93)
Liquidity	−	−0.020***	−0.020**	−0.019**
		(−2.61)	(−2.53)	(−2.53)
RPT	?	0.001	0.001	0.001
		(0.51)	(0.50)	(0.45)
Opinion_1	+	0.047	0.050	0.051
		(0.60)	(0.64)	(0.66)
Punish_1	+	0.013	0.014	0.008
		(0.23)	(0.24)	(0.15)
Fee	?	0.587***	0.574***	0.565***
		(20.46)	(19.59)	(19.30)
Marketindex	+	0.009	0.008	0.008
		(1.50)	(1.25)	(1.35)
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		−6.662***	−6.503***	−6.400***
		(−21.63)	(−20.64)	(-20.30)
N		6244	6244	6244
Adj-R2		0.34	0.34	0.341

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Table 8
Audit firm size, corporate governance and audit effort before audit mode change.

Variable	Expected sign	Before audit mode change		
		Effort	Effort	Effort
Gov	−	0.036	0.032	0.009
		(1.05)	(0.94)	(0.26)
Big10	?		0.085**	0.131***
			(2.35)	(2.78)
Gov*Big10	?			0.124
				(1.52)
Tenure	?	0.011	0.013*	0.012*
		(1.44)	(1.73)	(1.65)
Switch	?	−0.019	−0.022	−0.025
		(−0.34)	(−0.40)	(−0.45)
Size	+	0.071***	0.069***	0.070***
		(3.45)	(3.31)	(3.38)
Debt	+	−0.223**	−0.205*	−0.205*
		(−2.07)	(−1.91)	(−1.91)
Loss	+	0.026	0.026	0.027
		(0.55)	(0.55)	(0.57)
Growth	−	−0.026	−0.026	−0.016
		(−0.11)	(−0.11)	(−0.07)
Cro_list	+	−0.080	−0.104**	−0.101**
		(−1.61)	(−2.04)	(−1.99)
Rec_inv	+	0.063	0.064	0.063
		(0.66)	(0.67)	(0.66)
Liquidity	−	−0.010	−0.010	−0.010
		(−0.99)	(−1.00)	(−0.98)
RPT	?	0.046	0.051	0.054
		(0.42)	(0.46)	(0.49)
Opinion_1	+	−0.048	−0.050	−0.051
		(−0.65)	(−0.68)	(−0.70)
Punish_1	+	0.063	0.070	0.071
		(0.87)	(0.97)	(0.99)
Fee	?	0.179***	0.164***	0.165***
		(5.59)	(5.02)	(5.05)
Marketindex	+	0.035***	0.033***	0.033***
		(4.08)	(3.88)	(3.79)
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		−4.151***	−3.917***	−3.967***
		(−10.57)	(−9.68)	(−9.77)
N		2242	2242	2242
Adj-R2		0.07	0.07	0.08

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Table 9
Robustness test: controlling for legal environment.

Variable	Expected sign	Effort	Effort	Effort
Panel A: Effect of audit mode change on relationship between corporate governance and audit effort				
Gov	–	−0.128***	−0.124***	0.105**
		(−6.14)	(−5.86)	(2.05)
After	?		−0.066	−0.097*
			(−1.30)	(−1.88)
Gov*After	–			−0.272***
				(−4.91)
Control variables		Controlled	Controlled	Controlled
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		−6.443***	−6.452***	−6.477***
		(−23.61)	(−23.64)	(−23.76)
N		8486	8486	8486
Adj-R2		0.31	0.31	0.34
Variable	Expected sign	After audit mode change		
		Effort	Effort	Effort
Panel B: Audit firm size, corporate governance and audit effort				
Gov	–	−0.163***	−0.165***	−0.094***
		(−6.98)	(−7.06)	(−3.47)
Big10	?		0.059**	0.079***
			(2.03)	(2.69)
Gov*Big10	?			−0.221***
				(−4.97)
Control variables		Controlled	Controlled	Controlled
Industry/Year		Controlled	Controlled	Controlled
Constant		−6.603***	−6.473***	−6.366***
		(−21.51)	(−20.65)	(−20.30)
N		6244	6244	6244
Adj-R2		0.34	0.34	0.34

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

5.3.3. Controlling for the self-selection problem

Because a client's choice of auditor is a business decision that is seldom random, there may be a self-selection problem. For example, a client may choose a large audit firm, which is more likely to provide a high-quality audit, to signal excellence to the market (Francis, 1984; Francis and Simon, 1987). We thus speculate that companies that differ in corporate governance quality may also differ in their choice of auditor and that auditors may accept clients in accordance with their level of corporate governance, thus creating a self-selection problem that may bias least squares estimation. To control for this possibility, we use Heckman's (1978) two-stage selection, as follows.

First, we estimate the probability model of an audit firm being chosen to calculate the inverse Mills coefficient (i.e., Mills). The first step in Model (3) is shown below, with the dependent variable being the probability of a listed company selecting a Big Ten audit firm.

$$\begin{aligned}\Pr(\text{Big10}) = {} & \gamma_0 + \gamma_1 \text{Size} + \gamma_2 \text{Capital} + \gamma_3 \text{Cycle} + \gamma_4 \text{Roa} + \gamma_5 \text{Growth} \\ & + \gamma_6 \text{Loss} + \gamma_7 \text{Gov} + \gamma_8 \text{Year} + \gamma_9 \text{Industry} + \varepsilon \end{aligned} \quad (3)$$

The independent variables in Model (3) come primarily from Francis and Krishnan (1999), with some additional variables. Francis and Krishnan (1999) argue that companies with a high level of accruals are more likely to employ large audit firms, with capital intensity and the business cycle being the key variables affecting the level of accruals. Capital intensity (total fixed assets divided by net sales) mainly measures long-term accruals, with greater capital intensity indicating fewer accruals. The longer the operating cycle (inventory turnover days + accounts receivable turnover days) and the more inventory and accounts receivable, the higher the level of accruals. To these two variables, we add company size, growth, profitability and financial distress. As the new auditing standards require auditors to evaluate a client's corporate governance, we also include the corporate governance index (Gov) in this model (variable definitions not reported due to space constraints).

Second, we incorporate the estimated inverse Mills coefficient (i.e., Mills) into Model (2), and then regress according to the previous method.

The results of the self-selection regression model show that the greater a company's size, sales cycle, profitability and corporate governance index, and the lower its capital intensity, the greater the probability of it hiring one of the Big Ten. The coefficients for each variable are consistent with expectations. The regression results are essentially consistent with Table 7, and as they are based on the estimated Mills coefficient used in Model (3) and entered into the Model (2) regression, they support our earlier conclusion (results unreported due to space constraints).

5.3.4. Endogenous decision-making problems between audit effort and corporate governance

Jensen and Meckling (1976) consider external auditing to be an important guarantee mechanism for reducing both conflicts of interest between a company's contractual parties and agency costs. The visibility of external auditors affects a company's corporate governance, and there may thus be an endogeneity problem between decisions made by external auditors (including their allocation of audit effort) and corporate governance risk, which could in turn affect the reliability of the estimated coefficients in the regression model. Caramanis and Lennox (2008) encounter a similar problem in the relationship between audit effort and earnings quality, and use lagged estimated audit effort as the instrumental variable to solve the corresponding endogeneity problem.

Drawing on Caramanis and Lennox (2008), to represent corporate governance we select an instrumental variable that does not directly affect audit effort. The lag variable of corporate governance is deemed appropriate for this purpose, as it meets the demands of both the Sargan and Hausman tests as an instrument.

Furthermore, although the internal and external governance environment is constantly changing in theory, it is not reasonable to expect auditors to consider the lag in corporate governance when making decisions. Hence, although lagged corporate governance variables can explain the current period of corporate governance, they are unlikely to affect current audit effort directly. Empirical tests confirm that the lag in corporate governance can explain current corporate governance but has no direct correlation with current audit effort (results unreported owing to space constraints). We thus use the estimated lag in corporate governance as an instrumental variable in the corresponding regression analysis. As shown in Table 10, the results still support the original conclusion.

5.3.5. Structural change test

Because all listed companies in China have been affected by the new auditing standards, no control sample is possible, rendering it difficult to exclude other factors over the study period. We thus conduct sub-period analysis to examine the relationship between corporate governance and audit effort before and after 2007. Using the Chow test with dummy variables, we assess whether there has been structural change. The results in Table 11 show that in the period before 2007 there is a positive correlation between audit effort and corporate governance, which is inconsistent with our theoretical expectation. In the period after that year, however, there is a negative correlation between the two, and a coefficient difference test shows the difference to be significant (T value $= -4.97$). Hence, the relationship between audit effort and governance before and after 2007 is the result of structural change.

Table 10
Robustness test: controlling for endogenous decision-making problem.

Variable	Expected sign	Effort	Effort	Effort
Panel A: Effect of audit mode change and corporate governance on audit effort				
Gov_1	–	−0.095***	−0.095***	0.151**
		(−3.20)	(−3.20)	(2.03)
After	?		−0.191***	−0.292***
			(−3.59)	(−4.87)
Gov_1*After	–			−0.291***
				(−3.95)
Control variables		Controlled	Controlled	Controlled
Year		Controlled	Controlled	Controlled
Industry		Controlled	Controlled	Controlled
Constant		−6.448***	−6.256***	−6.198***
		(−19.85)	(−19.74)	(−19.55)
N		6360	6360	6360
Adj-R2		0.31	0.31	0.31
Variable	Expected sign	After audit mode change		
		Effort	Effort	Effort
Panel B: Audit firm size, corporate governance and audit effort				
Gov_1	–	−0.133***	−0.135***	−0.002
		(−4.05)	(−4.11)	(−0.06)
Big10	?		0.068**	0.075**
			(2.13)	(2.36)
Gov_1*Big10	?			−0.359***
				(−6.46)
Control variables		Controlled	Controlled	Controlled
Industry and year		Controlled	Controlled	Controlled
Constant		−6.531***	−6.374***	−6.269***
		(−18.78)	(−17.93)	(−17.69)
N		5080	5080	5080
Adj-R2		0.31	0.31	0.33

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

Based on the empirical tests above, we consider our main conclusions to be relatively robust.

5.4. Supplementary analysis

If, following the adoption of the risk-based audit mode, auditors exerted greater effort in the face of poor corporate governance, and thus improved audit quality and corporate governance while simultaneously reducing audit effort without any decline in audit quality, that would constitute further proof of the optimization of audit effort in the post-change period.

We thus conduct supplementary analysis using earnings quality as a proxy for audit quality, and find that for companies with poor corporate governance, increased audit effort reduces earnings management and improves audit quality. We also find no evidence of a decline in audit quality when audit effort is reduced due to better corporate governance. These findings suggest that the implementation of the risk-based audit mode has indeed optimized audit effort in China (results unreported due to space constraints).

Table 11
Results of chow test for dummy type.

Variable	Expected sign	Effort (1) Before audit mode change	Effort (2) After audit mode change
Gov	–	0.110**	−0.168***
		(2.09)	(−7.17)
Control variables		Controlled	Controlled
Year		Controlled	Controlled
Industry		Controlled	Controlled
Constant		−6.756***	−6.422***
		(−10.99)	(−20.26)
Diff of (1) & (2)		−0.287***	
		(−4.97)	
N		2242	6244
Adj-R2		0.25	0.33

* Statistical significance at the 10% level.
** Statistical significance at the 5% level.
*** Statistical significance at the 1% level.

6. Conclusions

Given that contract management creates an incentive to manipulate financial information, auditors who adopt the internal control-based mode find it difficult to identify financial manipulation by management, which affects both the efficiency and results of their audits. The risk-based system, in contrast, requires auditors to perform a deeper assessment of clients' corporate governance, as reasonable and effective corporate governance directly constrains management from falsifying financial statements.

Based on a literature review and an analysis of China's institutional background, this study examines whether auditors have been evaluating corporate governance to guide their allocation of audit effort since the government-mandated change to the risk-based audit mode. It also explores the optimal allocation of audit effort needed to improve audit effectiveness and the way in which corporate governance has influenced the allocation of audit effort since the change in audit mode. Our findings show that under the earlier internal control-based mode, the relationship between audit effort and corporate governance was weak, but became significantly stronger following the implementation of the risk-based mode. Further analysis shows that since the change in audit mode, Big Ten auditors have gained a significantly better grasp of governance risk and allocated their audit efforts accordingly.

The results indicate that the mandatory switch to the risk-based audit mode has improved the ability of auditors in China to practice risk control and audit efficiency. However, the Chinese Institute of CPAs needs to strengthen its supervision and inspection, particularly for smaller auditing firms, to ensure a better understanding and more skilled use of the risk-based mode. Our study offers a useful perspective on the issues concerned and provides empirical evidence for the development of policy relating to investor protection and market regulation.

It should be noted that there are some inherent limitations in our sample. Most importantly, because the regulations require all listed companies and auditors to apply the risk-based audit mode, it is not possible to find a control sample of companies unaffected by the new auditing standards for use in our regression models.

Appendix A

Based on PCA, we use software to normalize the 12 indicators and select 5 main components. The corporate governance index is based on the weightings of principal components Y1 to Y5 ($Gov = W1 * Y1 + W2 * Y2 + W3 * Y3 + W4 * Y4 + W5 * Y5$, where W is the calculated variance contribution rate). The factor loadings of the principal components are shown in Table 12. In PCA, a factor with a

Table 12
Principal component factor loadings.

Name		Principal component				
		Y1	Y2	Y3	Y4	Y5
Shareholding structure and shareholder equity	Largest shareholder ownership	0.16	0.27	0.33	0.52	−0.48
	Shareholder concentration	0.50	0.18	0.40	0.14	−0.29
	Proportion of state-owned shares	−0.39	−0.46	0.21	0.56	0.22
	Proportion of board shareholding	0.85	−0.38	0.07	−0.18	0.04
	Proportion of supervisory committee shareholding	0.14	−0.66	0.17	0.40	0.25
Management governance	Managerial ownership	0.85	−0.39	0.07	-0.17	0.04
	CEO duality	0.36	−0.16	−0.21	-0.00	−0.04
Directors, supervisors and other forms of governance	Board size	−0.25	0.09	0.66	0.14	−0.29
	Proportion of independent directors	0.27	0.18	−0.61	0.28	−0.18
	Board meeting frequency	0.20	0.52	−0.01	0.11	0.61
	Supervisory board meeting frequency	0.40	0.51	0.08	0.19	0.43
	Number of committee members	0.34	0.44	0.17	0.10	−0.04

loading greater than 0.3 is generally considered significant in explaining the original variable. For the first principal component, the loading factors of shareholder concentration, proportion of board shareholding and management ownership account for more than 50% of the variance, and are thus used to represent and reflect shareholding structure, shareholder equity and managerial ownership. The second principal component is a less important factor in the composition, and the loading factors of the meeting frequency of the board of directors and supervisory board are slightly more significant than the other indicators, and better reflect directors, supervisors and other forms of governance. For the third main component, the highest loading factors are board size followed by shareholder concentration, and these two indicators thus reflect shareholding structure and shareholder equity, and directors, supervisors and other forms of governance. For the fourth principal component, the largest loading factors are the largest shareholder and state-owned shares, which account for more than 50%, and thus better reflect shareholding structure and shareholder equity. For the fifth main component, the loading factors of board and supervisory board meeting frequency are the most significant indicators to reflect directors, supervisors and other forms of governance. Thus, the keys to improving corporate governance are to increase the shareholdings of the largest shareholders, to reduce the proportion of state-owned shares, and to increase managerial ownership and the meeting frequency of both the board of directors and supervisory board.

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