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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)***
MKTCAPR1	**−0.121**	**(−3.07)*****														
MKTLIQR1			**−0.028**	**(−3.19)*****												
$FINR1_{AVG}$					**−0.028**	**(−2.32)****										
CREDITR1							**−0.430**	**(−1.72)***								
MKTCAPR2									**−0.066**	**(−1.81)***						
MKTLIQR2											**−0.014**	**(−1.80)***				
$FINR2_{AVG}$													**−0.024**	**(−1.81)***		
CREDITR2															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:

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

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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