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Accounting research in banking – A review

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1. Why carry out accounting research in the banking industry?

1.1. Why focus on the banking industry?

The banking industry is critically important to national and global economies. Banks are vital to the operation of a country's domestic economy in their role as depository institutions and lenders to both corporations and individuals. For example, Fields et al. (2004) estimate that banks represent over twenty percent of the total public equity market capitalization in the United States.

Compared to industrial firms, firms in the banking industry have a number of distinct characteristics that suggest interesting topics for research. First, banks have an unusually high degree of leverage relative to other firms, with the leverage ratio in the banking sector reported to be as high as 90%. Employing an analytical model, DeAngelo and Stulz (2015) demonstrate why it is optimal for banks to be highly leveraged. In their model, high bank leverage is not the result of moral hazard, taxes or any of the other leverage-related distortions outlined in Modigliani and Miller (1958). In an idealized setting without any such distortions, the only motive for a bank to issue debt is the value generated by servicing the demand for socially valuable safe/liquid claims.

Second, banks have a different governance structure from non-financial firms. Kroszner and Strahan (2001) find that banks in the 1992 Forbes 500 had larger boards and a lower fraction of insiders than non-financial firms. Adams (2011) also reports bank boards to be larger and more independent than the boards of non-financial firms in the Riskmetrics database of S&P 1500 firms from 1996 to 2007. However, recent proposals to improve bank governance, such as that made by Walker (2009), suggest that bank governance structures are ineffective because of their differences from those of non-financial firms. The current bank governance regime is also blamed for being responsible in large part for the subprime mortgage crisis (Adams and Mehran, 2011).

Third, banks operate with a higher degree of information uncertainty than other firms. Bank operations and products are complex, rendering it difficult to assess risks of large and diverse portfolios of loans or other financial instruments (Autore et al., 2009). Given these complexities, it is difficult to fully understand all the relevant information when communicating about a bank's future prospects.

Finally, banks are highly regulated. In the United States, they are subject to the scrutiny of the Federal Deposit Insurance Corporation (FDIC), Federal Reserve Board and other government agencies. Regulation restricts banks' activities and imposes other conditions. For example, banks have to maintain minimum levels

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of capital, and they were not allowed to engage in the issuance of securities until the late-1990s. Moreover, governments in some countries provide deposit insurance and guarantees, which change the way banks think about risk, an important issue during the recent financial crisis. The highly regulated nature of the industry renders banks relatively homogeneous compared with industrial firms, both in terms of their operating activities and accounting practices. Focusing on a single, relatively homogeneous industry with relatively homogeneous accounting practices facilitates control over other determinants of cross-sectional differences, thus increasing the reliability of inferences from empirical analysis. Hence, focusing on the banking industry allows researchers to avoid many of the problems that arise when dealing with industrial firms.

1.2. Accounting research in the banking industry

The financial crisis of 2007–2009 sparked a surge in accounting and finance research on the banking industry. Conducting accounting research on this industry has many advantages.

First, the banking industry is a good setting for investigating earnings management. Banking was a profitable industry until 2007, and became highly profitable once again after the financial crisis. For example, in 2001, the industry ranked second in profitability after pharmaceuticals among Fortune 500 firms in the United States (Public Citizen, 2002) and ranked third in returns on revenue in 2005 (CNNMoney.com). These high levels of profitability provide opportunities and incentives for managers to earn quasi-rents by distorting earnings. Moreover, the complexity of banking operations and the high level of information asymmetry increase the need for the communication of private information, and thus also expand opportunities for earnings management.

Second, as the banking industry is highly regulated, there are several regulations that affect banks' financial reporting, auditing, internal control, etc. In 1991, the FDIC Improvement Act (FDICIA) imposed new auditing, corporate reporting and governance requirements on depository institutions with assets exceeding US $500 million (this threshold was raised to $1 billion in 2005) and on their auditors (Murphy, 2004). More specifically, the FDICIA requires bank management to evaluate the bank's internal controls over financial reporting, and auditors to attest to and report on the effectiveness of those controls. Such requirements, particularly in the wake of the financial crisis, raise many interesting and important accounting-related research questions. For example, Jin et al. (2011) examine whether and how accounting and audit properties predicted impending bank failures and trouble during the crisis.

Finally, the exogenous shock to the system caused by the 2008–2009 financial crisis has created considerable interest in conducting research on the banking industry. For example, the crisis provides an ideal setting in which to test the implications of discretionary reporting choices for risk-taking and financial stability. Moreover, as with any empirical research, data constitute the foundation and the banking industry offers a large body of detailed information for public and private banks that is readily available to researchers.

2. What have we learned from recent accounting research in banking?

2.1. Use of reporting discretion

The majority of accounting research in the banking arena focuses on how bank managers use their reporting discretion. Bank managers have flexibility when preparing financial statements. Therefore, how they use that flexibility, and particularly whether they manipulate financial reporting, is deserving of study.

Unlike studies on the use of reporting discretion in by non-banking firms, research in the banking sector generally focuses on a single accrual, loan loss provision (LLP) or loan loss allowance (LLA). LLP (LLA) is by far the largest and most important accrual for banks. In normal times, the median ratio of LLP to earnings before LLP ranges between 15% and 20%, according to most studies, and the median ratio of LLA to stockholders' equity is around 10%. Bank managers estimate LLP to reflect changes in expected future loan losses, a process that allows them wide latitude for discretion in LLP estimation (Kanagaretnam et al., 2003). Moreover, the degree of discretion depends on the type of loan. For example, homogeneous loans typically provide management with less flexibility in estimating LLP than do heterogeneous loans. Bank managers' use of discretion in estimating LLP has received considerable attention from the U.S. Securities and Exchange

Commission (SEC) and bank regulatory agencies. The incurred loss model currently used to estimate LLP (LLA) is similar to accounting for contingencies, which means that bank managers are often estimating the likely implications of events that have already occurred. However, in July 2014, the International Accounting Standards Board issued a new version of IFRS 9, which introduces an expected loss model for the recognition and measurement of LLP (LLA). This model allows managers to incorporate estimates of potential future events, and therefore affords managers considerably more discretion than does the incurred loss model.

As noted, the banking literature generally focuses on a single accrual, that is, LLP or LLA. Focusing on a single accrual facilitates a sharper separation of abnormal (discretionary) and normal (nondiscretionary) accruals. Healy and Wahlen (1999) also state that examining specific accruals allows researchers to provide direct evidence for standard setters concerning which standards work well and where there may be room for improvement. Moreover, the measures of abnormal accruals commonly used for industrial firms are subject to serious measurement errors (McNichols, 2002). For example, Dechow et al. (2010) show that in cross-industry samples it is difficult to disentangle the smoothness of reported earnings that reflect the smoothness of the (i) fundamental earnings process, (ii) accounting rules, and (iii) intentional earnings manipulation. McNichols (2002) also argues that the complexity associated with the modeling of estimation errors in aggregate accruals is daunting, and that proxies based on aggregate accruals have poor construct validity. Because LLP (LLA) has a more uniform accrual-generating process, it can be decomposed into its nondiscretionary and discretionary components more accurately, thus increasing the power of tests related to discretionary accounting choices.

Bank managers' use of reporting discretion can be classified into two categories based on their motivation. The first is bank managers' use of discretion for reasons of efficiency. For example, they may use LLP (LLA) to signal private information, smooth income to reduce perceived risk, or obtain external financing. The second is their use of discretion for opportunistic reasons. For example, they may use LLP (LLA) to meet or beat performance benchmarks, increase reported income, or enhance job security. The rest of this presentation reviews some of the most important topics relating to bank managers' reporting discretion.

2.1.1. Signaling

Bank managers have an incentive to communicate their private information on the bank's favorable future prospects. One approach is to signal that the bank is strong enough to absorb future potential losses by increasing current LLP. A common explanation for why increased current LLP constitutes good news is that bank managers are more likely to take hits to current earnings when the bank's future earnings prospects are favorable (Lobo and Yang, 2001). The main empirical approach used to test the signaling hypothesis is to examine the relation between current returns and current discretionary LLP or that between changes in future cash flows and current discretionary LLP. Current discretionary LLP should be positively related to both abnormal returns and changes in future cash flows under the signaling hypothesis.

There is considerable evidence supporting the signaling hypothesis. Beaver et al. (1989) recognize that investors interpret an unexpected increase in LLP as a signal of a bank's financial strength. Scholes et al. (1990) find that bank managers can lower their cost of capital by conveying private information to investors by exercising discretion over LLP. Wahlen (1994) offers evidence to show that bank managers increase the discretionary component of current LLP when cash flow prospects are expected to improve in future. Consistent with Wahlen's (1994) findings, Beaver and Engel (1996) also find a positive relationship between bank's discretionary LLP and stock price. Moreover, Beaver et al. (1997), Liu et al. (1997) and Kanagaretnam et al. (2009) also document evidence of signaling. Ahmed et al. (1999), in contrast, find no evidence in support of signaling and do not observe a positive relationship between one-year-ahead change in operating cash flows and discretionary LLP.

2.1.2. Smoothing

Bank managers' income smoothing behavior has long been the subject of considerable attention from the SEC and banking agencies. In fact, LLP is one of the items under scrutiny by the SEC's task force on earnings management (*The Wall Street Journal*, 16 November 1998). Banks have strong incentives to smooth income to avoid potential regulatory monitoring due to unusually high or low levels of earnings and to reduce their perceived risk. The implicit assumption is that regulators pay particular attention to banks with unusually high or

low earnings (Lobo and Yang, 2001). Beatty et al. (1995) also confirm that regulators monitor banks based on their earnings. Given that LLP is an expense, banks can decrease their income in good times by increasing their LLP and increase their income in bad times by decreasing it. The general approach to testing the smoothing hypothesis is to examine the relation between discretionary LLP and contemporaneous earnings before taxes and provisions.

Numerous studies explore the use of discretion over LLP for smoothing income, but the evidence is mixed. Wahlen (1994), for example, documents a positive relationship between unexpected provisions and current pre-loan loss earnings, which means that the discretionary components of unexpected provisions are used to smooth earnings. Kanagaretnam et al. (2004) find the propensity to smooth income to be stronger for banks with good or poor current performance relative to those with moderate performance. Collins et al. (1995), Liu and Ryan (2006), Fonseca and Gonzalez (2008) and Kilic et al. (2013) also report evidence in support of smoothing. Moyer (1990), Beatty et al. (1995) and Ahmed et al. (1999), in contrast, find no evidence of smoothing. Beatty et al. (1995) fail to find any evidence of LLP being used to manage earnings, and Wetmore and Brick (1994) argue that the income smoothing incentive is not a major factor in determining LLP.

2.1.3. Risk-taking

Banks can also use their discretion over LLP (LLA) to manage risk. They can do so by recognizing LLP (LLA) earlier (later), which creates incentives for taking less (more) risk. For example, banks can manage risk-taking by being more or less conservative in their LLP (LLA) accounting. Banks with a high reported LLP and low reported income in the current period will draw the attention of regulators, and thus limit their risk-taking. Moreover, banks' loan officers are evaluated by the net amount they earn from loans. Hence, if a bank is quite conservative in reporting the LLP for each loan, the LLP amount becomes larger and the loan officer earns less. Under this scenario, loan officers may typically have incentives to take fewer risks in granting loans. The general approach used to test the risk-taking hypothesis is to examine the relation between discretionary LLP (LLA) and risk-taking.

There is some evidence indicating that banks use their discretion over LLP (LLA) for risk management purposes. Jin et al. (2016) argue that banks use their discretion over LLA for efficiency rather than opportunistic purposes, which means that they use that discretion to build a cushion to write off future losses and manage risk, not to manage earnings. Bushman and Williams (2012) also find banks that smooth earnings through LLP have less risk-taking discipline, possibly because the reduced transparency makes external monitoring more difficult, whereas banks that recognize LLP in a more timely manner exhibit greater such discipline.

2.1.4. Capital management

Banks have incentives to meet regulatory minimum capital requirements by managing LLP because regulators monitor banks using accounting-based capital measures. The capital management hypothesis predicts that the capital ratio is negatively related to LLP because bank managers with low capital ratios can increase them by charging more LLPs to reduce the regulatory costs imposed by capital adequacy ratio regulations (Lobo and Yang, 2001). Ryan (2011) notes that banks' LLA was included in their primary capital without limit prior to 1990. Hence, their ability to influence their capital adequacy ratios through LLA was much greater prior to 1990 than it is now.

The general approach used to test the capital management hypothesis is to examine the relation between a bank's proximity to the minimum capital ratio and discretionary LLP. As stated above, using data from the pre-1990 period, several studies have found evidence consistent with the capital management hypothesis (Moyer, 1990; Beatty et al., 1995; Collins et al., 1995; Ahmed et al., 1999).

2.2. Role of formal and informal institutions

As previously noted, there are many interesting topics concerning whether and how formal and informal institutions affect the behavior of banks. Several studies discuss the implications of institutional differences for banks' income smoothing, risk-taking, earnings management and earnings quality. Formal institutions refer to the rule of law and efficiency of the judicial system and/or bank-specific regulations, whereas informal

institutions refer to culture, religion and trust. The general approach to testing the role of formal and informal institutions in the banking industry is to examine differences in the earnings properties and/or risk-taking behavior of banks in countries where these institutions are strong or weak.

Recently, several studies have documented evidence on the implications of formal and informal institutions in the banking industry. For example, Kanagaretnam et al. (2011, 2014) find the uncertainty avoidance and individualism dimensions of national culture to be related to earnings quality, reporting conservatism and risk-taking. They also provide evidence on the relation between legal, extra-legal and political institutional factors and earnings quality (Kanagaretnam et al. 2014). Moreover, Fonseca and Gonzalez (2008) show that banks' income smoothing depends on investor protection, disclosure, regulatory supervision, financial structure and financial development.

2.3. Relevance of fair value

Banks have numerous financial instruments that are subject to fair value reporting, which renders the banking industry a perfect setting in which to explore the implications of fair value accounting. The underlying theme in the literature is that fair value provides more relevant but perhaps less reliable information to investors. There is a tradeoff between relevance and reliability. Hence, the overall usefulness of fair value accounting remains unclear. The general approach to testing its relevance in the banking industry is to examine the explanatory power of fair value versus historical cost measures of financial instruments for the market value of equity or to compare the coefficients relating fair value and historical cost measures to the market value of equity.

Early studies such as Barth et al. (1996), Eccher et al. (1996) and Nelson (1996) find some evidence to suggest that disclosures (under SFAS 107) are not value-relevant, whereas Venkatachalam (1996) documents value relevance (for SFAS 119 disclosures). More recently, Ahmed et al. (2006) examine whether investors' valuations of derivative fair value (before and after SFAS 133) differ depending on whether they are recognized or disclosed. Song et al. (2010) show the value relevance of level-1 and level-2 fair value (under SFAS 157) to be greater than that of level-3 fair value. Moreover, Ahmed et al. (2011) report that derivative disclosures under SFAS 133 provide risk-relevant information to debt holders.

2.4. Role of auditing

The banking industry is also a good setting in which to investigate auditor independence and the implications of audit quality. There is mixed evidence of a relation between abnormal audit fees and abnormal accruals for industrial firms. It is unclear whether this mixed evidence is the result of greater auditor independence or whether impaired auditor independence is masked by error in measuring earnings management. As previously noted, total accruals are more easily decomposed into discretionary and non-discretionary components in the banking industry, and thus an undistorted relation between earnings management and auditor interdependence seems likely.

Several recent studies have discussed the role of auditing in the banking industry. Kanagaretnam et al. (2010a), for example, find auditor independence to be impaired only for small banks. Kanagaretnam et al. (2010b) consider a sample of banks from 29 countries, and show that the presence of Big 4 auditors and industry specialist auditors reduces earnings management. Moreover, Kanagaretnam et al., 2009 report that discretionary LLP is more informative for banks audited by Big 5 auditors and industry specialist auditors.

3. Concluding remarks

As indicated at the start of this review, the banking industry is a rich and rewarding setting for addressing a variety of important and interesting accounting issues. This review does not cover all the interesting questions that have been studied. The recent reviews by Beatty and Liao (2014) and Bushman (2014) provide more detailed discussions and cover a wider range of topics. These papers will help you gain a deeper understanding of and appreciation for the interesting and wide-ranging accounting research questions that have been addressed in the banking setting.

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Regulatory pressure and income smoothing by banks in response to anticipated changes to the Basel II Accord ☆

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Retail banking

ABSTRACT

We examine the effects of the revised Basel II rules on bank managers' discretionary behavior, specifically income smoothing and loan loss provisioning. As the revised rules exert greater regulatory pressure on corporate than retail banking, we predict corporate bank managers to reduce risk-taking activities or increase income smoothing. Analysis of segmental reports reveals greater (less) income smoothing in the corporate banking segments of low-capital (high-capital) banks during the Basel II period, with their managers recognizing loan loss provisions in a less timely fashion. We find no such effects for retail banking. Although we document an initially negative market reaction to the regulatory announcements, that reaction weakens over time. Overall, the study highlights the unintended consequences of the banking rule changes.

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1. Introduction

The Basel II Accord places greater emphasis on the risk sensitivity of bank assets than the 1988 Basel Accord (i.e., Basel I). Basel II's aim was to constrain banks' risk-taking activities by imposing higher capital requirements on banks with riskier assets (Basel, 2006). As banks make a trade-off concerning the returns and risks of various activities, they may engage in more or fewer risk-taking activities in response to the proposed changes in Basel II. In this study, we examine whether those changes are associated with a greater amount of discretionary behavior in bank financial reporting. Our findings suggest that the proposed changes to the banking rules in Basel II may have had unintended consequences. The decision to require banks to improve their capital adequacy placed some banks under increased regulatory pressure to engage in manipulative behavior in the form of income smoothing and less timely loan loss recognition.

Prior banking research shows that bank managers have incentives to engage in three types of discretionary behavior (e.g., Beatty et al., 1995; Collins et al., 1995; Beaver and Engel, 1996; Ahmed et al., 1999; Kanagaretnam et al., 2004; Perez et al., 2008). First, bank managers are prone to managing capital because proper capital management is crucial to determining the effectiveness of bank operations. More specifically, they decrease (increase) loan loss provisions when their banks' capital adequacy ratios are high (low). Second, bank managers have incentives to engage in income smoothing behavior, that is, to decrease (increase) loan loss provisions when current period income is low (high). Third, bank managers may also engage in discretionary behavior to signal future earning performance. Thus, they increase loan loss provisions when they anticipate that future income will be high.

Here, we examine how bank managers react to the proposed regulatory changes to Basel II. Our specific focus is on the effects of these changes on income smoothing and the timeliness of loan loss provisioning. By imposing more stringent capital requirements and the stricter monitoring of risky banks, the aim of the Basel II rules was to remedy a major weakness of the Basel I Accord, that is, its failure to distinguish between the levels of credit risk in commercial and industrial loans (Jacques, 2008). Under Basel I, all commercial loans, regardless of credit quality, are assigned a 100% risk weight. The Basel II rules, in contrast, take into account differences in the credit ratings of the loans banks hold (Basel, 2006). Thus, Basel II is expected to reduce banks' risk-taking incentives (Elizalde, 2007).

Corporate banking is generally viewed as riskier than retail banking (Kohler, 2013).[2] Hence, we expect the revised Basel II rules to adversely affect corporate and investment banking to a greater extent than retail banking. The increased regulatory pressure may induce corporate banking managers to either reduce their risky activities or engage in greater income smoothing to reduce earnings volatility and perceived risk. Corporate banking managers in banks with low capital adequacy ratios need to maintain risky activities to sustain their revenue streams. Hence, any reduction in those activities will negatively affect earnings and shrink the bank's earnings base. Accordingly, we predict the corporate banking managers of low-capital banks to be likelier to engage in greater income smoothing to reduce perceived earnings volatility and risk than their counterparts in banks with high capital adequacy ratios, who have the capacity to curtail their risk-taking activities, and hence may not resort to income smoothing.

We also examine the effects of the rule changes on the timeliness of loan loss recognition in both the corporate and retail banking sectors. The Basel II rules impose a more sophisticated risk assessment structure on banks than the Basel I rules. They require banks to assess their capital adequacy and risk positions with greater accuracy. Although the banks in our sample use the incurred loan loss provisioning method specified by either U.S. generally accepted accounting principles (GAAP) or International Financial Reporting Standards (IFRS), they still enjoy substantial discretion in determining their loan loss provisions. One possibility is that the greater risk sensitivity required in regulatory reporting may spill over to banks' financial reporting practices, with the result that they are timelier in recognizing loan loss provisions in their loan portfolios.

[2] We define retail banking as comprising the following segments: consumer/retail banking, including credit card services, community banking and commercial banking to small- and medium-sized enterprises (SMEs). Consequently, we define corporate banking as comprising the following segments: corporate banking and investment banking, asset/fund management, treasury/global markets, wealth/private banking and wholesale banking. Hence, for a typical bank, retail and corporate banking activities constitute the entirety of banking operations.

Another possibility, however, is that the stricter capital requirements exert greater regulatory pressure on banks to delay their loan loss recognition to artificially bolster their reserves. We expect the corporate banking managers in low-capital banks to be more inclined toward imposing less timely loan loss provisions because they are more adversely affected by the Basel II rule changes.

We use a sample of banks from the countries that led the Basel II Accord (i.e., the U.S., the U.K., various European countries, Canada and Australia) to examine the effects of bank regulatory changes on bank managers' discretionary behavior. We obtain data on these banks from the Bankscope database. Our sample period ranges from 1999 to 2007 because the revised Basel II Accord was first conceptualized in 1999, and had been implemented by the majority of banks by 2007.[3] We partition the sample into high-Tier 1 capital banks and low-Tier 1 capital banks. We analyze banks at the segmental reporting level because we are interested in assessing the differential effects of Basel II on the different business segments within a bank. Hence, we hand-collect data on the loan loss provisions and profits before those provisions and taxes of corporate banking and retail banking from the segmental reporting section within the footnote disclosures of each bank's financial statements.

We find evidence of income smoothing by corporate banking managers in low-capital banks from 2003 to 2007 (hereafter, the "Basel II period"). Relative to the pre-Basel II period, these managers are observed to increase (decrease) their loan loss provisions when the level of prior-period pre-tax earnings before those provisions is high (low). Consistent with Kanagaretnam et al. (2004), this evidence indicates the presence of income smoothing. In additional tests, we document a more pronounced income smoothing effect in the 2005–2007 than in the 2003–2004 period.

In a second set of tests, we observe a delay in the timeliness of loan loss provision recognition by corporate banking managers in low-capital banks during the later Basel II period (i.e., 2005–2007). This result indicates that corporate banking managers in weaker banks faced greater regulatory pressure and thus engaged in manipulative behavior in anticipation of the changes imposed by Basel II. In contrast, we document no differences over time in the timeliness of loan loss provisions for retail banking during our sample period.

Finally, we examine how market participants interpreted and reacted to the effects of these rule changes on the banks affected. Consistent with our hypothesis, we find that the market initially reacted negatively to regulatory announcements regarding Basel II implementation across banks. That negative market reaction is also found to be stronger for banks with more corporate banking than retail banking exposure. We further find the initial negative market reaction to have weakened over time as banks became more geared toward implementing the Basel II rule changes. Overall, these findings provide support for the view that Basel II imposes differential market pressure on banks.

This study contributes to the stream of research exploring the interaction between bank manager behavior and regulatory changes. In particular, we examine how bank managers anticipate and respond to the changes to banks' operating environments imposed by the regulatory authorities. Although prior research considers how the revised Basel II guidelines have affected banks in terms of capital management and procyclicality (e.g., Gordy and Howells, 2006; Perez et al., 2008), there is little research examining whether those guidelines induced changes in banks' financial reporting behavior and financial reporting quality. We show that the greater regulatory pressure and more intense competitive environment arising from the more stringent capital requirements in Basel II induced greater income smoothing and deferred loan loss provisioning by bank managers. Our findings have implications for regulators and accounting standard setters concerned with whether changes to banks' regulatory environment may lead to a deterioration in their financial reporting quality. The findings are particularly timely, as banks are starting to assess and prepare for the likely effects of the proposed Basel III rules on their capital structure and operating profitability.

[3] Unlike many regulatory changes, there is no definite cutoff date for Basel II implementation. Instead, the Accord allows for phased implementation across different jurisdictions and banks. We end the sample period in 2007 because of the global financial crisis of 2008, which imposed significant changes on banks' operations and discretionary reporting behavior. Including the financial crisis years in our sample would have confounded our results because of the difficulty of disentangling the effects of the crisis on managerial behavior from those of the Basel II regulatory changes. In a sensitivity check, we repeat our analysis with 2007, the year Basel II took effect in the U.S., excluded from the sample period, and the results remain robust.

The next section develops our hypotheses and discusses the institutional background surrounding Basel II implementation. Section 3 describes the sample and empirical measures. Section 4 discusses the test results, and Section 5 concludes.

2. Literature review and hypothesis development

2.1. Basel II changes

The Basel II rules have effected substantial changes in the banking regulatory environment. In particular, they impose more refined risk measurement rules that affect both retail banking and corporate banking. As a result of the changes effected by the 1988 Basel I Accord on the existing framework, there are several approaches that banks can take to assess the credit risks in their loan portfolios: (1) the standardized approach, (2) the foundation internal ratings-based (F-IRB) approach and (3) the advanced internal ratings-based (A-IRB) approach (Basel, 2006).[4] Overall, the risk sensitivity and stringency of capital calculations have increased under the Basel II rules relative to Basel I. Hence, bank operations are now under greater regulatory pressure.

The risk assessment modifications in the Basel II Accord affect the retail and corporate banking sectors differently. Banks' business areas generally comprise housing loans, credit cards, retail loans such as car loans, student loans and personal loans, corporate loans, retail and corporate deposits, wealth and asset management, and such investment banking activities as equity and bond placements and treasury trading (Dermine, 2015). These banking activities can be broadly classified by client type. The clients of a bank's retail banking business are individuals and SMEs, and retail banking thus comprises housing loans, credit cards and retail loans and deposits. The clients of its corporate banking business, in contrast, are large corporations, and corporate banking thus involves corporate loans and deposits, wealth and asset management, investment banking and treasury trading.

The banking literature suggests that the Basel II revisions appear to favor retail banking (Altman and Sabato, 2005; Berger, 2004). The Basel II Accord stipulates that retail banking exposure (excluding mortgage loans) and loans secured by residential properties using the standardized approach are risk-weighted at 75% and 35%, respectively. Past-due loans are risk-weighted at 150% (100%) when specific provisions are less than (no less than) 20% of the outstanding loan amount. Exposure to sovereign states, banks, public sector entities and corporations is risk-weighted on the basis of external credit ratings in the standardized approach. For example, the risk weights on corporate loan exposure range from 20% for borrowers rated AAA/AA− to 150% for borrowers rated below BB−. Under the two IRB approaches, banks must provide estimates of the risk parameters in their risk models for retail loan exposure.[5] With regard to corporate banking exposure, the F-IRB approach requires banks to provide their own estimates of the probability of default (PD), but to use supervisory estimates for the other risk parameters, whereas banks using the A-IRB approach must calculate all of the risk components. The different risk weights and risk component estimates specified in Basel II thus lead to differential capital requirements for retail and corporate banking.

Prior research examining the effect of the revised Basel II guidelines on banks is primarily concerned with whether the rule changes exacerbate the procyclicality inherent in their lending behavior (e.g., Gordy and Howells, 2006). Gordy and Howells (2006) find that the changes do indeed exacerbate such procyclicality. More specifically, the risk-sensitive capital requirements in the Basel II rules reinforce the procyclicality of bank behavior in the following manner. As bank assets and loans are assigned higher risk weightings during economic downturns, the capital required during those downturns increases. At the same time, capital positions tend to deteriorate as loan losses accelerate. Such a situation induces banks to reduce lending and

[4] All three approaches increase the sensitivity of capital requirements to risk assessments. However, the way in which risk is calculated varies depending on the approach banks adopt. More specifically, the standardized approach uses standard risk buckets and risk weights that vary by product, credit rating and collateral. In contrast, banks that apply the F-IRB or A-IRB approaches calculate credit risks based on their internal risk models.

[5] The risk parameters in these risk models are probability of default (PD), loss given default (LGD), and exposure at default (EAD) and maturity (EAM).

increase lending margins, thereby contributing to procyclicality. A recent study in the Australian regulatory setting reports the country's forward-looking regulatory provisions to prompt managers to use their discretion in setting regulatory provisions to dampen the influence of credit market volatilities on lending activities (Cummings and Durrani, 2014). However, what is left unaddressed in this stream of research is whether the revised Basel II rules effect changes in banks' financial reporting behavior and financial reporting quality.

2.2. Hypothesis development

A theoretical reason for banks to engage in income smoothing is to reduce the perceived risk inherent in banking operations because such smoothing reduces earnings variability, which in turn reduces perceived risk (Francis et al., 2004). The revised rules under Basel II exert greater regulatory pressure on bank managers, as the introduction of more refined risk measurement stipulations imposes greater capital requirements, which can in turn have an adverse influence on profitability. As a result, we hypothesize that the rules increase the pressure on bank managers to engage in income smoothing. In addition, for the reasons discussed earlier, we expect the increased regulatory pressure arising from the Basel II Accord to exert differential effects on the income smoothing activities of corporate and retail banking managers.

Prior to Basel II implementation, corporate and investment banking had advantages over retail banking, as it faced lower capital requirements. However, regulators and governments have recognized the greater risks posed by corporate and investment banking, particularly in the wake of the 2008 global financial crisis. Hence, greater attention is now paid to the risks associated with corporate banking, with specific capital rules imposed on it in Basel II. To mitigate the perceived higher risks resulting from the regulatory changes, corporate banking managers can either reduce risk-taking activities or engage in more income smoothing activities.

The corporate banking managers in weaker banks, i.e., those with a low capital adequacy ratio, face constraints in reducing their risk-taking activities because such activities tend to generate greater earnings, thereby increasing the shareholder equity that constitutes part of the banks' Tier 1 capital. Hence, these managers may resort to greater income smoothing to mask the extent of their risk-taking activities. Corporate banking managers in stronger banks, i.e., those with a larger capital base, have more choices: they can either reduce risk-taking activities or engage in income smoothing to mitigate the market pressures arising from the greater Basel II-imposed risk sensitivity. If they reduce their risk-taking activities, their actual earnings variability declines. Consequently, these managers do not need to engage in as much income smoothing as their counterparts in low-capital banks. We thus hypothesize that increased regulatory pressure induces corporate banking managers in weaker banks to increase their degree of income smoothing. Expressed in alternative form, our first hypothesis is as follows.

H1. Corporate banking managers in banks with low capital adequacy ratios engaged in more income smoothing during the Basel II period.

Another important issue is whether there were changes in the timeliness of loan loss provisions during the Basel II period. On the one hand, the Accord's revised rules impose changes on the risk assessment framework of banks' loan portfolios, allowing them to more accurately assess their capital adequacy and risk positions. As a result, banks may be in a better position to enact timelier loan loss provisions in their loan portfolios. On the other hand, the resulting increase in regulatory pressure may induce banks to delay loan loss recognition. Corporate banking managers, in particular, may be inclined to impose less timely loan loss provisions because they are more adversely affected by the Basel II implementation rule changes than their retail counterparts. Liu and Ryan (1995) hypothesize that the timeliness of loan loss provisions decreases as discretion over those provisions increases. As bank managers tend to have more discretion over larger loans (e.g., corporate loans) than smaller loans (e.g., consumer loans), we predict that corporate banking managers use their discretion to engage in less timely loan loss provisioning. More specifically, we expect a delay in the timeliness of loan loss recognition among corporate banking managers in low-capital banks as a result of the Basel II rule changes. Accordingly, we express our second hypothesis in alternative form as follows.

H2. Corporate banking managers in banks with low capital adequacy ratios engaged in delayed loan loss provision recognition during the Basel II period.

Finally, we also examine the market reaction to a series of Basel II announcements. If the Basel II rules impose greater regulatory pressure on corporate than retail banking, then we expect a negative market reaction to those announcements because the regulatory changes adversely affect the capital adequacy ratios of banks with more corporate banking than retail banking exposure. In contrast, we expect the market to react favorably to the Basel II announcements if it anticipates the revised rules to enhance the competitiveness and capital adequacy of the affected banks. How market participants react to the series of regulatory announcements concerning the Basel II changes is an empirical question. Thus, we express our third hypothesis in null form, as follows.

H3. There is no difference in the market reaction to the Basel II announcements between banks with more corporate banking exposure and those with more retail banking exposure.

3. Research design

Our sample comprises banks from the U.S., U.K., Europe, Canada and Australia, with data drawn from the Bankscope database for the 1999–2007 period. For each bank, the loan losses and profits before taxes are disclosed and reported at the business segment level (i.e., retail and corporate banking) in the footnote disclosures in its annual financial reports (see Appendix A). We hand-collect the segmental information pertaining to retail and corporate banking for each bank in our sample. The data for the other variables (i.e., non-performing loans, change in non-performing loans, loan growth and Tier 1 capital ratios) are obtained from Bankscope or, if unavailable, collected manually from the banks' annual reports.

We estimate the following regression to test our first hypothesis.

$$\begin{aligned} LL_{it} = {} & \alpha_0 + \alpha_1\ Retail_{it} + \alpha_2\ Corp_{it} + \alpha_3 Lowcap * Retail_{it} + \alpha_4\ Lowcap * Corp_{it} + \alpha_5 Basel * Retail_{it} \\ & + \alpha_6 Basel * Corp_{it} + \alpha_7 Basel * Lowcap * Retail_{it} + \alpha_8 Basel * Lowcap * Corp_{it} + \alpha_9 CAP_{it} \\ & + \alpha_{10} NPL_{it-1} + \alpha_{11} \Delta NPL_{it} + \alpha_{12} \Delta LOAN_{it} + \alpha_{13} Lowcap_{it} + \varepsilon_{it}, \end{aligned} \tag{1}$$

where *LL* is measured as *LLcorp*, *LLretail* or the sum of the two; *LLcorp* (*LLretail*) is the corporate (retail) banking segment's provisions for loan losses; *Retail* (*Corporate*) is the retail (corporate) banking's segmental profit before taxes and loan loss provisions; *Lowcap* is an indicator variable that equals 1 for banks with a below-median Tier 1 capital ratio (i.e., low-capital banks), and 0 otherwise (i.e., high-capital banks); and *Basel* is an indicator variable that equals 1 if the bank-year observation is in the Basel II period, and 0 otherwise. The Basel II period spans from 2003 to 2007, when the third and final consultative paper on Basel II was issued by the Basel Committee and consensus on the Basel II framework was achieved. A reaction to the impending Basel II rules is expected from both the market and banks in this period.

The foregoing regression equation is adapted from those in Kanagaretnam et al. (2004) and Gebhardt and Novotny-Farkas (2011). Similar to their equations, to control for the non-discretionary portion of loan provisions, we include *CAP*, which is a bank's Tier 1 capital ratio; *NPL*, which is its nonperforming loans at the beginning of the year; ΔNPL, which is the change in nonperforming loans from the prior to current year; and $\Delta LOAN$, which is the change in total loans outstanding from the prior to current year. Thus, our regression specification relates the discretionary portion of corporate (retail) banking loan provisions to corporate (retail) banking segmental profits before taxes and loan provisions.

Model (1) estimates the income smoothing coefficients of each combination of *Corp*/*Retail*, High-/Low-Tier I capital ratios and Basel II/Pre-Basel II periods. In line with prior research (e.g., Kanagaretnam et al., 2004), the baseline measures of income smoothing are α_1 and α_2. A positive α_1 (α_2) suggests that retail (corporate) banking managers increase their loan loss provisions with an increase in profits before taxes and loan provisions in the pre-Basel II period. We interact our measure of loan smoothing with banks' Tier 1 capital. In these interaction variables, a positive α_3 (α_4) equates to the managers who oversee the retail (corporate) banking business of their banks engaging in more income smoothing activities when their Tier 1 capital is below the median Tier 1 capital ratio in our sample.

To test H1, we examine whether the coefficients on *Basel*∗*Lowcap*∗*Retail* and *Basel*∗*Lowcap*∗*Corp* are significant and positive. A positive α_7 (i.e., the coefficient on *Basel*∗*Lowcap*∗*Retail*) means that the retail banking

managers in low-capital banks manage loan loss provisions to a greater extent to smooth pre-tax profits during the Basel II period. Similarly, a positive α_8 (i.e., the coefficient on *Basel*∗*Lowcap*∗*Corp*) means that loan loss provisions are used to a greater extent to smooth pre-tax profits by corporate banking managers in low-capital banks during the Basel II period. We thus interpret a statistically significant positive coefficient on α_7 (α_8) as implying that retail (corporate) banking managers in low-capital banks engaged in more income smoothing activities in anticipation of the Basel II rule changes.

For our second hypothesis, we estimate the following regression model.

$$\begin{aligned} LL_{it} = {} & \alpha_0 + \alpha_1 Retail_{it} + \alpha_2 Corp_{it} + \alpha_3 \Delta NPL_{it} + \alpha_4 \Delta LagNPL_{it-1} + \alpha_5 \Delta LOAN_{it} + \alpha_6 Lowcap_{it} + \alpha_7 Basel \\ & + \alpha_8 Lowcap_{it} * Basel + \alpha_9 Lowcap_{it} * \Delta NPL_{it} + \alpha_{10} Lowcap_{it} * \Delta NPL_{it-1} + \alpha_{11} Lowcap_{it} \\ & * \Delta LOAN_{it} + \alpha_{12} Basel * \Delta NPL_{it} + \alpha_{13} Basel * \Delta NPL_{it-1} + \alpha_{14} Basel * \Delta LOAN_{it} + \alpha_{15} Lowcap_{it} \\ & * Basel * \Delta NPL_{it} + \alpha_{16} Lowcap_{it} * Basel * \Delta LagNPL_{it-1} + \alpha_{17} Lowcap_{it} * Basel * \Delta LOAN_{it} + \varepsilon_{it}. \end{aligned} \quad (2)$$

Model (2), which is adapted from Beatty and Liao (2011), relates current *LL* to current and prior changes in *NPL* for each combination of *Corp*/*Retail*, High-/Low-Tier I capital ratios and Basel II/Pre-Basel II periods, where *LL* is measured as either *LLcorp* or *LLretail*, as defined in Eq. (1). This model also includes Δ*LOAN* and *Lowcap* as control variables. The coefficients of interest are those on Δ*NPL* and Δ*LagNPL*. These coefficients measure the timeliness of loan loss recognition, with a positive coefficient indicating that loan loss provisions reflect the change in non-performing loans in a timelier manner.

H2 posits a delay in the timeliness of loan loss provisioning in the Basel II period for corporate banking managers in low-capital banks. Our baseline measurement variables are α_1 and α_2, which are the coefficients on Δ*NPL* and Δ*LagNPL*. These measures of the timeliness of loan loss provisions are based on the measures in Beatty and Liao (2011) and Bushman and Williams (2012). A positive α_3 and α_4 demonstrate that these provisions capture the increase in the timeliness of non-performing loan recognition in the pre-Basel period. Because we are interested in the extent of that timeliness in the Basel II period, our variables of interest are α_{15} and α_{16} (i.e., the coefficients on *Lowcap*∗*Basel*∗Δ*NPL* and *Lowcap*∗*Basel*∗Δ*LagNPL*). Negative values mean that the loan loss provisions capture the change in non-performing loans in the Basel II period in a less timely fashion, indicating that banks delayed loan loss recognition in response to greater regulatory pressure.

For our third hypothesis, we identify 19 events associated with Basel II implementation. Events 1 to 6 cover the period from 1999 to 2002, which encompasses the conceptualization of the Basel II Accord, release of detailed information on the Basel II rule changes (in the second consultative paper) and achievement of general consensus on the major implementation issues concerning the rules. News articles during this period generally indicate that banks would likely be badly hit by the stringent and restrictive Basel II rules, which would be costly to implement. The revised capital requirements, in particular, were viewed as tougher and thus likely to exert more pressure on certain businesses. For example, it was felt that bank loans to SMEs and derivative activities would be adversely affected. Events 7 to 12 cover the period from October 2002 to May 2004, during which the Basel Committee carried out a comprehensive field test on its proposals, issued and obtained public feedback on a third consultation paper, and took decisions on key issues and achieved consensus on the remaining issues. Finally, Events 13 to 19 took place between June 2004 and May 2006. This period saw further refinements of the trading exposure rules, additional quantitative impact studies and evaluation of the IFRS effects on the capital rules concerning implementation of the standardized approach.

Our tests are based on the banks' three-day cumulative abnormal returns centered on each of the 19 event dates: $CAR_{j,e}$, where *j* denotes firm and *e* denotes event. The expected stock return for each bank on each event date is the bank's average stock return one month before the event date. The abnormal return for each bank is its raw stock return less its expected return. The return data from 1999 to 2006 are computed on the basis of total return indices from Datastream. Finally, *t*-tests are run to compare abnormal returns on each event date for the two bank sub-samples. More specifically, we compare the differences in the market reactions for banks' retail and corporate banking businesses and for low- and high-capital banks.

4. Results

4.1. Main results

Panel A of Table 1 presents the distribution of our sample firms by year and country, and Panel B the descriptive statistics of our key variables. Three hundred and eighty-six observations are from U.S. banks, and 316 from non-U.S. banks. The sample is evenly distributed across the sample period, with a gradual increase in the number of bank-year observations throughout. As shown in Panel B, loan losses and profits before taxes and loan losses are generally higher in the retail banking segment than in the corporate banking

Table 1
Sample composition. This table describes our sample firms. Panel A reports the sample distribution by country and year. Panel B provides the descriptive statistics of the variables used in our regression analyses. *LLretail* is retail loan losses scaled by prior-year market capitalization; *LLcorp* is corporate loan losses scaled by prior-year market capitalization; *Retail* is retail banking segmental profit before taxes and excluding loan losses scaled by prior-year market capitalization; *Corp* is corporate banking segmental profit before taxes and excluding loan losses scaled by prior-year market capitalization; *CAP* is Tier 1 capital ratio, as defined by the Basel rules; *NPL* is non-performing loans in the prior year scaled by market capitalization; ΔNPL is a change in non-performing loans from the prior year to current year scaled by market capitalization; *Basel* is an indicator variable that is equal to 1 for 2003–2007, and to 0 otherwise; *Basel0304* is an indicator variable that is equal to 1 for 2003–2004, and to 0 otherwise; *Basel0507* is an indicator variable that is equal to 1 for 2005–2007, and to 0 otherwise; and *Lowcap* is an indicator variable for bank-year observations with a Tier 1 capital ratio below the median capital ratio, and 0 otherwise.

	Total		Total
Panel A: Sample distribution			
USA	386	2000	55
Canada	66	2001	65
U.K.	32	2002	70
Australia	28	2003	77
France	12	2004	88
Germany	21	2005	106
Switzerland	22	2006	113
The Netherlands	4	2007	128
Italy	20		
Spain	26		
Sweden	10		
Norway	13		
Belgium	7		
Ireland	16		
Finland	5		
Denmark	10		
Austria	13		
Greece	11		
Total	702	Total	702

	Obs	*Mean*	*Std Dev*	*Median*	*Min*	*Max*
Panel B: Descriptive statistics						
LLretail	702	0.014	0.019	0.010	−0.106	0.166
LLcorp	702	0.006	0.014	0.000	−0.008	0.133
Retail	702	0.083	0.061	0.084	0.000	0.498
Corp	702	0.054	0.060	0.043	−0.059	0.388
CAP	702	0.107	0.075	0.094	0.051	0.920
NPL	702	0.071	0.152	0.024	0.000	2.008
ΔNPL	702	−0.007	0.091	−0.000	−1.425	0.841
$\Delta Loan$	702	−0.132	1.988	0.000	−12.664	13.314
Basel	702	0.729	0.445	0.000	0.000	1.000
Basel0304	702	0.235	0.424	0.000	0.000	1.000
Basel0507	702	0.494	0.500	0.000	0.000	1.000
Lowcap	702	0.499	0.500	0.000	0.000	1.000

segment. More specifically, the mean (median) value of *LLretail* is 0.014 (0.010), whereas that of *LLcorp* is 0.006 (0.000). In terms of profitability, the mean (median) value of *Retail* is 0.083 (0.084), whereas that of *Corp* is 0.054 (0.043). The percentages of mean retail and corporate banking loan losses and mean non-performing loans are 2% and 7.1%, respectively. These measures are scaled by the beginning market value of equity.

Table 2 shows the Spearman correlation matrix. The negative correlations between *Retail* and *LLretail* (*Corp* and *LLcorp*) provide evidence indicating that banks use retail (corporate) banking loan losses to smooth their retail (corporate) banking segmental income. At the business segment level, the negative correlation between *Retail* and *Corp* suggests that banks tend to focus on either retail or corporate banking. That between *NPL* and ΔNPL suggests that the higher the number of non-performing loans in the prior period, the likelier it is that banks are able to reduce the number of such loans in the subsequent period. Finally, the positive correlation between $\Delta Loan$ and ΔNPL shows that greater loan growth leads to an increase in non-performing loans. These results are generally consistent with the empirical evidence in Salas and Saurina (2002).

Table 3 reports the results of our regression analyses examining the effects of income smoothing during the Basel II period using retail and corporate loan losses. The first column presents the results of regressing *LL* on our variables of interest. The coefficient of our key variable, *Basel∗Lowcap∗Corp* (0.2244), is positive and statistically significant at the 0.05 level. We interpret this result as suggesting that the extent of income smoothing is greater for corporate banking than for retail banking among weaker banks in the Basel II period. An *F*-test comparing the extent of income smoothing in the retail banking segment of weak banks $[(\alpha_1 + \alpha_3 + \alpha_5 + \alpha_7) - (\alpha_1 + \alpha_3)]$ against that in the corporate banking segment of weak banks $[(\alpha_2 + \alpha_4 + \alpha_6 + \alpha_{8)} - (\alpha_2 + \alpha_4)]$ suggests a statistically significant difference ($\alpha_5 + \alpha_7 - \alpha_6 + \alpha_8 < 0$) during the Basel II period relative to the pre-Basel period. The difference (-0.1783, $p = 0.068$) is statistically different at the 0.10 level.

In the second and third columns of Table 3, we regress *LLretail* and *LLcorp* separately. The positive coefficients of *Retail* (in the column with dependent variable *LLretail*) and *Corp* (in the column with dependent variable *LLcorp*) show that income smoothing using loan loss provisions occurs in both retail banking and corporate banking. In the *LLcorp* column, the coefficient of *Lowcap∗Corp* is negative, indicating that corporate banking managers in weaker banks with low capital adequacy ratios smoothed their income to a lesser extent prior to the Basel II period. This result suggests that there was less regulatory pressure on corporate banking before Basel II. The coefficient of *Basel∗Corp* is also negative, indicating that the corporate banking business of high-capital banks faced less regulatory pressure during the Basel II period. The coefficient of our key variable, *Basel∗Lowcap∗Corp* (0.2183), is positive and statistically significant at the 0.01 level. Consistent with our first hypothesis, this result suggests that during the Basel II period, corporate banking managers in weaker banks with low capital adequacy ratios faced more regulatory pressure. Consequently, they smoothed income to a greater extent than their counterparts in stronger banks during that period. An *F*-test also shows the extent of income smoothing for the corporate banking segment to have increased (0.1323, $p = 0.023$) among the weaker banks during the Basel II period relative to the pre-Basel period. This result is statistically significant at the 0.05 level. Overall, these results support our first hypothesis that corporate banking managers

Table 2
Correlation Matrix. This table presents the correlations among the variables used in the empirical analyses. Pearson (Spearman) correlations are presented above (below) the diagonal. The variables are defined in Table 1. Correlations in bold are statistically significant at the 0.01 level.

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
LLretail (1)	1.000											
LLcorp (2)	0.09	1.000										
Retail (3)	**0.47**	**−0.12**	1.000									
Corp (4)	−0.05	**0.38**	**−0.31**	1.000								
Cap (5)	**−0.15**	**−0.10**	**−0.15**	−0.05	1.000							
NPL (6)	**0.18**	**0.29**	0.01	**0.24**	**−0.11**	1.000						
ΔNPL (7)	**0.17**	0.00	0.08	−0.04	0.00	**−0.55**	1.000					
ΔLoan (8)	**0.17**	−0.05	**0.11**	−0.01	−0.02	**−0.28**	**0.40**	1.000				
Basel0304 (9)	−0.03	−0.03	0.05	0.05	0.03	0.03	−0.04	−0.02	1.000			
Basel0507 (10)	−0.09	**−0.16**	**−0.13**	0.06	−0.03	−0.04	−0.04	0.01	**−0.55**	1.000		
Basel (11)	**−0.13**	**−0.21**	−0.10	**0.11**	0.00	−0.02	−0.09	−0.01	**0.34**	**0.60**	1.000	
Lowcap (12)	**0.14**	**0.17**	0.02	**0.22**	**−0.38**	**0.19**	0.00	0.00	−0.07	0.07	0.01	1.000

Table 3
Regression Analyses: Basel II (2003–2007) and Income Smoothing. This table reports the results of our regressions examining the effects of income smoothing during the Basel II period using retail and corporate loan losses obtained from the segmental results of banks' footnote disclosures. The variables are defined in Table 1. *p*-values are reported in parentheses.

		LL	*LLretail*	*LLcorp*
Panel A: Multivariate analysis				
Retail	α_1	0.1015***	0.1260***	−0.0245**
		(0.009)	(0.001)	(0.033)
Corp	α_2	0.1507***	0.0018	0.1489***
		(0.008)	(0.967)	(0.000)
Lowcap∗Retail	α_3	0.0226	−0.0142	0.0368
		(0.745)	(0.788)	(0.396)
Lowcap∗Corp	α_4	−0.2293***	−0.0552	−0.1741***
		(0.010)	(0.436)	(0.006)
Basel∗Retail	α_5	0.0583	0.0445	0.0139
		(0.315)	(0.386)	(0.526)
Basel∗Corp	α_6	−0.0416	0.0444	−0.0860**
		(0.519)	(0.368)	(0.029)
Basel∗Lowcap∗Retail	α_7	−0.0538	−0.0331	−0.0207
		(0.545)	(0.642)	(0.688)
Basel∗Lowcap∗Corp	α_8	0.2244**	0.0061	0.2183***
		(0.024)	(0.935)	(0.002)
Cap	α_9	−0.653*	−0.0388	−0.0265***
		(0.067)	(0.222)	(0.007)
NPL	α_{10}	0.1779***	0.0952**	0.0827***
		(0.002)	(0.021)	(0.010)
ΔNPL	α_{11}	0.1345	0.0824	0.0521
		(0.214)	(0.333)	(0.135)
$\Delta Loan$	α_{12}	0.0017	0.0014	0.0003
		(0.136)	(0.197)	(0.252)
Lowcap	α_{13}	−0.0483*	−0.0358*	0.0126
		(0.077)	(0.063)	(0.485)
Basel	α_{14}	−0.0090	−0.0103	0.0012
		(0.349)	(0.238)	(0.752)
Year effects		Yes	Yes	Yes
Country effects		Yes	Yes	Yes
Observations		702	702	702
Adjusted R-square		0.4054	0.3732	0.3384

	LL	*LLretail*	*LLcorp*
Panel B: Hypothesis testing (F-test)			
Retail versus corporate banking			
High-capital banks:	0.0999		
$\alpha5 - \alpha6 < 0$	(0.073)		
Low-capital banks:	−0.1783		
$\alpha5 + \alpha7 - \alpha6 - \alpha8 < 0$	(0.068)		
Low-capital banks (retail banking)			
Overall effect (Basel II period):		0.1232	
$\alpha1 + \alpha3 + \alpha5 + \alpha7 > 0$		(0.000)	
Basel II period – Pre-Basel period:		0.0114	
$\alpha5 + \alpha7 > 0$		(0.821)	
Low-capital banks (corporate banking)			
Overall effect (Basel II period):			0.1071
$\alpha2 + \alpha4 + \alpha6 + \alpha8 > 0$			(0.000)
Basel II period – Pre-Basel period:			0.1323
$\alpha6 + \alpha8 > 0$			(0.023)

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

in low-capital (high-capital) banks engaged in more (less) income smoothing activities during the Basel II period. In contrast, we document no differential effect in relation to income smoothing for the retail banking segment during that period.

Table 4 reports the results of a regression comparing time-series differences in income smoothing trends during the Basel II period. We partition our sample observations into two periods: the early Basel II period (2003–2004) and late Basel II period (2005–2007). The positive (negative) and statistically significant coefficient of the key variable, *Basel0507∗Lowcap∗Corp* (*Basel0507∗Corp*), is present in the late Basel II period (Table 4, Panel B), but not in the early period (Table 4, Panel A), which suggests that corporate banking managers in low-capital (high-capital) banks engaged in more (less) income smoothing in the former period.

We also run several *F*-tests to validate our inferences. Consistent with the foregoing result, we find that the *F*-test difference between retail and corporate banking for low-capital banks during the early Basel II period is not statistically significant (-0.0202, $p = 0.755$), whereas that for low-capital banks is (-0.115, $p = 0.10$). Thus, we document evidence suggesting that corporate banking managers intensified their income smoothing activities in the latter part of our sample period.

Table 5 reports the results of regressions examining the timeliness of loan loss provisions for corporate and retail banking during the latter part of the Basel II period (i.e., 2005–2007). When the dependent variable is *LLcorp*, the key coefficient of *Lowcap∗Basel0507∗ΔNPL* is negative and statistically significant (-0.082, $p = 0.084$), which suggests that corporate banking loan loss provisions capture the change in non-performing loans on a less timely basis in the late Basel II period. We document no effect for the timeliness of such provisions for retail banking throughout the sample period. In robustness tests, we remove European banks from the sample, as IFRS came into effect in Europe in 2005, but the key results remain unchanged. Overall, our findings provide some evidence in support of our second hypothesis that corporate banking managers in low-capital banks provided less timely loan loss provisions during the Basel II period.

For the dependent variable *LLcorp*, the coefficient of *Lowcap∗ΔNPL* (0.084. $p = 0.054$) is positive and statistically significant, which indicates that, prior to the Basel II period, corporate banking managers in low-capital banks exhibited greater timeliness than their counterparts in high-capital banks in recognizing loan loss provisions. However, there are fewer corporate banking loan loss provisions in the Basel II than in pre-Basel II period, particularly for low-capital banks. More specifically, the coefficient of *Lowcap∗Basel0507* (-0.004, $p = 0.049$) is negative and statistically significant at the 0.05 level. Consistent with our prediction that retail banking has been relatively less affected by the regulatory changes, we find the foregoing results to lose their statistical significance when the dependent variable is *LLretail*.

4.2. Enforcement tests

Tables 6 and 7 report the results of additional cross-sectional tests in which the sample is partitioned between banks located in countries with more and less stringent banking enforcement based on Barth et al. (2013), which reports the results of surveys carried out by the authors with sponsorship from the World Bank. We are specifically interested in the survey responses "Yes," "No" or "N/A" to three questions: "If an infraction of any prudential regulation is found in the course of supervision, must it be reported?" "Are there mandatory actions that the supervisor must take in these cases?" and "Are supervisors legally liable for their actions?" When the answer to at least two of these questions is "Yes," we classify banks located in the countries in question as being located in countries with strict enforcement, with the remaining banks classified as being in countries with less strict enforcement.

Table 6 reports the results of income smoothing tests on the partitioned sample. The objective of these tests was to determine whether our results vary across the two types of banking enforcement regime. Our expectation is that banks located in countries with strict such enforcement are under greater regulatory pressure than their counterparts in countries with lax banking regulations, and thus the results for the latter should be weaker and less significant.

Consistent with that expectation, we find a statistically significant result at the 0.01 level for the coefficient of our key variable, *Basel∗Lowcap∗Corp* (0.2161, $p = 0.005$), among banks subject to strict banking regulations, whereas no such result is found for the other banks (0.0118, $p = 0.937$). Overall, these results suggest that the incentives to smooth income in response to the Basel II rule changes are concentrated among

Table 4
Regression Analyses: Early (2003–2004) and Late Periods (2005–2007) of Basel II and Income Smoothing. This table reports the results of our regressions examining the effects of income smoothing in the early and late Basel II period using retail and corporate loan losses. The variables are defined in Table 1. *p*-values are reported in parentheses.

		LL	*LLretail*	*LLcorp*
Panel A: Early Basel II period				
Retail	α_1	0.1081***	0.1467***	−0.0386**
		(0.001)	(0.000)	(0.000)
Corp	α_2	0.0975***	0.0328	0.0646***
		(0.001)	(0.105)	(0.000)
Lowcap∗Retail	α_3	−0.0254	−0.0341	0.0087
		(0.604)	(0.381)	(0.716)
Lowcap∗Corp	α_4	−0.0616***	−0.0584*	−0.0032
		(0.226)	(0.064)	(0.928)
Base0304∗Retail	α_5	0.0360	−0.0200	0.0560**
		(0.468)	(0.580)	(0.041)
Basel0304∗Corp	α_6	0.0208	−0.0119	0.0327
		(0.681)	(0.660)	(0.469)
Basel0304∗Lowcap∗Retail	α_7	0.0266	−0.0246	0.0512
		(0.721)	(0.668)	(0.240)
Basel0304∗Lowcap∗Corp	α_8	0.0620	0.0291	0.0329
		(0.402)	(0.521)	(0.581)
Cap	α_9	−0.0204**	−0.0078	−0.0126***
		(0.021)	(0.220)	(0.002)
NPL	α_{10}	0.1179***	0.0833***	0.00346*
		(0.003)	(0.002)	(0.072)
ΔNPL	α_{11}	0.1278	0.0908	0.0370
		(0.109)	(0.144)	(0.192)
$\Delta Loan$	α_{12}	0.0014	0.0012	0.0002
		(0.176)	(0.197)	(0.498)
Lowcap	α_{13}	−0.0060	−0.0018	−0.0042
		(0.715)	(0.887)	(0.646)
Basel0304	α_{14}	−0.0127	−0.0012	−0.0115***
		(0.715)	(0.812)	(0.003)
Year effects		Yes	Yes	Yes
Country effects		Yes	Yes	Yes
Observations		702	702	702
Adjusted R-square		0.3738	0.3686	0.3064
		LL	*LLretail*	*LLcorp*
Panel B: Late Basel II period				
Retail	α_1	0.1051***	0.1271***	−0.0220**
		(0.001)	(0.000)	(0.031)
Corp	α_2	0.1270***	0.0172	0.1098***
		(0.000)	(0.483)	(0.000)
Lowcap∗Retail	α_3	0.0020	−0.0395	0.0415
		(0.968)	(0.364)	(0.1440)
Lowcap∗Corp	α_4	−0.1282**	−0.0547	−0.0735*
		(0.020)	(0.185)	(0.082)
Base0507∗Retail	α_5	0.0662	0.0690	−0.0028
		(0.351)	(0.254)	(0.916)
Basel0507∗Corp	α_6	−0.0354	0.0393	−0.0747**
		(0.482)	(0.288)	(0.019)
Basel0507∗Lowcap∗Retail	α_7	−0.0940	−0.0343	−0.0597
		(0.314)	(0.664)	(0.161)
Basel0507∗Lowcap∗Corp	α_8	0.1226	−0.0087	0.1314**
		(0.121)	(0.867)	(0.026)
Cap	α_9	−0.0282*	−0.0155	−0.0128**
		(0.060)	(0.202)	(0.033)

NPL	α_{10}	0.1650***	0.0964***	0.0686***
		(0.001)	(0.010)	(0.002)
ΔNPL	α_{11}	0.1447	0.0940	0.0507
		(0.219)	(0.298)	(0.193)
$\Delta Loan$	α_{12}	0.0015	0.0012	0.0003
		(0.179)	(0.243)	(0.326)
Lowcap	α_{13}	−0.0414**	−0.0317**	−0.0097
		(0.033)	(0.022)	(0.449)
Basel0507	α_{14}	−0.0089	−0.0092	0.0003
		(0.241)	(0.146)	(0.939)
Year effects		Yes	Yes	Yes
Country effects		Yes	Yes	Yes
Observations		702	702	702
Adjusted R-square		0.3918	0.3739	0.3222

	LL	*LLretail*	*LLcorp*
Panel C: Hypothesis testing (F-test)			
Early Basel II period:			
Retail versus corporate banking			
High-capital banks:	0.0152		
$\alpha5 - \alpha6 < 0$	(0.692)		
Low-capital banks:	−0.0202		
$\alpha5 + \alpha7 - \alpha6 - \alpha8 < 0$	(0.755)		
Low-capital banks (retail banking)			
Overall effect (Basel II period):		0.0680	
$\alpha1 + \alpha3 + \alpha5 + \alpha7 > 0$		(0.070)	
Basel II period – Pre-Basel period:		−0.0446	
$\alpha5 + \alpha7 > 0$		(0.322)	
Low-capital banks (corporate banking)			
Overall effect (Basel II period):			0.1270
$\alpha2 + \alpha4 + \alpha6 + \alpha8 > 0$			(0.000)
Basel II period – Pre-Basel period:			0.0656
$\alpha6 + \alpha8 > 0$			(0.092)
Late Basel II period:			
Retail versus corporate banking			
High-capital banks:	0.1016		
$\alpha5 - \alpha6 < 0$	(0.049)		
Low-capital banks:	−0.1150		
$\alpha5 + \alpha7 - \alpha6 - \alpha8 < 0$	(0.101)		
Low-capital banks (retail banking)			
Overall effect (Basel II period):		0.1223	
$\alpha1 + \alpha3 + \alpha5 + \alpha7 > 0$		(0.002)	
Basel II period – Pre-Basel period:		0.0347	
$\alpha5 + \alpha7 > 0$		(0.492)	
Low-capital banks (corporate banking)			
Overall effect (Basel II period):			0.0930
$\alpha2 + \alpha4 + \alpha6 + \alpha8 > 0$			(0.013)
Basel II period – Pre-Basel period:			0.0567
$\alpha6 + \alpha8 > 0$			(0.249)

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

banks located in countries with a strong banking enforcement regime.[6] Corporate banking managers in these countries presumably experience greater regulatory pressure than their counterparts in less stringent regimes.

[6] In countries with strong banking enforcement, increased regulatory pressure can induce bank managers to engage in income smoothing because the bank regulators are primarily interested in ensuring that their banks are well-regulated and well-capitalized. They are less concerned with income smoothing and other forms of accounting manipulation, which are under the purview of accounting standard setters.

Table 5
Regression Analyses: Timeliness of Loan Loss Provisions. This table reports the results of our regressions examining the timeliness of loan loss provisions. All variables are defined in Table 1. *p*-values are reported in parentheses.

	LLretail	*LLcorp*
Retail	0.1476***	−0.0211**
	(0.000)	(0.035)
Corp	0.0262	0.0527**
	(0.152)	(0.012)
Δ*NPL*	0.0278	−0.0485
	(0.673)	(0.179)
Δ*LagNPL*	0.0197	0.0068
	(0.538)	(0.685)
Δ*Loan*	0.0012	0.0006
	(0.393)	(0.143)
Lowcap	0.0043	0.0036*
	(0.123)	(0.061)
Basel0507	−0.0034	−0.0111***
	(0.168)	(0.000)
Lowcap∗*Basel0507*	−0.0016	−0.0040**
	(0.608)	(0.049)
Lowcap∗Δ*NPL*	0.0072	0.0840*
	(0.928)	(0.054)
Lowcap∗Δ*LagNPL*	0.0702	−0.0008
	(0.116)	(0.968)
Lowcap∗Δ*Loan*	0.0011	−0.0019
	(0.664)	(0.233)
Basel0507∗Δ*NPL*	−0.0536	0.0572
	(0.459)	(0.167)
Basel0507∗Δ*LagNPL*	−0.0083	−0.0124
	(0.813)	(0.467)
Basel0507∗Δ*Loan*	−0.0004	−0.0002
	(0.835)	(0.835)
Lowcap∗*Basel0507*∗Δ*NPL*	0.0541	−0.0820*
	(0.520)	(0.084)
Lowcap∗*Basel0507*∗Δ*LagNPL*	−0.0714	0.0197
	(0.135)	(0.437)
Lowcap∗*Basel0507*∗Δ*Loan*	−0.0030	0.0016
	(0.301)	(0.420)
Year effects	Yes	Yes
Country effects	Yes	Yes
Observations	566	566
Adjusted R-square	0.3193	0.2429

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

Finally, Table 7 reports the test results on the timeliness of corporate loan loss provisions after partitioning the sample by enforcement regime. Only in countries with laxer banking enforcement are low-capital banks less timely in recognizing corporate loan loss provisions in the Basel II period, as reflected in the negative and statistically significant coefficient of *Lowcap*∗*Basel0507*∗Δ*NPL* (−0.6442, $p = 0.001$). Stricter bank regulators monitor the timeliness of loan loss provisions more closely than their less strict counterparts (Costello et al., 2016). Thus, the managers of low-capital banks in strict enforcement regimes enjoy less discretion to manage such timeliness under the Basel II rules even though they are under considerable pressure to do so. It thus appears that the timeliness of loan loss provision effect is concentrated in less stringent enforcement regimes, where corporate banking managers in low-capital banks have more discretion with respect to the timing of corporate loan loss recognition.

Table 6
Regression Analyses: Income Smoothing and Enforcement. This table reports the results of our regressions examining the effects of income smoothing during the Basel II period between banks located in countries with strict versus less strict enforcement regimes. All variables are defined in Table 1. *p*-values are reported in parentheses.

Dependent: *LLcorp*	*Strict*	*Non-Strict*
Retail	−0.0213*	0.1303
	(0.078)	(0.314)
Corp	0.1589***	−0.1051
	(0.000)	(0.120)
Lowcap∗Retail	0.0147	−0.1194
	(0.737)	(0.407)
Lowcap∗Corp	−0.1110*	−0.0389
	(0.089)	(0.764)
Basel∗Retail	−0.0025	−0.1019
	(0.915)	(0.434)
Basel∗Corp	−0.1291***	0.1825*
	(0.001)	(0.055)
Basel∗Lowcap∗Retail	0.0235	0.0885
	(0.665)	(0.558)
Basel∗Lowcap∗Corp	0.2161***	0.0118
	(0.005)	(0.937)
Cap	−0.0230***	3.2112***
	(0.006)	(0.003)
NPL	0.0739**	0.5958***
	(0.020)	(0.000)
Δ*NPL*	0.0424	0.0924
	(0.181)	(0.226)
Δ*Loan*	0.0002	0.0111***
	(0.468)	(0.000)
Lowcap	0.0147	0.4565***
	(0.232)	(0.011)
Basel	0.0027	0.3499**
	(0.481)	(0.013)
Year effects	Yes	Yes
Country effects	Yes	Yes
Observations	545	157
Adjusted R-square	0.3805	0.5755

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

4.3. Market reaction tests

Table 8 reports the market reactions to important announcements regarding changes to the Basel II rules. It can be seen that the market reactions to Events 1 to 12 are more negative for banks with greater corporate banking exposure than retail banking exposure, particularly for three of those events: (1) 13 December 2001 (Event 5: −2.96%) when the Basel Committee's quantitative impact studies suggested that the revised Basel II Accord would be able to meet the Committee's objectives; (2) 10 July 2002 (Event 6: −2.68%) when the Basel Committee reached agreement on a number of important issues related to Basel II implementation; and (3) 11 May 2004 (Event 12: −0.84%) when the Committee announced that it had achieved consensus on the remaining issues and would publish the text of the Basel II Accord at the end of June 2004. Overall, our test results suggest that in the period spanned by those events the market perceived the effects of the Basel II regulatory changes to have more negative implications for corporate banking than retail banking because the new rules imposed more stringent capital requirements on market risks, which affect corporate and investment banking to a greater extent than retail banking.

Table 7
Regression Analyses: Timeliness of Loan Loss Provisions and Enforcement. This table reports the results of our regressions examining the timeliness of loan loss provisions in banks located in countries with strict versus less strict enforcement regimes. All variables are defined in Table 1. *p*-values are reported in parentheses.

Dependent: *LLcorp*	*Strict*	*Non-Strict*
ΔNPL	−0.0131	−0.1805
	(0.723)	(0.146)
$\Delta LagNPL$	0.0152	0.0745
	(0.268)	(0.458)
$\Delta Loan$	0.0001	0.0036
	(0.725)	(0.258)
Lowcap	0.0038**	0.0019
	(0.034)	(0.835)
Basel0507	−0.0063**	
	(0.020)	
Lowcap∗*Basel0507*	−0.0024	−0.0050
	(0.237)	(0.589)
Lowcap∗ΔNPL	0.0262	0.6651***
	(0.497)	(0.001)
Lowcap∗$\Delta LagNPL$	0.0076	−0.0096
	(0.715)	(0.931)
Lowcap∗$\Delta Loan$	−0.0004	−0.0124***
	(0.549)	(0.002)
Basel0507∗ΔNPL	0.0415	0.1763
	(0.363)	(0.162)
Basel0507∗$\Delta LagNPL$	−0.0288**	−0.0720
	(0.041)	(0.480)
Basel0507∗$\Delta Loan$	−0.0013	−0.0032
	(0.278)	(0.408)
Lowcap∗*Basel0507*∗ΔNPL	−0.0358	−0.6442***
	(0.476)	(0.001)
Lowcap∗*Basel0507*∗$\Delta LagNPL$	0.0247	0.0100
	(0.389)	(0.929)
Lowcap∗*Basel0507*∗$\Delta Loan$	0.0016	0.0114**
	(0.303)	(0.014)
Year effects	Yes	Yes
Country effects	Yes	Yes
Observations	441	125
Adjusted R-square	0.1787	0.4642

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

Conversely, we find that the market reactions to Events 13 to 19 are more positive for banks with more corporate than retail banking exposure. The positive market reaction to these banks is especially large on 24 May 2006 (Event 19: 2.88%), the date on which the results of a quantitative impact study were released for G10 countries showing that the minimum capital required under Pillar 1 of the Basel II framework would decrease relative to the Basel I framework. The market appears to have been relieved that the consequences for corporate banking of the Basel II rules would be less negative than originally feared. The positive market reaction also corresponds with greater income smoothing using corporate loan losses and more active lobbying by various regulators and industry groups to minimize the adverse effects of the Basel II regulatory changes.[7] In

[7] The regulators engaged in lobbying included the Office of the Comptroller of the Currency, the top regulator of national banks in the U.S., U.S. Senate banking committee members, the U.S. Federal Deposit Insurance Corporation, the U.K. Financial Services Authority and the China Banking Regulatory Commission. The industry groups included the Securities Industry Association, British Bankers Association, European Banking Association, French Banking Federation and banking industry bodies such as the International Swaps and Derivatives Association, Institute of International Finance, European Private Equity and Venture Capital Association.

Table 8
Market Reaction to Basel II Announcements. This table reports the results of the market reaction to significant Basel II announcements. Figures in bold are statistically significant at the 0.10 level.

Press release date (Event no.)	Event description	Overall Mean CAR (t stat/p value) (n = obs)	High Tier1 cap group CAR (t stat/p value) (n = obs)	Low Tier1 cap group CAR (t stat/p value) (n = obs)	Retail group CAR (t stat/p value) (n = obs)	Corporate group CAR (t stat/p value) (n = obs)
3 June 1999 (1)	The Basel Committee issued a **consultative paper on a new capital adequacy framework** consisting of three pillars: minimum capital requirements, which expand on the standardized rules in the 1988 Accord; supervisory review of an institution's capital adequacy and internal assessment process; and effective use of market discipline to strengthen disclosure and encourage sound banking practices	**0.0049 (2.30/0.022) (*n* = 199)**	0.0000 (0.00/0.999) (n = 38)	0.0047 (0.97/0.339) (n = 38)	0.0053 (1.17/0.248) (n = 61)	0.0050 (1.27/0.209) (n = 62)
(1)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)[a]			(0.54/0.588)		(0.04/0.970)
15 Dec 1999 (2)	The Basel Committee issued a paper providing detailed guidance on what disclosures should be made to the market, which was designed to strengthen the third pillar of the consultative paper issued in June 1999	**−0.0156 (−3.92/0.000) (*n* = 201)**	−0.0028 (−0.36/0.722) (n = 38)	**−0.0197 (−4.12/0.000) (*n* = 39)**	**−0.0116 (−2.39/0.020) (*n* = 62)**	**−0.0105 (−1.80/0.076) (*n* = 63)**
(2)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			**(−1.83/0.071)**		(−0.15/0.880)
18 Jan 2000 (3)	The Basel Committee issued two supplementary papers: A New Capital Adequacy Framework: Pillar Three, Market Discipline proposes guidelines for bank disclosures, and the Range of Practice in Banks' Internal Rating Systems assesses the current state of practice in banks' internal rating systems and processes	**−0.0127 (−4.61/0.000) (*n* = 202)**	0.0052 (0.67/0.510) (n = 38)	**−0.0280 (−4.60/ 0.000) (*n* = 39)**	−0.0084 (−1.32/0.190) (n = 62)	**−0.0185 (−4.55/0.000) (*n* = 63)**
(3)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			**(−3.37/0.001)**		(1.35/0.180)
16 Jan 2001 (4)	The Basel Committee issued a second consultative proposal based on three pillars: minimum capital requirements, refining the framework in Basel 1; the supervisory review of a bank's capital adequacy; and market discipline, through effective disclosure to encourage safe and sound banking practices	**0.0062 (3.42/0.001) (*n* = 206)**	0.0073 (1.60/0.117) (n = 39)	−0.0003 (−0.07/0.941) (n = 39)	0.0015 (0.44/0.659) (n = 63)	**0.0115 (3.07/0.003) (*n* = 65)**
(4)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			(−1.26/0.212)		**(−1.99/0.049)**
13 Dec 2001 (5)	The Committee reviewed its progress toward the completion of a new Basel Capital Accord, noting that the direction of its proposed modifications to the revised Accord had been well received and that its quantitative impact studies suggested the revised Accord was now closer to meeting its objectives	**−0.0202 (−10.16/0.000) (*n* = 207)**	**−0.0096 (−3.23/0.003) (*n* = 39)**	**−0.0225 (−4.63/0.000) (*n* = 39)**	**−0.0120 (−3.50/0.001) (*n* = 63)**	**−0.0296 (−10.95/0.000) (*n* = 65)**
(5)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			**(−2.27/0.026)**		**(4.07/0.000)**

(*continued on next page*)

Table 8 (*continued*)

Press release date (Event no.)	Event description	Overall Mean CAR (*t* stat/*p* value) (*n* = obs)	High Tier1 cap group CAR (*t* stat/*p* value) (*n* = obs)	Low Tier1 cap group CAR (*t* stat/*p* value) (*n* = obs)	Retail group CAR (*t* stat/*p* value) (*n* = obs)	Corporate group CAR (*t* stat/*p* value) (*n* = obs)
10 July 2002 (6)	The Basel Committee reached agreement on a number of important issues related to the new Basel Capital Accord. It also approved the creation of a new IRB risk-weight curve to provide more risk-sensitive treatment of certain revolving retail exposures, including many credit card exposures	**−0.0196 (−10.31/0.000) (*n* = 209)**	**−0.0181 (−4.53/0.000) (*n* = 39)**	**−0.0174 (−4.36/0.000) (*n* = 39)**	**−0.0159 (−5.04/0.000) (*n* = 64)**	**−0.0268 (−8.04/0.000) (*n* = 65)**
(6)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(0.11/0.914)		**(2.37/0.019)**
1 Oct 2002 (7)	The Basel Committee launched a comprehensive field test of its proposals for banks. The test, which is referred to as the third quantitative impact survey, or QIS 3, focused on the Pillar 1 of Basel II. It was undertaken with the goals of ensuring the efficacy of the Basel Committee's proposals and gathering information to assess whether further modifications were necessary prior to the release of a formal package for consultation in the spring of 2003	**0.0042 (1.68/0.094) (*n* = 211)**	**0.0118 (2.82/0.008) (*n* = 39)**	0.0072 (1.39/0.172) (*n* = 39)	**0.0126 (3.98/0.000) (*n* = 64)**	0.0048 (1.21/0.230) (*n* = 65)
(7)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(−0.70/0.486)		(1.53/0.128)
29 April 2003 (8)	The Basel Committee issued to banks and all other interested parties a third consultative paper on Basel II, with comments due by 31 July 2003. The Committee said it would make final modifications to its proposal and aim to complete the new accord by the fourth quarter of 2003, with implementation to take effect in member countries by year-end 2006. Work was begun in a number of countries on draft rules that would integrate Basel capital standards with national capital regimes	**0.0075 (4.35/0.000) (*n* = 212)**	**0.0101 (3.34/0.002) (*n* = 39)**	**0.0120 (2.76/0.009) (*n* = 39)**	**0.0103 (3.72/0.000) (*n* = 64)**	0.0048 (1.51/0.135) (*n* = 65)
(8)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(0.37/0.714)		(1.30/0.197)
18 Aug 2003 (9)	The Basel Committee published a report entitled "High-level Principles for the Cross-border Implementation of the New Accord." As the Committee moved toward the completion of Basel II, this interim publication highlighted the work of the Accord Implementation Group (AIG) in developing a set of principles to facilitate closer, practical cooperation and information exchange among supervisors	**0.0104 (6.95/0.000) (*n* = 213)**	**0.0185 (5.11/0.000) (*n* = 39)**	0.0047 (1.61/0.116) (*n* = 39)	**0.0133 (4.59/ 0.000) (*n* = 64)**	**0.0100 (3.27/0.002) (*n* = 65)**
(9)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			**(−2.98/0.004)**		(0.79/0.431)

11 Oct 2003 (10)	The Basel Committee met to decide on responses to public comments received on Basel II and to deliberate the next steps. The Committee received over 200 comments on its third consultative paper, indicating broad support for the new accord and agreement on the need to adopt a more risk-sensitive capital framework. Committee members committed to work promptly to resolve the outstanding issues by no later than mid-year 2004	**0.0059 (5.95/0.000) (*n* = 213)**	**0.0103 (4.86/0.000) (*n* = 39)**	**0.0035 (1.84/0.074) (*n* = 39)**	**0.0080 (4.26/0.000) (*n* = 64)**	**0.0089 (5.47/0.000) (*n* = 65)**
(10)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			**(−2.42/0.018)**		(−0.36/0.719)
15 Jan 2004 (11)	The Basel Committee reviewed the progress made on outstanding matters to meet its mid-year 2004 objective and took decisions on key issues. It decided on modifications to implement the proposal made in October and said it would publish them shortly. The Committee agreed with industry comments that the cap on the recognition of excess provisions should not be based on Tier 2 capital components. Instead, it was decided to convert the cap to a to-be-determined percentage of credit risk-weighted assets	**0.0135 (8.25/0.000) (*n* = 213)**	**0.0139 (3.82/0.000) (*n* = 39)**	**0.0192 (4.82/0.000) (*n* = 39)**	**0.0138 (4.24/0.000) (*n* = 64)**	**0.0165 (5.85/0.000) (*n* = 65)**
(11)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(0.98/0.331)		(−0.64/0.521)
11 May 2004 (12)	The Basel Committee announced that it had achieved consensus on the remaining issues and would publish the text of Basel II at the end of June 2004. That text would serve as the basis for national rule-making and for banks to complete their preparations for Basel II implementation	−0.0006 (−0.31/0.760) (*n* = 216)	0.0067 (1.67/0.103) (*n* = 39)	0.0023 (0.55/0.584) (*n* = 39)	**0.0092 (2.91/0.005) (*n* = 64)**	**−0.0084 (−2.21/0.030) (*n* = 65)**
(12)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(−0.76/0.452)		**(3.56/0.001)**
8 Jun 2004 (13)	The Basel Committee said it had considered the potential effect of IFRS on regulatory capital and decided that, for regulatory capital purposes, it would be appropriate for national supervisors to exclude cumulative gains and losses on cash flow hedges that are recognized directly in equity from the definition of Tier 1 and Tier 2 capital. It said it believed that the gains and losses arising from changes in an institution's own credit risk under the fair value option on liabilities should also be excluded from Tier 1 and Tier 2 capital	0.0019 (1.59/0.113) (*n* = 216)	0.0002 (0.10/0.920) (*n* = 39)	−0.0005 (−0.25/0.801) (*n* = 39)	−0.0001 (−0.03/0.976) (*n* = 64)	**0.0043 (1.86/0.067) (*n* = 65)**
(13)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(−0.25/0.804)		(−1.42/0.157)
20 July 2004 (14)	Further to its press release of 8 June 2004, the Basel Committee considered the potential effect on regulatory capital of IFRS. It made no adjustments to capital adequacy in response to IFRS in these areas: definition of the trading book, equity/liability classification, intangible assets (including goodwill), deferred tax assets, pension costs, stock option costs and leasing	**0.0076 (4.96/0.000) (*n* = 216)**	**0.0075 (1.82/0.076) (*n* = 39)**	0.0052 (1.38/0.176) (*n* = 39)	**0.0069 (2.47/0.016) (*n* = 64)**	**0.0095 (2.68/0.009) (*n* = 65)**
(14)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(−0.42/0.679)		(−0.58/0.564)

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Table 8 (*continued*)

Press release date (Event no.)	Event description	Overall Mean CAR (t stat/p value) (n = obs)	High Tier1 cap group CAR (t stat/p value) (n = obs)	Low Tier1 cap group CAR (t stat/p value) (n = obs)	Retail group CAR (t stat/p value) (n = obs)	Corporate group CAR (t stat/p value) (n = obs)
15 Dec 2004 (15)	The Basel Committee considered additional issues related to the potential effect on regulatory capital of the implementation of certain IFRS. The Committee accepted IAS 39 treatment of impairment losses that reduce Tier 1 capital, and also said it was considering excluding unrealized gains and losses on loans designated as available-for-sale from the regulatory definition of Tier 1 and Tier 2 capital	0.0008 (0.41/0.685) ($n = 219$)	−0.0019 (−0.72/0.477) ($n = 39$)	0.0017 (0.56/0.577) ($n = 39$)	0.00001 (0.01/0.996) ($n = 64$)	0.0032 (0.66/0.514) ($n = 65$)
(15)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			(0.90/0.373)		(−0.58/0.562)
11 Apr 2005 (16)	The Basel Committee and International Organization of Securities Commissions proposed solutions for certain trading-related exposures and double-default effects under Basel II. The Committee issued a paper for public comment outlining proposed capital requirements for banks' exposures to certain trading-related activities, including counterparty credit risk and a solution for double-default effects (the risk that both a borrower and guarantor default on the same obligation)	−0.0018 (−1.34/0.180) ($n = 221$)	−0.0035 (−1.54/0.132) ($n = 39$)	0.0032 (1.22/0.228) ($n = 39$)	−0.0009 (−0.34/0.734) ($n = 64$)	−0.00002 (−0.01/0.993) ($n = 65$)
(16)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			**(1.93/0.057)**		(−0.25/0.803)
13 July 2005 (17)	The Basel Committee issued documents on the use of the fair value option, estimation of LGD during economic downturns, treatment of certain trading-related exposures and double-default effects under Basel II. This proposal did not impose additional accounting or disclosure requirements beyond those set out in IAS 39, except that gains and losses arising from changes in a bank's own credit risk associated with its liabilities should not be included in capital.	**−0.0044 (−2.71/0.007) ($n = 222$)**	**−0.0144 (−3.42/0.001) ($n = 39$)**	**0.0057 (2.30/0.027) ($n = 39$)**	**−0.0061 (−2.03/0.046) ($n = 64$)**	−0.0015 (−0.61/0.543) ($n = 65$)
(17)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			**(4.12/0.000)**		(−1.18/0.240)
18 Jul 2005 (18)	The Basel Committee discussed solutions for the application of Basel II to certain trading-related exposures, including counterparty credit risk and the treatment of double-default effects	−0.0025 (−1.62/0.106) ($n = 222$)	**−0.0046 (−1.82/0.077) ($n = 39$)**	−0.0038 (−1.22/0.231) ($n = 39$)	**−0.0044 (−1.73/0.088) ($n = 64$)**	**−0.0063 (−2.58/0.012) ($n = 65$)**
(18)	t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t stat/p value)			(0.20/0.839)		(0.54/0.593)

24 May 2006 (19)	The Basel Committee maintained calibration of the Basel II framework based on the results of the fifth Quantitative Impact Study (QIS 5). The QIS results for G10 countries showed that the minimum required capital under Pillar 1 of that framework would decrease relative to the current Accord. For internationally active banks, the minimum required capital would decrease on average by 6.8%, with a greater reduction for those using the advanced IRB approach	**0.0216 (10.81/0.000) (*n* = 223)**	**0.0109 (4.13/0.000) (*n* = 39)**	**0.0131 (4.35/0.000) (*n* = 39)**	**0.0144 (5.57/0.000) (*n* = 64)**	**0.0288 (7.23/0.000) (*n* = 65)**
(19)	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(0.54/0.592)		**(−3.03/0.003)**
Events 1–6	3 June 1999 to 10 July 2002. The Basel Committee issued a consultative paper on Basel II, provided details via supplementary documents, issued its second consultative package, reached consensus on important issues and confirmed the implementation timeline in this period	**−0.0096 (−8.88/0.000) (*n* = 1224)**	−0.0030 (−1.22/0.222) (*n* = 231)	**−0.0139 (−6.68/0.000) (*n* = 233)**	**−0.0069 (−3.80/0.000) (*n* = 375)**	**−0.0116 (−6.38/0.000) (*n* = 383)**
1–6	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			**(−3.83/0.000)**		**(2.75/0.006)**
Events 7–12	1 October 2002 to 11 May 2004. This period covers the quantitative impact surveys, issue of the third consultative paper, agreement on cross-border implementation and publication of the comprehensive package	**0.0068 (9.29/0.000) (*n* = 1278)**	**0.0119 (8.28/0.000) (*n* = 234)**	**0.0081 (5.03/0.000) (*n* = 234)**	**0.0112 (9.51/0.000) (*n* = 384)**	**0.0061 (4.55/0.000) (*n* = 390)**
7–12	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			(−1.15/0.251)		(1.617/0.106)
Events 1–12	3 June 1999 to 11 May 2004. This period encompasses the conceptualization of Basel II, issues of the second and third consultative packages and publication of the comprehensive package	**−0.0012 (−1.82/0.070) (*n* = 2502)**	**0.0045 (3.04/0.002) (*n* = 465)**	**−0.0029 (−2.03/0.043) (*n* = 467)**	**0.0022 (1.99/0.047) (*n* = 759)**	**−0.0026 (−2.27/0.023) (*n* = 773)**
1–12	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			**(−3.60/0.000)**		**(3.02/0.003)**
Events 13–19	8 June 2004 to 24 May 2006. This period was after the issue of comprehensive guidelines, covering further refinements on trading exposures, additional quantitative impact studies, evaluation of IFRS effects on capital rules and the final milestone before implementation of the standardized approach	**0.0033 (5.16/0.000) (*n* = 1539)**	−0.0008 (−0.68/0.500) (*n* = 273)	**0.0035 (3.08/0.002) (*n* = 273)**	0.0014 (1.38/0.170) (*n* = 448)	**0.0054 (4.10/0.000) (*n* = 455)**
13–19	*t*-test for diff between high/low Tier 1 cap and between retail/corp. groups (*t* stat/*p* value)			**(2.59/0.010)**		**(−2.40/0.017)**
Events 1–19	3 June 1999 to 24 May 2006. This period ranges from the issuance of a conceptual paper to the final milestone before implementation of the standardized approach by most banks at the end of 2006	0.0005 (1.07/0.286) (*n* = 4041)	**0.0025 (2.42/0.016) (*n* = 738)**	−0.0005 (−0.52/0.602) (*n* = 740)	**0.0019 (2.40/0.016) (*n* = 1207)**	0.0003 (0.38/0.705) (*n* = 1228)
1–19	*t-test for diff between high/low Tier 1 cap and between retail/corp. groups (t* stat/*p value)*			**(−2.09/0.034)**		**(2.24/0.025)**

[a] A negative *t*-statistic for Tier 1 capital groups means that the market reaction to the low-Tier 1 capital group is less positive (or more negative) than that to the high-Tier 1 capital group. A positive *t*-statistic for the corporate banking group means that the market reaction to the retail banking group is more positive (or less negative) than that to the corporate banking group.

response to such lobbying, the Basel Committee revised the rules to reduce the capital requirements for mortgage loans and SMEs. The regulations were also watered down for brokerage and securities houses such as Goldman Sachs and Morgan Stanley. Finally, there was also growing awareness that some banks could potentially reduce their capital requirements under Basel II's advanced IRB approach.

We also compare the market reaction to low- and high-capital banks. During the early part of our sample period (Events 1–12), that reaction was more negative for low- than high-capital banks, most likely because the market was concerned that the Basel II rules would have a greater adverse effect on the former. However, during the later part of the period (Events 13–19), the market was more receptive to low-capital banks than to their high-capital counterparts, possibly because subsequent refinements and political lobbying mitigated Basel II's effects on the former.

Considering all 19 events together, we find that the overall market abnormal returns to the full sample, banks with low-Tier 1 capital adequacy ratios and banks with more corporate banking exposure are not statistically significantly different from 0. It seems that the market recovered fairly quickly from the initial negative shock of the Basel II announcement. However, for banks with high-Tier 1 capital adequacy ratios and those with more retail banking exposure, we find the overall market abnormal reaction to the 19 Basel II events to be positive. Overall, the evidence suggests that the implementation of Basel II benefitted strongly capitalized banks and those with greater retail banking exposure because the regulatory changes allowed these banks to gain a competitive advantage over weakly capitalized banks and those with greater corporate banking exposure.

5. Conclusion

This study examines the interaction between a major banking regulatory policy change (i.e., the Basel II rule changes) and its effects on bank managers' discretionary behavior. We find evidence to suggest that corporate banking managers in weaker banks with low capital adequacy ratios engaged in income smoothing to a greater extent in the Basel II period than their counterparts in stronger banks, most likely because of the more stringent capital requirements imposed on corporate and investment banking by the regulatory changes. We also find such smoothing to be more prevalent in the latter part of the Basel II period, being non-existent in the early part.

Similarly, we find corporate banking managers in weaker banks with low capital adequacy ratios to have reduced the timeliness of their loan loss provisions in the latter part of the Basel II period. In additional cross-sectional tests, we demonstrate that income smoothing and the timeliness of loan loss provisions vary depending on the strictness of the bank enforcement regime under which banks operate. Finally, we find that the market reacted more negatively to banks with more corporate banking exposure than to those with more retail banking exposure in the Basel II period. However, the negative market reaction to the former was negligible toward the end of that period.

The study offers important input to policymakers, showing that banks that are affected by capital regulations may engage in such discretionary behavior as income smoothing and the delayed recognition of loan losses. The corporate banking sector faces increased regulatory risks as a result of Basel II implementation. To mitigate those risks, it appears that the managers who oversee the corporate banking business of weaker banks engage in income smoothing activities and delayed loan loss recognition.

Appendix A

Source: Bank of America 2007 Annual Report Note 22

The following tables present total revenue, net of interest expenses, on an FTE basis and net income for 2007, 2006 and 2005, total assets as of 31 December in 2007 and 2006 for each business segment and all other items

Business segments At and for the Year Ended December 31	Total corporation (1)			Global consumer and small business banking (2, 3)		
(Dollars in millions)	2007	2006	2005	2007	2006	2005
Net interest income (4)	$36,182	$35,815	$31,569	$28,809	$28,197	$17,571
Noninterest income	31,886	37,989	26,438	18,873	16,729	10,848
Total revenue, net of interest expense	68,068	73,804	58,007	47,682	44,926	28,419
Provision for credit losses (5)	8385	5010	4014	12,929	8534	4706
Amortization of intangibles	1676	1755	809	1336	1452	480
Other noninterest expense	35,334	33,842	27,872	18,724	16,923	12,277
Income before income taxes	22,673	33,197	25,312	14,693	18,017	10,956
Income tax expense (4)	7691	12,064	8847	5263	6639	3934
Net income	$14,982	$21,133	$16,465	$9430	$11,378	$7022

	Global corporate and investment banking (2)			Global wealth and investment management (2)		
(Dollars in millions)	2007	2006	2005	2007	2006	2005
Net interest income (4)	$11,217	$9877	$10,337	$3857	$3671	$3554
Noninterest income	2200	11,284	9530	4066	3686	3320
Total revenue, net of interest expense	13,417	21,161	19,867	7923	7357	6874
Provision for credit losses	652	9	44	14	(39)	(5)
Amortization of intangibles	178	218	239	150	72	74
Other noninterest expense	11,747	11,360	10,217	4485	3795	3667
Income before income taxes	840	9574	9367	3274	3529	3138
Income tax expense (4)	302	3542	3413	1179	1306	1126
Net income	$538	$6032	$5954	$2095	$2223	$2012

(Dollars in millions)	2007	All other (2, 3)	
		2006	2005
Net interest income (4)	$(7701)	$(5930)	$107
Noninterest income	6747	6290	2740
Total revenue, net of interest expense	(954)	360	2847
Provision for credit losses (5)	(5210)	(3494)	(731)
Amortization of intangibles	12	13	16
Other noninterest expense	378	1764	1711
Income before income taxes	3866	2077	1851
Income tax expense (4)	947	577	374
Net income	$2919	$1500	$1477

(1) There were no material intersegment revenues among the segments.
(2) Total assets include asset allocations to match liabilities (i.e., deposits).
(3) GCSBB is presented on a managed basis with a corresponding offset recorded in All Other.
(4) FTE basis.
(5) Provision for credit losses represents: For GCSBB – Provision for credit losses on held loans combined with realized credit losses associated with the securitized loan portfolio and for All Other – Provision for credit losses combined with the GCSBB securitization offset.

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Economic policy uncertainty, credit risks and banks' lending decisions: Evidence from Chinese commercial banks

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ABSTRACT

Using data for Chinese commercial banks from 2000 to 2014, this paper examines the effects of economic policy uncertainty (EPU) on banks' credit risks and lending decisions. The results reveal significantly positive connections among EPU and non-performing loan ratios, loan concentrations and the normal loan migration rate. This indicates that EPU increases banks' credit risks and negatively influences loan size, especially for joint-equity banks. Given the increasing credit risks generated by EPU, banks can improve operational performance by reducing loan sizes. Further research indicates that the effects of EPU on banks' credit risks and lending decisions are moderated by the marketization level, with financial depth moderating the effect on banks' credit risks and strengthening it on lending decisions.

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1. Introduction

As an emerging and transforming economic power, China's government plays an important role in business activities. To realize the goal of social governance, governments use economic policies (e.g., fiscal, monetary, industrial and administrative) to adjust and control the economic operation and behavioral patterns of market participants. Following the 2008 financial crisis, the Chinese government proposed and implemented a set of intensive policies to stimulate the economy and alleviate the pressure generated by the economic downturn. These policies efficiently addressed the economic decline, but they also objectively aroused tremendous economic policy uncertainty (hereinafter referred to as EPU). Fan and Xu (2015) survey 1041 CEOs in domestic and foreign enterprises operating in China, and find that 57% and 66% of CEOs in domestic and foreign enterprises, respectively, explicitly treat the condition that laws and regulations are ambiguous, changeful and selectively executed as their biggest concern. Facing a high level of EPU in China, market participants must dynamically rectify their operational strategies and actions.

As important participants in the Chinese market, commercial banks possess the same essential attributes as general corporations, but one of their special functions is channeling the effects of governmental macroeconomic control. Specifically, given advancing marketization, commercial banks are becoming more similar to general enterprises, exhibiting more market-orientated behavioral modes and operating goals. Governments also intensively adjust deposit rates and reserve requirement ratios to indirectly achieve economic regulation and control. This suggests that commercial banks are a key loop in the transmission mechanism of official macroeconomic policies. The operating businesses of commercial banks are at enormous risk and inherently possess great influence. Given these characteristics, we assume that the effects of EPU on commercial banks are particularly complex. Therefore, there is an urgent need to investigate whether EPU affects commercial banks. In particular, it is important to uncover the mechanism by which EPU operates, and the solutions for mitigating its effect on commercial banks. To answer these issues, we pursue an understanding of commercial banks' behavioral patterns in dealing with the shock generated by EPU within emerging economies.

Using unbalanced panel data for Chinese commercial banks between 2000 and 2014, we investigate how EPU influences commercial banks' credit risks and lending decisions, and how commercial banks respond to these effects. We find that an increase in EPU increases bank non-performing loans, single borrower concentration and the normal loan migration rate. That is, EPU increases the credit risks of Chinese commercial banks. We also reveal that the level of EPU significantly and negatively correlates with the loan-to-deposit ratio and the loan growth rate, and this negative relationship is more pronounced in joint-equity commercial

banks with fewer state-owned shares. This empirical finding indicates that commercial banks, particularly joint-equity commercial banks, reduce their loan sizes. In addition, commercial banks can improve their operating performance by decreasing loan size in response to greater EPU. Further analysis shows that the effect of EPU on credit risks and loan sizes can be weakened by marketization level development. Meanwhile, following in-depth financial development, the effect of EPU on credit risks can be weakened, whereas that on loan size can be strengthened.

Our study makes three contributions. First, we extend the literature on the mechanisms and consequences of EPU. The extant research in this field focuses on EPU's effect on macro-economic growth and micro-enterprise investment (Baker et al., 2013; Li and Yang, 2015) by simply emphasizing its economic consequences. As bridges linking state macro-economic adjustments and controlling policies, and micro-enterprise operation and investment behavior, commercial banks can be affected by EPU. Moreover, due to the frequent adjustment and vague orientation of economic policies, commercial banks more or less mingle at their own discretion when they understand and execute their policies, effectively amplifying the shock of EPU on macro-economic growth and micro-enterprise operation. Hence, our study enriches the related literature by shedding light on the mechanism through which macro-economic policies influence micro-enterprise behavior.

Second, we deepen the comprehension of what causes commercial banks' credit risks. Research mainly focuses on the effects that legal institutions, diversification and internal governance mechanisms have on credit risks, whereas our study provides a new perspective on macro-economic policies that reveal the following points: EPU can increase credit risks for commercial banks through enterprise and bank balance sheets, and it has a crowd-out effect on loan size.

Third, our study contributes to the evaluation of the enforcement, efficiency and effectiveness of macro-economic policies issued by the government to alleviate economic volatility and achieve economic governance. Frequent changes to economic policies can produce uncertainty shock, which is harmful to commercial banks' operations because it disorders the direction and strength of monetary policies. Therefore, our findings can explain why the enforcement outcomes of economic policies do not always achieve the expectations of regulators. Our findings are particularly beneficial for understanding contra-cycle loan adjustments in Chinese commercial banks (Pan and Zhang, 2013).

The remainder of this paper is organized as follows. Section 2 discusses the literature and develops three hypotheses. Section 3 explains the research design and introduces the sample. Section 4 presents the main results and Section 5 reports supplementary analyses. Section 6 concludes by discussing the study's policy implications.

2. Literature and hypotheses

2.1. Institutional background

Following the financial crisis of 2008, to prevent a severe recession, the major economies (China, the US, the European Union, etc.) implemented a series of economic policies designed to adjust and control the inevitable economic deterioration. These policies worked in part, but they also generated tremendous EPU. The International Monetary Fund repeatedly mentions EPU in the 2012 World Economic Outlook Report. They insist that the level of EPU in the US and European Union hit a record high after 2008. They also point out that increasing EPU suppresses investment, employment and consumption in enterprises and families, slowing global economic recovery. Fortune Magazine once reported that extraordinary uncertainty was a major part, maybe the largest part, of why the US economy was barely moving or why millions of workers could not find jobs. The same article identified the hyperpolarized US Congress as an uncertainty-generating machine.

Due to market-oriented reform, the formation terms and consequences of EPU in China differ from those in the US. China's political system can guarantee sequential consistency for blueprints of state-level economic development, but the government lacks adequate transparency and scientificity in drawing up specific economic policies. This leads to regulators testing the short-term objectives of economic development by subjecting the use of specific economic policies to a trial and error process. Moreover, individuals in economic

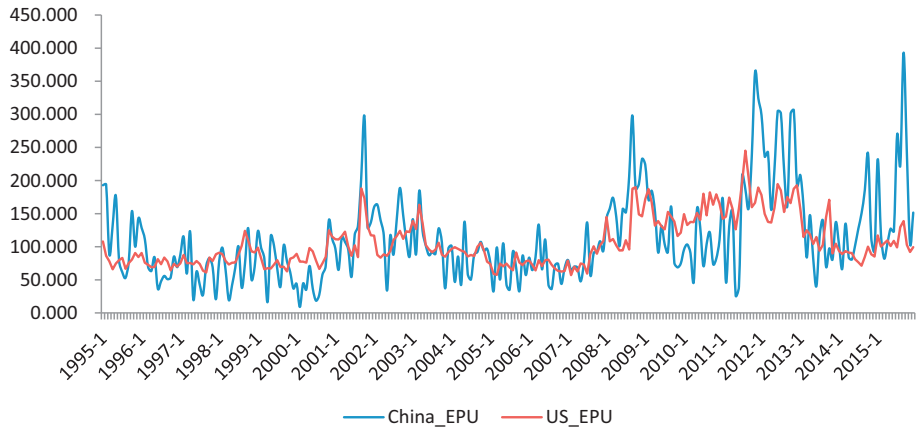

Figure 1. Comparison of EPU indices in the US and China.

businesses tend to feel ambiguous about the orientation, effect size and persistence of the economic policies due to the aforementioned lack of transparency and scientificity in the policy-making process. Launching the circuit breaker in the China stock market is a vivid example of how to depict EPU. On 4 December, 2015, the Shanghai Stock Exchange, Shenzhen Stock Exchange and China Financial Futures Exchange formally announced circuit breaker-related regulations, which were then enforced as of 1 January, 2016. However, only two trading days later, the China Securities Regulatory Commission (CSRC) claimed that the circuit breaker had been suspended. The CSRC had implemented the circuit breaker to stabilize the stock market, but the enforcement outcomes went against the initial intention. This hurried implementation and withdrawal of the circuit breaker revealed that the government still has a long way to go in improving scientificity in policy making.

In contrast, China is an emerging transition economy, and its visible ties to central and local governments and invisible ties to the market interactively affect economic operation and resource allocation. The government can influence enterprise through industrial entry, administrative license and price regulation. For instance, the government directly intervenes in the hiring of top managers and rank-and-file workers in state-owned enterprises, restricts private firms from entering specific domains and industries and intervenes in the lending decisions of commercial banks. This level of government intervention and the extensive and profound effects of the economic policies they issue on participants in business activities indicate that slight changes in economic policies could produce significant uncertainty shock. Therefore, compared with the US, EPU is more significant in China. To achieve a better understanding of the differences in EPU in the US and China, we compare the two countries' EPU indices from January 1995 to December 2015. As Fig. 1 shows, the EPU indices in the US and China are highly correlated, whereas the China index is of greater mean value and volatility. As a result, to correctly estimate the institutional efficiencies of various economic policies introduced by the government, we must investigate EPU's influence on enterprises, commercial banks and individuals in China.

2.2. Literature review

2.2.1. Effects of EPU

Due to their opacity, ambiguity and unpredictability, the economic policies issued by the government often confuse participants in business activities, or prompt governments to take a position opposing a policy's original intention when they are enforced, ultimately generating uncertainty shocks. We treat this type of uncertainty as EPU. For example, China's government introduced intensive regulation and control policies to adjust supply and demand for real estate and its related prices from 2005 to 2014. However, the policy targets swung chaotically among stabilizing economic growth, controlling real estate prices, guaranteeing people's

livelihoods, etc. Related policy instruments include public finances, taxation regulation, administrative restriction of real estate buying and credit limitations. Co-movement and consistency are absent among these policy instruments, which in turn produce greater EPU in the real estate market.

EPU can be driven by the following circumstances: the indeterminate expectations created by frequent policy changes introduced by governments (Feng, 2001); the possibility that governments might take a position opposing policies in enforcement (Le and Zak, 2006); and new policies enforced by private sector profits (Pastor and Veronesi, 2013). EPU has also had extensive influence on economic development. Baker et al. (2013) show that increases in EPU foreshadow decline in output, employment and investment. Moreover, high levels of policy uncertainty are associated with weaker growth prospects. Specifically, an increase in EPU steepens the yield curve and increases the volatility in asset and option markets (Ulrich, 2012). Increasing EPU also boosts the volatility of share pricing (Pastor and Veronesi, 2013), which can affect enterprises extensively. Panousi and Papanikolaou (2012) document that high EPU can increase financing costs and risk aversion among top managers, which then depresses the investment size. In addition, the depressing effect of EPU on investments is more significant in firms with higher irreversibility in investing that are more dependent on government public expenditure (Gulen and Ion, 2013). Li and Yang (2015) show that an increase in EPU reduces Chinese listing firms' investments, with the depressing effect more pronounced in firms with greater irreversibility in investment, lower learning capability, lower institutional shareholding and higher ownership concentration. Wang et al. (2014) examine Chinese listing firms' data and find evidence that firms tend to hold more cash when faced with increasing EPU.

2.2.2. Credit risks and lending decisions of commercial banks

The credit risks and lending decisions of commercial banks are jointly determined by various internal and external factors. For the internal factors, the share proportions held by heterogeneous shareholders can significantly affect the risk management, lending decisions and operating performance of commercial banks (La Porta et al., 2002; Barry et al., 2011; Zuzana et al., 2011). Specifically, for Chinese commercial banks, the ratio of state-owned shareholding significantly affects their risk taking in different stages of the business cycle (Pan and Zhang, 2012). Related party loans weaken the effectiveness of compensation incentives within commercial banks (Zhang et al., 2012) and diversification can lower the credit risk, but makes no contribution to improving performance (Liu et al., 2012). For external factors, in countries with better legal protection for creditors, loan sizes increase (La Porta et al., 1998), credit spreads decrease (Laeven and Majnoni, 2005), financial crises are less frequent (Johnson et al., 2000), loan concentrations are higher and loan maturity is longer (Qian and Strahan, 2007). Using data from Chinese commercial banks, Zhang and Wang (2012) find evidence that the level of legal protection is beneficial for raising the loan size. Qian and Cao (2015) document that trusts, as a type of informal institution, can help commercial banks simplify the loan pricing and approval processes related to lending decisions. This, in turn, contributes to controlling non-performing loans and improving operating performance for commercial banks. Moreover, the promotion of local officials significantly influences the length of maturity and size of a non-performing loan (Qian et al., 2011).

2.2.3. Brief summary of related literature

The research on EPU is primarily based on developed economies, particularly that of the US, and empirical evidence from emerging economies remains scarce. The few studies on China's EPU simply focus on its effect on the investing behavior and cash holdings of enterprises. Commercial banks occupy an important position in a country's economic development. Unfortunately, few studies pay attention to the mechanism through which EPU affects such banks, or the economic consequences of those effects. The literature on commercial banks tends to focus on firms' demand for or commercial banks' ability to supply loans. Theoretically, supply and demand are interdependent and interactive. EPU can shock a firm's investments and cash holdings, shocking its demand for loans and simultaneously driving commercial banks to adjust their supply. Hence, this study contributes to the literature by incorporating the work on EPU and commercial banks into a logic consistent analysis framework.

2.3. Theoretical analysis and hypotheses development

To ensure that economic policies remain consistent with the demands of economic development, governments adjust and change economic policies contingently. Nevertheless, the policy-making process is always accompanied by unpredictability, opaqueness and ambiguity—all of which can prompt EPU. Existing research shows that EPU influences macro-economic, capital market and enterprise behavior in varying degrees, and it has a multi-aspect, multi-layer effect on business participants. As an important component of any economic system, commercial banks are affected by economic policies, and they transfer those effects. Hence, as a variable that affects participants in economic activities, EPU is expected to influence the behavior of commercial banks.

EPU can directly influence commercial banks in that their behavior can be shocked by macro-policy, not only because banks are important participants in economic activities but also because they often adjust the strategies for lending decisions. Enterprises cannot develop completely without the support of credit resources from banks, but the latter's supply of credit resources cannot always meet enterprises' funding demands due to scarcity. As such, banks need to screen customers to find those with the best potential growth and value to allocate credit resources. Macro-economic policies are beneficial for commercial banks to select customer enterprises. Compared with banks, the regulators who introduce the economic policies possess more farsighted cognition for economic development and industrial planning. Different industries make diverse contributions to economic growth. To increase the pace of macro-economic development, regulators use various economic policies to induct industrial progress and introduce and adjust other economic policies to gather resources into supported industries or enterprises more efficiently and intensively. Commercial banks have the most capital resources for economic growth, to the extent that the allocation of credit resources is inevitably affected by macro-economic policies. Theoretically, the guiding role of economic policies increases the efficiency of credit resource allocation. However, if changes to economic policies are frequent and excessive, EPU arises, forcing commercial banks to deal with ambiguity regarding which regulators want to support which industries or enterprises. It then becomes difficult to accurately identify which industries or enterprises are valuable for allocating credit resources. In this case, economic policies can mislead banks to allocate scarce credit loans to industries or enterprises with poor prospects for future gains. The regulation policies in China's real estate industry are the most typical examples of this. China's central and local governments have introduced a series of policies to adjust and control real estate prices since 2005, but commercial banks find it difficult to accurately evaluate their industrial prospects because the policies change so frequently and local governments often take a stand against the original goals of regulation policies during the enforcement process. Consequently, commercial banks encounter greater information asymmetry when deciding how to allocate their credit resources. This eventually creates an increase in non-performing loans. Thus, an increase in EPU can directly increase credit risks.

EPU can also indirectly affect banks through its effect on enterprises. Banks are the most common financing source for enterprises, so a deterioration of a firm's financial condition or bankruptcy affects the sizes of non-performing loans and influences the operating performance of commercial banks. Specifically, if a customer enterprise is in severe financial distress, banks can subsequently fall into loss or insolvency (Zhu, 2002). As such, the operational risks taken by enterprises have a spillover effect on banks' credit risks. An increase in operational risk can cause firms' operations to fluctuate, making their financial situations more unstable. This in turn shocks the debt-paying abilities of customer firms. The literature shows that enterprises decrease investments or increase cash holdings to cope with an increase in EPU. However, if EPU increases continuously, firms' conservative behavior is not always enough to counter the adverse effects of extraneous risks, and firms' operations do deteriorate as EPU increases, inevitably spilling over to create a surge in banks' credit risks.

According to the above analysis, EPU can escalate banks' credit risks through direct and indirect channels. Formally stated, our first hypothesis is as follows:

H1. The level of economic policy uncertainty positively affects the credit risks of commercial banks.

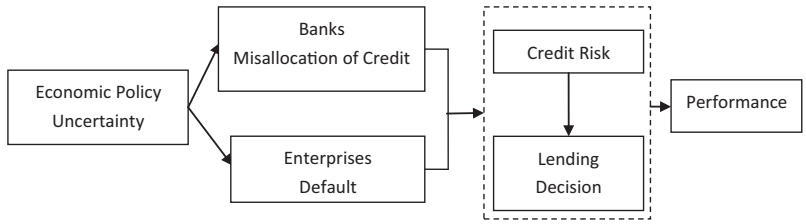

Figure 2. The theoretical framework of our research.

After long-term financial marketization reform, commercial banks in China exhibit market-oriented behavioral patterns and operational objectives (Cai and Zeng, 2012), and their risk management capabilities have shown considerable progress. As the main source of capital for enterprises, commercial banks adopt various measures to reduce their credit and overall operational risks when their credit risks increase. Zhang and Wang (2012) document that the non-performing loan ratio is an important determinant of loan size. Li and Yang (2015) find evidence that as EPU increases, enterprises encounter difficulties in evaluating future trends and project profitability, which results in reduced investments. Enterprises generate the uppermost demand for bank credits, and that demand decreases if the level of investment in customer firms decreases, shrinking the size of bank credits. This is the indirect mechanism based on corporate balance sheets. Moreover, commercial banks assess the economic and industrial development prospects in which the applicants for credit resources are located, and EPU can disturb those judgments when the banks forecast their economic development prospects. Banks can also reduce loan sizes to manage risk. This is the direct mechanism based on bank balance sheets. For instance, statistical data issued by the People's Bank of China on 16 November, 2015, showed that the total loans supplied by Bank of China, Agriculture Bank of China, China Construction Bank and Industrial and Commercial Bank of China were 35.69 trillion, aggregately, by the end of October 2015–656 billion less than in September 2015. Some specialists affiliated with financial medium analysis indicate that loan size decreases sharply because commercial banks are cautious of the economic prospects and asset quality. This practical case is evidence of the direct mechanism based on bank balance sheets.[1]

Commercial banks play a vital role in stabilizing economic development and insuring that governments achieve their regulation goals. The adjustment of credit quotas can immediately shock the market liquidity and credit resource availability of enterprises. China's banking system is fairly complex. According to the ownership structure, we can group commercial banks into two categories: state-owned and joint-stock. In state-owned banks (Bank of China, Agriculture Bank of China, China Construction Bank, Industrial and Commercial Bank of China, city commercial banks), state-owned shares are enormous, lending decisions are subject to governmental intervention and there is limited space to make decisions autonomously. In joint-stock banks, the ownership structure is dispersed, with little state ownership, and there is more freedom to adjust lending decisions. Compared with state-owned banks, joint-stock banks reduce more credit loans when facing a similar level of EPU. Thus, we hypothesize:

H2a. Greater economic policy uncertainty results in smaller credit quotas, and

H2b. Compared with state-owned banks, the adverse effect of economic policy uncertainty on credit quotas in joint-stock banks is more significant.

Security, liquidity and profitability—three fundamental principles of commercial banks (Liu et al., 2012)—are dynamic and interactive, and banks seek to achieve a dynamic equilibrium among them. Asset liability management theory indicates that banks manage assets and liabilities simultaneously and achieve a balance point between risk and profit to control risk. Loans are a bank's greatest assets; thus, asset management mainly refers to loan management. Assets and liabilities have a U-shaped relationship; that is, when credit loans rise to a certain level, a further increase generates greater risk (Calem and Rob, 1999). When EPU

[1] Source: http://news.hexun.com/2015-11-17/180616640.html.

Table 1
Sample distribution by year.

Year	Big 4 state-owned banks	Joint-stock banks	City commercial banks	Frequency
2000	4	3	2	9
2001	4	5	3	12
2002	4	6	4	14
2003	4	6	6	16
2004	4	7	8	19
2005	4	8	14	26
2006	4	8	29	41
2007	4	10	45	59
2008	4	10	68	82
2009	4	10	95	109
2010	4	10	136	150
2011	4	10	161	175
2012	4	10	202	216
2013	4	10	206	220
2014	4	9	136	149
Total	60	122	1115	1297

Note: Big 4 state-owned banks include Bank of China, Agricultural Bank of China, Industrial and Commercial Bank of China and China Construction Bank.

increases, banks encounter greater credit risk and deterioration of asset quality. According to asset liability management theory, a moderate decrease in credit quotas can prevent risk from rising unceasingly and push banks to achieve a new equilibrium between security and profitability. Song and Zheng (2011) find that conservative and rational developing strategies often bring about greater returns in Chinese commercial banks. This leads to the third hypothesis:

H3. When economic policy uncertainty arises, banks can improve operational performance by decreasing the total supply of credit.

Our theoretical framework is illustrated in Fig. 2.

3. Research design

3.1. Sample

Our sample consists of Chinese commercial banks and the sample period is 2000–2014. We manually collect and sort the data on commercial banks from the CSMAR database, the BANKSCOPE database and each bank's official website. Overall, we obtain 1297 observations, the composition and distribution of which are shown in Table 1. To remove outliers, all continuous variables are winsorized at 1% and 99%.

3.2. Key variables

3.2.1. Credit risks

Considering the commercial bank risk regulation core index issued by China's bank regulatory commission, our research topic and data availability, we use three proxies to measure the credit risks of commercial banks. The first indicator is the non-performing loan ratio (NPLR), which equals the summation of subordinate, doubtful and loss loans divided by total loans. The second indicator is the single biggest customer loan ratio (SBCLR), which equals the loan balance for the single biggest customer, divided by net capital. This proxy reflects the degree of concentration for credit loans in commercial banks. The third indicator is the normal loan migration rate (NLMR), which equals the non-performing loans derived from normal loans, divided by normal loans. This measure depicts the dynamic changes in credit risk.

3.2.2. Loan sizes

In accordance with Qian et al. (2011), we design two indicators to measure loan size for commercial banks. The first proxy is the loan-to-deposit ratio (LTDR), which equals the loans divided by deposits. This indicator measures the static stock of loan sizes. The second proxy is the growth rate of loans (GRL), which equals the changes in loan amounts in the current year, divided by loans in last year. This proxy measures the dynamic changes in loan size.

3.2.3. EPU

To measure EPU for China, Baker et al. (2013) construct a scaled frequency count of articles about policy-related economic uncertainty in the South China Morning Post (SCMP), Hong Kong's leading English-language newspaper. The method follows their news-based indices of EPU for the US, Russia, Canada and other countries.

First, Baker et al. identify SCMP articles about economic uncertainty pertaining to China by flagging those that contain at least one term from each of the China EU term sets: {China, Chinese}, {economy, economic} and {uncertain, uncertainty}. Second, they identify the subset of the China EU articles that also discuss policy matters. For this purpose, the articles must satisfy the following text filter: {{policy OR spending OR budget OR political OR "interest rates" OR reform} AND {government OR Beijing OR authorities}} OR tax OR regulation OR regulatory OR "central bank" OR "People's Bank of China" OR PBOC OR deficit OR WTO. They use this compound filter because it outperforms simpler alternatives in their audit study. Third, they apply these requirements in an automated search of every SCMP article published since 1995, yielding a monthly frequency count of those about policy-related economic uncertainty. Fourth, they divide the monthly frequency count by the number of all SCMP articles in the same month. They then normalize the resulting series to a mean value of 100 from January 1995 to December 2011 by applying a multiplicative factor.

The methodology for constructing an economic policy index is analogous to that for used in creating a questionnaire survey, which is prevalently used in social science research. By measuring how concerned a news medium is about EPU, researchers can infer the extent to which participants in business activities perceive it when new economic policies are introduced. Baker et al. (2013) provide abundant evidence justifying the methodology for constructing this index and confirming its effectiveness. This index is also widely used in academic research and government decision making.

The reasonability of selecting the SCMP is reflected in the following aspects. First, Baker et al. (2013) construct an EPU index of the US based on 10 mainstream English newspapers, and the news reports in the

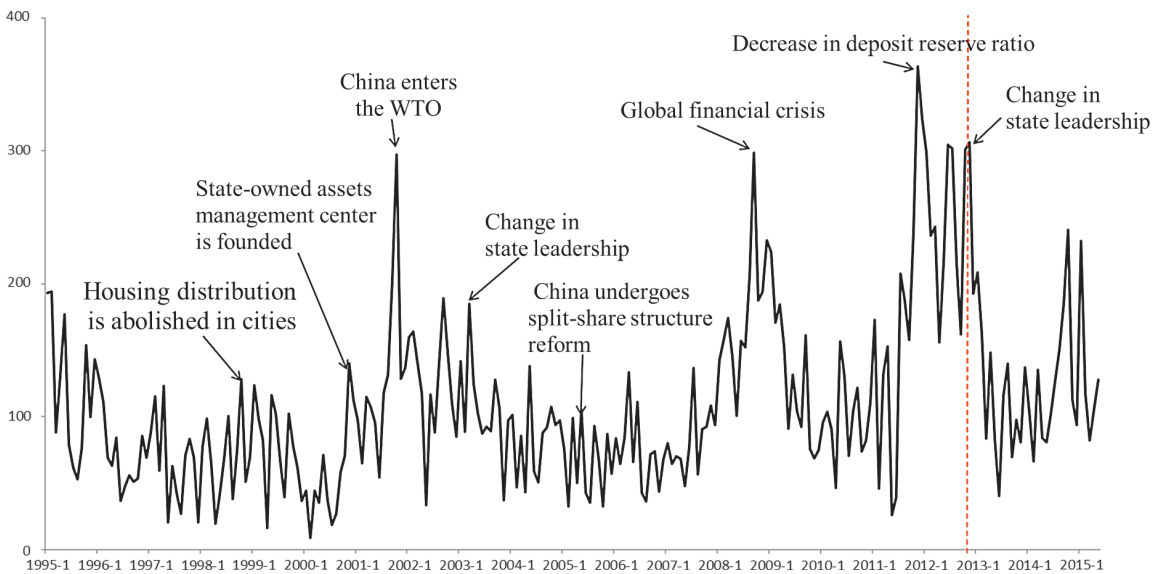

Figure 3. Timing of significant economic policies and index trends in China.

SCMP are also English articles. As such, the effectiveness of the methodology for constructing the index cannot decline within the same language. Second, the SCMP cannot be affected by the media regulation in mainland China, which confirms the neutrality and timeliness of the news reports published in the SCMP. Third, the SCMP has a long and established history as the most credible and authoritative newspaper in Hong Kong, and even in Asia, over the last hundred years. The news published in the SCMP often includes in-depth reports and special analyses that possess great social influence and credibility.

To verify whether it is accurate to use this index to depict EPU in China, we collect and sort the significant economic policies or related events that occurred from January 1995 to January 2015, based on index construction. We then mark the timing of these significant policies or events and note the peak of the index curve. The corresponding relationship between timing and peak is illustrated in Fig. 3. We find that the timing of significant policies or events and the peak of the index curve match to a great extent, indicating that the index constructed by Baker et al. (2013) can indeed depict EPU in China.

3.3. Model

We use the following regression model to test H1:

$$\begin{aligned}\text{Creditrisk}_{i,t} = {} & \alpha_0 + \alpha_1 EPU_{i,t-1} + \alpha_2 Size_{i,t-1} + \alpha_3 Lev_{i,t-1} + \alpha_4 Car_{i,t-1} + \alpha_5 LTDR_{i,t-1} + \alpha_6 Age_{i,t-1} \\ & + \alpha_7 Gdp_{i,t-1} + \alpha_8 Mpdum + \alpha_9 \text{Classify} + \Sigma Year + \Sigma Bank + \varepsilon_{i,t} \end{aligned} \quad (1)$$

The dependence variable is credit risk and consists of three variables: NPLR, SBCLR and NLMR—all of which measure the credit risks of commercial banks in different dimensions. The greater these variables are, the higher the credit risk is. The independent variable is EPU, and we use lagged EPU to alleviate the endogeneity problem. We control for bank size (Size), capital structure (Lev), capital adequacy ratio (Car), loan-to-deposit ratio (LTDR), bank age (Age) and annual GDP (Gdp). We also control for monetary policy (Mpdum) because banks' lending decisions are inevitably affected by monetary policy, which changes many times during our sample period. The literature documents that the ratio of state-owned shares seriously influences lending decisions, but we cannot control for share structure directly due to data unavailability. Considering the features of Chinese banking systems, and knowing that the ratio of state-owned shares is greater in state-owned and city banks than in joint-stock banks, we design a dummy variable named "Classify" to control for share structure. When the sample banks are state-owned and city banks, Classify equals 1, and 0 otherwise. We also control for year and bank dummies in the regression model. According to the theoretical analysis of H1, we predict that the coefficient of EPU should be significantly positive.

We adopt the following regression model to test H2a and H2b:

$$\begin{aligned} Loan_{i,t} = {} & \beta_0 + \beta_1 EPU_{i,t-1} + \beta_2 Size_{i,t-1} + \beta_3 Lev_{i,t-1} + \beta_4 Car + \beta_5 LTDR_{i,t-1} + \beta_6 Age + \beta_7 Gdp_{i,t-1} \\ & + \beta_8 Mpdum + \Sigma Year + \Sigma \text{Bank} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

The dependence variable is loan size (Loan) and consists of two variables: LTDR and GRL. The independent variable is lagged EPU. According to the theoretical analyses of H2a and H2b, we predict that the coefficient of EPU should be significantly negative. To test H2b, we partition the full sample into two subsamples based on the dummy variable Classify, and predict the coefficient of EPU in the subsample where Classify equals 0 to be more pronounced. The control variables are the same as in the first regression model, and thus are not explained here.

We design the following regression model to test H3:

$$\begin{aligned} Roa_{i,t} = {} & \lambda_0 + \lambda_1 Loan_{i,t-1} + \lambda_2 EPU_{i,t-1} + \lambda_3 Loan \times EPU_{i,t-1} + \lambda_4 \text{Size}_{i,t} + \lambda_5 \text{LeV}_{i,t} + \lambda_6 \text{Age}_{i,t} \\ & + \lambda_7 \text{Roa}_{i,t-1} + \lambda_8 Gdp_{i,t-1} + \lambda_9 \text{Classify} + \Sigma Year + \Sigma Bank + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Table 2
Variable definitions.

Variable	Symbol	Definition
Non-performing loan ratio	NPLR	Summation of subordinate loan, doubtful loan and loss loan divided by total loan
Single biggest customer loan ratio	SBCLR	Loan balance for the single biggest customer divided by net capital
Normal loan migration rate	NLMR	Non-performing loan derived from normal loan divided by normal loan
Loan-to-deposit ratio	LTDR	Loan divided by deposit
Growth rate of loan	GRL	Change amount of loan in current year divided by loan in last year
Performance	Roa	Return on assets
Economic policy uncertainty	EPU	China economic policy uncertainty index constructed by Baker et al. (2013)
	REPU	Ranking EPU on time-series from lower to upper decile, followed by normalization of the variable to a mean value of 0–1
Bank size	Size	Natural logarithm of assets
Financial leverage	Lev	Liabilities divided by assets
Capital adequacy ratio	Car	Assets divided by risk-weighted sum of assets
Bank age	Age	Natural logarithm of foundation years
Gross domestic product	Gdp	Natural logarithm of annual GDP
Monetary policy	Mpdum	Tight monetary policy, as defined by Rao and Jiang (2013), Mpdum equals 1 when samples are in 2004, 2006, 2007 or 2011, and 0 otherwise
Bank classification	Classify	Dummy variable, coded as 1 for Big 4 state-owned banks and local city commercial banks, and 0 otherwise
Marketization level	Mki	NERI INDEX of marketization of China's provinces, as calculated by Fan et al. (2011). If samples are Big 4 state-owned banks and joint-stock banks, we adopt the mean value of each provincial Mki to measure country level Mki. For local city commercial banks, we adopt province level Mki. Marketization level after 2010 equals that in 2010
Financial development depth	Fdd	Following Zhang and Wang (2012), if samples are Big 4 state-owned banks and joint-stock commercial banks with wide national operation, Fdd equals the state-level loan balance divided by the state-level GDP. For city commercial banks that do business within one province, Fdd equals the province-level loan balance divided by the province-level GDP

Table 3
Descriptive statistics.

	Obs.	Minimum	P25	P50	Mean	P75	Maximum	S.D.
NPLR (%)	1264	0.080	0.800	1.220	2.263	2.340	23.430	3.359
SBCLR (%)	1049	1.080	4.410	6.170	8.107	8.020	83.210	10.835
NLMR (%)	1016	0.002	0.023	0.048	0.080	0.093	0.611	0.098
LTDR (%)	1297	0.308	0.591	0.667	0.648	0.717	1.096	0.109
GRL (%)	1019	−0.228	0.152	0.199	0.226	0.264	0.917	0.144
Roa	1016	0.000	0.008	0.010	0.010	0.013	0.021	0.004
EPU	1296	0.557	0.989	1.276	1.446	1.790	2.444	0.563
Age	1297	0.693	2.079	2.639	2.501	2.944	4.111	0.703

Note: Although we collect data through various approaches, some observations remain absent.

The dependent variable is ROA, which measures bank performance. We mainly focus on the interaction term of Loan and EPU, such that if the coefficient of interaction is significantly negative, then H3 is confirmed. The control variables are the same as in the first and second regression models, and we control for lagged ROA to remove the time-series change of performance. Table 2 presents the variable definitions used in all of the regression models.

3.4. Descriptive statistics

Table 3 provides descriptive statistics about key variables used in the three regression models. The mean (maximum) NPLR for the sample banks is 2.27% (23.43%). The minimum (maximum) SBCLR is 8.11%

Table 4
The effect of EPU on credit risks.

	NPLR		SBCLR		NLMR	
	(1)	(2)	(3)	(4)	(5)	(6)
EPU_{t-1}	**11.879*****		**5.970***		**0.219*****	
	(20.41)		**(1.71)**		**(11.86)**	
$REPU_{t-1}$		**27.205*****		**13.672***		**0.501*****
		(20.41)		**(1.71)**		**(11.86)**
$Size_{t-1}$	1.305***	1.305***	−5.336***	−5.336***	0.060***	0.060***
	(4.52)	(4.52)	(−3.28)	(−3.28)	(6.49)	(6.49)
Lev_{t-1}	−7.920*	−7.920*	−96.388***	−96.388***	−0.497***	−0.497***
	(−1.77)	(−1.77)	(−3.07)	(−3.07)	(−3.63)	(−3.63)
Car_{t-1}	−0.049*	−0.049*	−0.743***	−0.743***	−0.002***	−0.002***
	(−1.93)	(−1.93)	(−4.47)	(−4.47)	(−2.63)	(−2.63)
$LTDR_{t-1}$	−0.367	−0.367	−26.964***	−26.964***	0.065**	0.065**
	(−0.37)	(−0.37)	(−4.76)	(−4.76)	(2.02)	(2.02)
Age_{t-1}	3.006*	3.006*	1.032	1.032	0.342***	0.342***
	(1.92)	(1.92)	(0.09)	(0.09)	(7.62)	(7.62)
Gdp_{t-1}	160.405***	140.651***	81.314*	71.386*	2.908***	2.545***
	(21.54)	(21.61)	(1.80)	(1.80)	(12.27)	(12.28)
Mpdum	60.818***	57.300***	30.255*	28.487*	1.128***	1.063***
	(21.47)	(21.51)	(1.77)	(1.77)	(12.55)	(12.58)
Classify	1.699*	1.699*	0.069	0.069	0.918***	0.918***
	(1.82)	(1.82)	(0.01)	(0.01)	(9.73)	(9.73)
Cons.	−2,178.622***	−1,916.272***	−829.273	−697.430	−41.005***	−36.174***
	(−22.01)	(−22.16)	(−1.37)	(−1.32)	(−13.05)	(−13.17)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	785	785	687	687	668	668
R^2	0.745	0.745	0.630	0.630	0.825	0.825

Note: This table reports the OLS regression results for the effect of EPU on credit risks. All of the variables are defined in Table 2. Coefficient estimates are provided in the top row and *t*-values in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% levels (two-tailed test), respectively.

(83.21%). According to the commercial bank risk regulation core index issued by China's bank regulatory commission, NPLR should be less than 5% and SBCLR should be less than 10%. This means that core risk indices meet requirements on average, but some commercial banks do not manage credit risk in accordance with regulations. The mean (maximum) value of EPU is 1.45 (2.44), with a standard deviation of 0.56, suggesting that EPU in China is rather high on average, with significant fluctuation. LTDR has a minimum (maximum) value of 0.308 (1.096); ROA is 0.01 on average and has a maximum value of 0.021; and Bank age has a minimum (maximum) value of 0.693 (4.111). These statistics are consistent with the stratified and incremental development features of China's banking systems.

4. Empirical results

4.1. EPU and credit risks

Table 4 presents the regression results for the first model with Credit risk as the dependent variable. Columns 1 and 2 report the results for the model with NPLR as the dependent variable, and they show that the coefficient of EPU (REPU) is 11.879 (27.205) and statistically significant at the 1% level. These results document that greater EPU results in higher NPLR. Columns 3 and 4 report the results for the model with SBCLR as the dependent variable. We find that the coefficient of EPU (REPU) is 5.97 (13.672) and statistically significant at the 10% level. This means that EPU significantly affects SBCLR. Columns 5 and 6 report the results for the model with NLMR as the dependent variable. The coefficient of EPU (REPU) is 0.219 (0.501) and statistically significant at the 1% level, suggesting that the increase in EPU can result in more

Table 5
Effect of EPU on loan size.

	LTDR			GRL		
	Full sample (1)	Classify = 1 (2)	Classify = 0 (3)	Full sample (4)	Classify = 1 (5)	Classify = 0 (6)
EPU_{t-1}	**−0.060*** **	**0.015**	**−0.084*** **	**−0.342*** **	**−0.320*** **	**−0.370*** **
	(−2.69)	**(0.44)**	**(−3.21)**	**(−8.15)**	**(−5.03)**	**(−6.78)**
$Size_{t-1}$	−0.095***	−0.090***	−0.096***	−0.136***	−0.095***	−0.277***
	(−7.85)	(−6.31)	(−4.14)	(−5.98)	(−3.59)	(−5.70)
Lev_{t-1}	−0.185	−0.188	−0.196	0.029	−0.094	0.334
	(−1.12)	(−0.96)	(−0.44)	(0.09)	(−0.26)	(0.36)
Car_{t-1}	−0.001	−0.001	−0.002	0.007***	0.005**	0.006
	(−1.20)	(−0.73)	(−0.75)	(3.45)	(2.32)	(1.34)
$LTDR_{t-1}$	−0.343***	−0.382***	−0.170**	−0.179**	−0.171**	−0.101
	(−9.14)	(−8.72)	(−2.15)	(−2.55)	(−2.12)	(−0.61)
Age_{t-1}	0.029	−0.036	−0.009	−0.021	0.005	−0.042
	(0.47)	(−0.39)	(−0.12)	(−0.18)	(0.03)	(−0.29)
Gdp_{t-1}	−0.404	0.656	−0.886***	−4.510***	−4.342***	−4.511***
	(−1.43)	(1.46)	(−3.02)	(−8.53)	(−5.26)	(−7.32)
Mpdum	−0.222**	0.169	−0.369***	−1.715***	−1.618***	−1.837***
	(−2.06)	(0.99)	(−3.22)	(−8.49)	(−5.15)	(−7.63)
Cons.	8.850**	−5.186	15.520***	63.938***	60.691***	68.033***
	(2.35)	(−0.87)	(3.87)	(9.07)	(5.56)	(8.07)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	801	634	167	801	634	167
R^2	0.849	0.854	0.827	0.693	0.649	0.849

Note: This table reports the OLS regression results for the effect of EPU on loan size. All of the variables are defined in Table 2. Coefficient estimates are provided in the top row and *t*-values in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

non-performing loans. Additionally, the coefficients of EPU in Table 4 are 11.978, 5.97 and 0.219, and the corresponding economic implications are that a unit increase in EPU can generate a 12% increase in NPLR, a 6% increase in SBCLR and a 0.2% increase in NLMR, respectively. All of these results support our H1 in different dimensions.

4.2. EPU and adjustment of loan sizes

Table 5 presents the regression results for the second model with Loan size as the dependent variable.[2] In Columns 1, 2 and 3, the dependent variable is LTDR, whereas in Columns 4, 5 and 6, it is GRL. Column 1 reports the results for the regression model with the full sample, and the coefficient of EPU is –0.06 and statistically significant at the 1% level. Then, we split the sample into two groups based on the dummy variable Classify, and the results are represented in Columns 2 and 3. Comparing Columns 2 and 3, the coefficient of EPU in the former is not significant, but in the latter it is –0.084 and statistically significant at the 1% level. These results confirm that EPU can adversely affect LTDR, particularly among joint-stock banks. The full-sample regression results in Column 4 of Table 5 show that the coefficient of EPU is −0.342 and statistically significant at the 1% level. The split-sample regression results in Column 5 (6), where Classify equals 1 (0), show that the coefficient of EPU is −0.342 (−0.37) and the *t* value is −5.03 (−6.78). Taken together, the regression results in Table 5 reveal that EPU adversely affects loan size, and that this effect is more pronounced in joint-stock banks, confirming H2a and H2b.

[2] The results remain the same for the regression model with REPU as the independent variable. We do not report these results due to space limitations.

Table 6
EPU, lending decisions and performance.

	(1)	(2)	(3)	(4)
	Dependent variable: Roa			
$LTDR_{t-1}$	0.004*	0.004*		
	(1.89)	(1.84)		
GRL_{t-1}			0.002	0.003
			(1.21)	(1.39)
EPU_{t-1}	−0.000		−0.002	
	(−0.11)		(−1.47)	
$REPU_{t-1}$		0.004		−0.007
		(0.53)		(−0.09)
$LTDR \times EPU_{t-1}$	**−0.003****			
	(−2.36)			
$LTDR \times REPU_{t-1}$		**−0.006*****		
		(−2.64)		
$GRL \times EPU_{t-1}$			**−0.002**	
			(−1.51)	
$GRL \times REPU_{t-1}$				**−0.004***
				(−1.73)
$Size_{t-1}$	0.000	0.000	0.001	0.001
	(0.62)	(0.69)	(1.01)	(0.96)
Lev_{t-1}	−0.004	−0.004	−0.010*	−0.010
	(−0.98)	(−1.02)	(−1.67)	(−1.60)
Age_{t-1}	−0.003	−0.003	−0.002	−0.001
	(−0.62)	(−0.58)	(−0.52)	(−0.08)
Roa_{t-1}	0.328***	0.328***	0.295***	0.296***
	(8.96)	(8.97)	(6.90)	(6.91)
Gdp_{t-1}	−0.029*	−0.032*	−0.031**	−0.029
	(−1.77)	(−1.70)	(−1.97)	(−0.67)
Classify	0.000	0.000	−0.000	−0.000
	(0.01)	(0.01)	(−0.06)	(−0.12)
Constant	0.401*	0.430*	0.426**	0.395
	(1.89)	(1.80)	(2.11)	(0.69)
Year	Yes	Yes	Yes	Yes
Bank	Yes	Yes	Yes	Yes
Obs.	773	773	631	631
R^2	0.809	0.810	0.828	0.828

Note: This table reports the OLS regression results for the effects of EPU and lending decisions on performance. All of the variables are defined in Table 2. Coefficient estimates are provided in the top row and *t*-value in parentheses. *, **, *** indicate significance at the 10%, 5% and 1% level, respectively.

For the control variables, the coefficient of Size is significantly negative, which shows that loan size is relatively low in large-scale banks, perhaps because the latter are more capable of deposit taking, exhibit higher market share stability and boast better customer relationships—all of which generate smaller loan sizes. The coefficient of MP is significantly negative, which shows that loan sizes decline when governments implement tight monetary policies.

4.3. EPU, adjustment of loan sizes and performance

Facing increasing EPU, is it beneficial to the operational performance of commercial banks to adjust loan sizes downward? We test H3 using the third regression model and report the results in Table 6. Column 1 represents the results for the regression model in which the dependent variable is ROA and LTDR is used to measure loan size. We construct the interaction term of Loan size with EPU and find that the coefficient of interaction labeled LTDR × EPU is statistically negative at the 5% level (coefficient is −0.003, *t* value is −2.36). In Column 2, we construct the interaction term of Loan size with REPU and find that the results

are consistent with those in Column 1. In Columns 3 and 4, we use GRL as an alternative proxy of loan size, and design the interaction term of GRL with EPU (REPU). The results show that the coefficient of GRL × EPU is negative but not statistically significant in Column 3, whereas the coefficient of GRL × REPU is statistically negative. For the control variables, the coefficient of lagged ROA is statistically positive, indicating that past performance can positively influence current performance. The coefficient of lagged Gdp is statistically negative, which is consistent with contra-cyclical economic development (Pan and Zhang, 2013). Consequently, the results reported in Table 6 prove H3; that is, that banks can improve performance by adjusting loan sizes downward when EPU arises.

5. Additional analyses

The literature suggests that institutional environments are varied and unbalanced in different regions within China, and they inevitably influence financial development and banking operations. Therefore, in this section we further analyze whether and how the differences in institutional environments influence the effects of EPU on commercial banks. We use marketization level and financial development depth to depict the differences in institutional environments.

Our first variable is marketization level. Fan et al. (2011) construct the marketization index using five aspects: the relationship between government and market, non-state-owned economic development, product market development, factor market development, intermediary organization development and law system. Marketization level can regulate the relationship between EPU and lending decisions through the following mechanisms. First, the greater the marketization level, the weaker the government's intervention in lending decisions. In this circumstance, commercial banks can flexibly and independently manage assets and liabilities to weaken the uncertainty shock resulting from economic policies when banks evaluate governmental policies.

Table 7
Results of additional tests.

	Splitting sample based on marketization level		Splitting sample based on financial development depth	
	High	Low	High	Low
		Panel A EPU and NPLR		
EPU_{t-1}	**−0.134**	**11.474*****	**−0.130**	**11.515*****
	(−0.78)	**(19.22)**	**(−0.74)**	**(19.21)**
CVs.	yes	yes	yes	yes
Obs.	618	167	395	390
R^2	0.841	0.747	0.684	0.819
		Panel B EPU and LTDR		
EPU_{t-1}	**−0.013***	**−0.072*****	**−0.018****	**−0.030**
	(−1.71)	**(−3.17)**	**(−2.28)**	**(−1.49)**
CVs.	yes	yes	yes	yes
Obs.	634	167	634	167
R^2	0.854	0.827	0.854	0.827
		Panel C EPU, adjustment of loan size, and performance		
$LTDR_{t-1}$	−0.001	0.009***	0.006	0.001
	(−0.14)	(2.85)	(1.53)	(0.40)
EPU_{t-1}	0.001	0.001	0.003**	−0.001
	(0.81)	(0.61)	(2.10)	(−0.80)
$LTDR \times EPU_{t-1}$	**−0.001**	**−0.005*****	**−0.004***	**−0.001**
	(−0.45)	**(−2.69)**	**(−1.91)**	**(−0.31)**
CVs.	Yes	Yes	Yes	Yes
Obs.	379	394	609	164
R^2	0.810	0.821	0.788	0.853

Note: This table reports the OLS regression results for additional tests. Panel A reports results for regression model one, Panel B presents results for regression model two, and Panel C shows results for regression model 3. All of the variables in three models are defined in Table 2. The results for control variables and constants are not presented due to space limitations. Coefficient estimates are provided in the top row and *t*-value in parentheses. *, ** and *** indicate significance at the 10%, 5% and 1% level, respectively.

Second, when the marketization level is greater, governments play more service-oriented roles and are more likely to seek advice from the public to improve the accuracy and enforceability of economic policies. High-quality government service and economic governance capacity can lower the uncertainty stored in economic policies, reducing the shock of EPU on the lending decisions of commercial banks. Third, intermediary organizations including journalists, accountants, lawyers, analysts, etc., fare better in environments with higher marketization levels. Abundant information from these intermediary organizations can help commercial banks to scientifically understand and judge economic policies, ultimately reducing the effects of economic policies on banks' lending decisions. Therefore, we assume that the effects of EPU on commercial banks are more pronounced in regions with low marketization levels.

Our second variable is financial development depth. This variable depicts to what extent finance permeates the real economy. Greater financial development depth deepens economical monetization and financialization, giving banks a greater effect on real economic development. When the level of financial development depth is high, governments are more likely to consider the effects of economic policies on financial institutions and credit resources, especially for policies that are directly related to monetary and loan policies. From this perspective, EPU's effects on commercial banks may be more pronounced in regions with lower levels of financial development depth. From another perspective, greater financial development depth implies that banks permeate the real economy, and thus are easily shocked by any fluctuations. This means that banks are extremely sensitive to the shock of EPU on customer enterprises. According to this theoretical analysis, we assume that the effect of EPU on the lending decisions of commercial banks can be relatively pronounced in regions with greater financial development depth.

The results for these additional analyses are reported in Table 7. We split our sample into four subsamples based on the median values of marketization level and financial development depth. Panel A reports the results of the first regression model. Within the low marketization level subsample, the coefficient of EPU (11.474) is statistically negative (t value is 19.22), and it is not significant in the high marketization level subsample. When we split the sample based on the median value of financial development depth, we find the same results. Within the low financial development depth subsample, the coefficient of EPU (78.575) is statistically negative (t value is 16.742), and it is not significant in the high financial development depth subsample. Based on Panel A of Table 7, we show that the effects of economic policies on credit risks are moderated by institutional environments. Specifically, increases in marketization levels and financial development depth can moderate the adverse shock of EPU on the credit risks of commercial banks.

Panel B of Table 7 presents the results for the second regression model. The coefficient of EPU (-0.072) is significantly negative at the 1% level (t value is -3.17) in the low marketization level subsample, but significantly negative at the 10% level (coefficient is -0.013, t value is -1.71) in the high marketization level subsample. When we split the sample based on the median value of financial development depth, the coefficient of EPU is not significant in the low subsample but statistically significant at the 5% level (coefficient is -0.018, t value is -2.28) in the high subsample. The results reported in Panel B show that the shock of EPU on loan size is more pronounced in the regions with lower marketization levels. The co-movement between banks' lending decisions and the financing and investments of enterprises is stronger with increased financial development depth. The shock of EPU on enterprises has a greater spillover effect on the lending decisions of commercial banks. Consequently, increases in financial development depth can strengthen the adverse shock of EPU on the credit risks of commercial banks.

Panel C of Table 7 shows the results for the third regression model. Similarly, we focus on the coefficient of the interaction term. In the low marketization level subsample, the coefficient of the interaction term (-0.005) is significantly negative at the 1% level (t value is -2.69), but not significant in the high marketization level subsample. The coefficient of the interaction term (-0.004) is also significantly negative at the 10% level (t value is -1.91) in the high financial development depth subsample, but not significant in the low financial development depth subsample. The contributing causes of these results are that banks that are adversely shocked by EPU are more flexible and independent in managing assets and liabilities to achieve equilibrium among security, liquidity and profitability when the marketization level is relatively high. In contrast, banks must carefully consider the possible shock of adjustments to loan sizes on the real economy when financial development depth increases, particularly in Chinese banking systems where state-owned shares are generally high and it is difficult for commercial banks to achieve such equilibrium by adjusting loan sizes downward.

The results reported in Table 7 show that an increase in marketization level (financial development depth) weakens (strengthens) the adverse effects of EPU on the credit risks and loan sizes of commercial banks. These results imply that commercial banks find it easy to balance security and profitability by adjusting loan sizes when the marketization level is low, and find it difficult to reach the goal of risk management when financial development depth increases.

6. Conclusion and implications

Some researchers are beginning to pay attention to the consequences of EPU, but they are mainly focusing on how it influences the macro-economic development and investment decisions of enterprises, while the mechanisms through which commercial banks deliver the effects of macro-economic policies on enterprises are overlooked. Our research fills this gap by investigating whether and how EPU affects the operational behavior of enterprises. Our results show that EPU can increase NPLR, SBCLR and NLMR, and adversely affect the loan sizes of commercial banks by shocking enterprises' demand for and banks' supply of credit resources, particularly in joint-stock commercial banks. When faced with an increase in EPU, banks can improve performance by reducing loan sizes. Marketization levels and financial development depth can also be used to modulate the effects of EPU on commercial banks.

Our results have the following implications. First, to lower the information asymmetry between commercial banks and raise the efficiency of credit resource allocation, governments should pay more attention to improving the opacity, smoothness, consistency and enforceability of economic policies. Second, commercial banks should pay more attention to the dynamic adjustment of risk management indicators and lending decisions based on changes in economic policies to balance security, liquidity and profitability when serving the real economy.

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Employee quality, monitoring environment and internal control

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ABSTRACT

We investigate the effect of internal control employees (ICEs) on internal control quality. Using special survey data from Chinese listed firms, we find that ICE quality has a significant positive influence on internal control quality. We examine the effect of monitoring on this result and find that the effect is more pronounced for firms with strict monitoring environments, especially when the firms implement the Chinese internal control regulation system (CSOX), have higher institutional ownership or attach greater importance to internal control. Our findings suggest that ICEs play an important role in the design and implementation of internal control systems. Our study should be of interest to both top managers who wish to improve corporate internal control quality and regulators who wish to understand the mechanisms of internal control monitoring.

1. Introduction

With the advent of the knowledge economy, human capital rather than physical assets has become the essential strategic resource of businesses. Rajan and Zingales (1998, 2000) have formalized the human capital theory of corporate governance. They argue that governance problems are no longer concentrated at the top of a steep pyramid; the focus of corporate governance in the new millennium must shift to the governance problems of employees. However, previous studies provide limited evidence of the extent to which employees influence corporate actions. In this study, we focus on internal control because internal control is a core component of corporate activities and is thus suitable for assuring the achievement of objectives relating to

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operations, reporting and compliance (COSO, 2013). We contribute to the literature on internal control by examining the relationship between internal control employees (ICEs) and internal control quality, and the effect of monitoring on this relationship.

Specifically, we ask two complementary research questions. Our first question examines whether ICE quality influences internal control quality. We argue that high quality ICEs increase the human capital investments in the design and implementation of internal control process, and thus improve internal control quality.

Our second question examines whether the monitoring environment modifies the effect of ICE quality on internal control quality. Although we predict that ICE quality has a positive influence on internal control quality, it is possible that this influence may vary between firms that are stringently monitored and firms that are not stringently monitored by regulators, institutional investors and/or top managers. Stringent monitoring could alleviate the employee agency problem and provide ICEs with incentives not to shirk. The increased diligence of employees further promotes the positive effects of ICE quality. Therefore, we expect that the positive effect of ICE quality on internal control quality is more pronounced in firms that are subject to more stringent monitoring.

Using special survey data from Chinese listed firms, we study a sample of 1522 firm-year observations from the 2011 to 2013 period. We use number, education and job tenure as the quality attributes of ICEs, and find that high quality ICEs improve internal control quality. Further, we examine the effect of monitoring on this relationship, and find that the positive effect of ICE quality is more pronounced for firms in stringent monitoring environments. In particular, we find that the positive effect is more significant when firms implement the Chinese internal control regulation system (CSOX), have higher institutional ownership or attach greater importance to internal control. Our results are robust to the misreporting problem of internal control weaknesses, endogeneity bias and chairman turnover.

Our study contributes to two streams of research. Our first contribution was to the internal control literature. To the best of our knowledge, this is the first study to demonstrate the influence of ICEs on internal control quality. There is a large and growing literature examining the determinants of internal control quality (e.g., Doyle et al., 2007; Ashbaugh-Skaife et al., 2007; Hoitash et al., 2009), but no study has examined the influence of ICEs. Given the increased importance of human capital in effective internal control (Doyle et al., 2007), we use special survey data from Chinese listed firms to examine how ICEs influence internal control quality. Our findings suggest that high quality ICEs are more likely to effectively discharge their responsibilities, thus increasing internal control quality.

Our second contribution was to the literature on the employee agency problem. To our knowledge, prior research has not examined the effect of monitoring mechanisms on the employee agency problem. We help fill this gap by providing the first evidence of the effect of monitoring on the relationship between ICEs and internal control quality. Our results suggest that monitoring by regulators, institutional investors and/or top managers could alleviate the employee agency problem and improve the positive effect of ICE quality.

The rest of this paper proceeds as follows. Section 2 introduces the institutional background and reviews related studies. Section 3 provides theoretical analysis and hypothesis development. Section 4 describes the research design, Sections 5 and 6 report the empirical results and robustness tests, respectively, and Section 7 concludes the paper.

2. Institutional background and literature review

2.1. Institutional background

In recent years, Chinese regulators have issued a series of internal control regulations. In May 2008, the five ministries, including the Ministry of Finance (MOF) and China Securities Regulatory Commission (CSRC), jointly issued the Basic Standards of Enterprise Internal Control (hereafter, the Basic Standards). In April 2010, the five ministries jointly issued a series of internal control guidelines, including the Implementation Guidelines for Enterprise Internal Control, the Guidelines for Assessment of Enterprise Internal Control and the Guidelines for Audit of Enterprise Internal Control. The Basic Standards and these guidelines constitute the internal control regulation system in China, which is also called CSOX.

Similar to the Sarbanes–Oxley Act in the United States, CSOX requires listed firms to carry out effective self-assessments of their internal control, to issue self-assessment reports on an annual basis and to appoint audit firms to audit internal control effectiveness and issue auditors' reports. Firms cross-listed on domestic and international exchanges have been required to adopt CSOX since 1 January 2011, and firms listed on the main boards of the Shanghai Stock Exchange (SSE) and Shenzhen Stock Exchange (SZSE) have been required to do so since 1 January 2012.

In February 2011, CSRC issued the Notice on the Assignments of Internal Control Pilots in Listed Firms and selected 216 listed firms as internal control pilots. The key pilot firms were required to adopt CSOX in 2011, and the other pilot firms have been required to do so since 2012.

In August 2012, MOF and CSRC jointly issued the Notice on Partial Implementation of Internal Control Regulation System by Main Board Listed Firms in 2012 (hereafter, the Notice), which postponed the implementation date for firms listed on the main boards of the SSE and SZSE. The Notice required that: "(1) Both central and local state owned listed firms should adopt CSOX in 2012 and disclose their annual self-assessments and auditors' reports on internal control along with their 2012 annual reports; (2) Non-state owned main board firms whose market values are larger than 5 billion RMB on 31 December 2011 and average net profits between 2009 and 2011 are larger than 30 million RMB, should disclose their annual self-assessments and auditors' reports on internal control along with their 2013 annual reports; (3) Other main board firms should disclose their annual self-assessments and auditors' reports on internal control along with their 2014 annual reports." MOF and CSRC do not require the firms listed on the Small and Medium-size Enterprise Board or the ChiNext market to implement CSOX.

2.2. Literature review

Our study is related to the following two research areas: (1) determinants of internal control quality; and (2) the employee agency problem.

2.2.1. Determinants of internal control quality

Previous studies have examined the determinants of internal control quality along the following three dimensions. First, from the perspective of corporate characteristics, many studies have investigated the effects of the complexity and scope of operations, organizational change, internal control resources and accounting application risk on internal control weaknesses (e.g., Doyle et al., 2007; Ashbaugh-Skaife et al., 2007; Lin and Rao, 2009; Tian et al., 2010; Rice and Weber, 2012). They all find that relative to non-disclosers, firms that disclose internal control weaknesses have more complex operations, recent organizational changes, greater accounting risk and fewer resources available for internal control.

Second, from the perspective of top management's characteristics, Li et al. (2010) examine the effect of CFOs' professional qualifications on internal control weaknesses and prove that firms that disclose internal control weaknesses have less-qualified CFOs.

Third, from the perspective of governance mechanisms, Krishnan (2005), Naiker and Sharma (2009) and Hoitash et al. (2009) analyze the effects of audit committee characteristics on internal control weaknesses and find that independent audit committees and audit committees with financial expertise are significantly less likely to be associated with incidences of internal control weaknesses. Masli et al. (2010) document that the implementation of internal control monitoring technology is associated with the lower likelihood of internal control material weaknesses. Lin et al. (2011) examine the relationship between material weakness disclosures and internal audit function and observe that material weakness disclosures are negatively associated with internal audit quality. Gong et al. (2013) argue that for cross-listed firms domiciled in weak investor protection countries, firms whose managers control their firms and have voting rights in excess of cash flow rights are more likely to misreport internal control weaknesses than other firms. Balsam et al. (2014) examine the relation between executive equity incentives and material weaknesses and prove that the likelihood of material weakness disclosures decreases with increases in equity incentives. Last but not the least, Guo et al. (2016) provide empirical evidence that personnel-friendly practices significantly attenuate internal control ineffectiveness.

In summary, although previous studies have examined the determinants of internal control from different perspectives, no study has investigated the influence of employees. Recognizing the increased importance of

human capital in effective internal control, we focus on ICEs and examine the effect of ICEs on internal control quality.

2.2.2. Employee agency problem

Prior studies have provided evidence that employees play an important role in corporate activities. For example, Edmans (2011) analyzes the relationship between employee satisfaction and long-term stock returns, and proves that employee satisfaction is positively correlated with shareholder returns. Bae et al. (2011) investigate corporate capital structure from the perspective of a firm's relations with its employees, and find that firms that treat their employees fairly maintain low debt ratios. Wu and Liu (2009) examine the effect of employee quality on R&D activities using special survey data from private firms in China, and document that employee quality has a significantly positive effect on R&D activities. Huang and Li (2014) investigate the relationship between employees and investment using special data from manufacturing firms in China, and find that the number of employees is positively associated with over-investment when firms face unfavorable investment opportunities.

However, the existence of the employee agency problem attenuates the positive effects of employees. Previous studies have examined how to alleviate the employee agency problem through motivation mechanisms such as compensation, stock options and ownership. For example, Chen et al. (2015) argue that employee compensation incentives have a significantly positive effect on earnings growth. Chang et al. (2015) provide empirical evidence of the positive effect of non-executive employee stock options on corporate innovation. Bova et al. (2015a, 2015b) document that employee ownership is positively associated with voluntary disclosure and negatively associated with risk. Kim and Ouimet (2014) find that small employee stock ownership plans increase corporate productivity, but the effect is weaker when there are too many employees to mitigate free-riding.

To the best of our knowledge, there is no research examining the effect of monitoring on the employee agency problem. Hence, we focus on ICEs and investigate the effect of monitoring on the relationship between ICEs and internal control quality, which helps to fill the gap in the literature on the employee agency problem.

3. Theoretical analysis and hypothesis development

We develop our research questions on the basis of the input-process-output theory and agency theory. First, Gladstein (1984) has formalized the input-process-output theory of group effectiveness, and highlights that group composition, such as employee quality, has a critical effect on group effectiveness. Therefore, our first research question is, in terms of ICE teams, does ICE quality influence internal control quality?

Second, according to agency theory, the preference for leisure induces employees to reduce their productive effort, thus leading to the agency conflict between top managers and employees (Alchian and Demsetz, 1972). A remedy to this problem is to invest resources into monitoring employees (Holmstrom, 1979). Therefore, our second research question is, in terms of internal control activities, does stringent monitoring promote the positive effect of ICE quality on internal control quality by improving ICE work efficiency?

Our theoretical framework is presented in Fig. 1. Based on this framework, we develop our hypotheses.

3.1. ICE quality and internal control quality

In his formalization of the input-process-output theory, Gladstein (1984) emphasizes that team composition, team structure, resources available and organizational structure are the four major determinants of team effectiveness. As a part of team composition, employee qualities such as the number, education degree and job tenure of employees assume enormous importance. Based on the input-process-output theory, we focus on ICE teams and argue that ICE quality could influence internal control effectiveness both directly and indirectly, as shown in Fig. 1. On the one hand, Ge and McVay (2005) indicate that a shortage of qualified staff is a common cause of internal control ineffectiveness. So high quality ICEs are more likely to discharge their responsibilities to adequately design and implement internal control policies and procedures, which directly increase internal control quality.

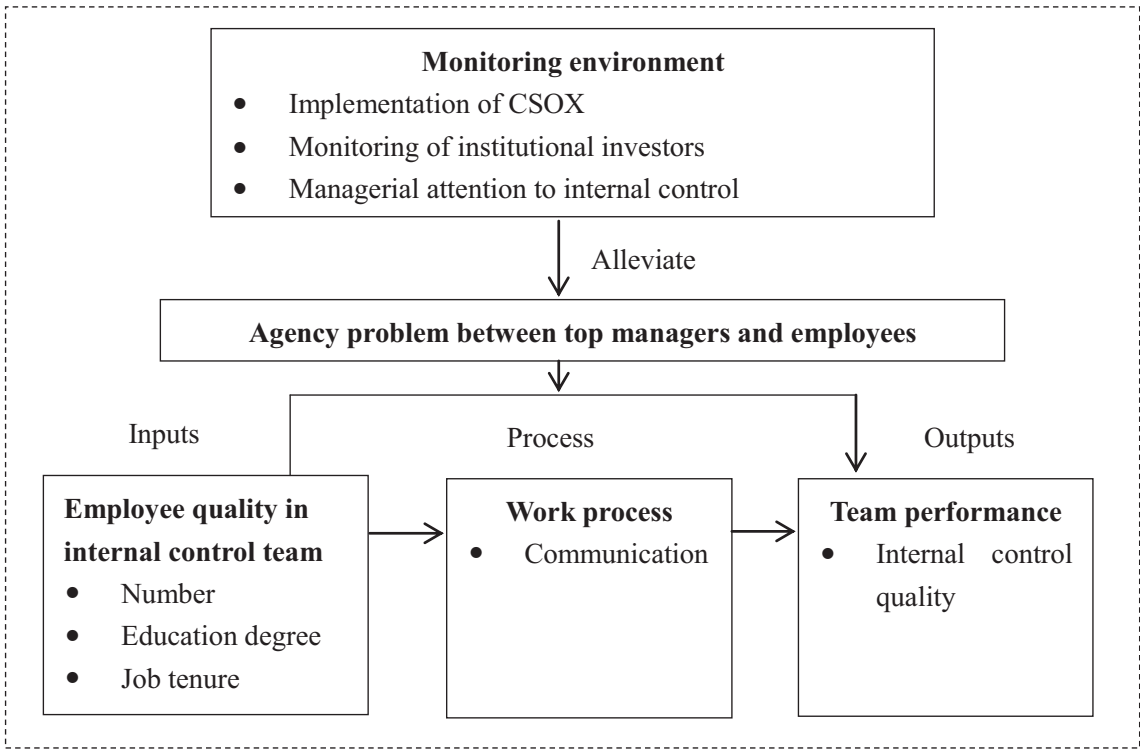

Figure 1. Theoretical framework.

On the other hand, ICE quality indirectly influences internal control quality through work processes. Take job tenure as an example: ICEs with long job tenure are more familiar with corporate culture and internal communication styles, and this improves the efficiency of the communication process (Zenger and Lawrence, 1989). Moreover, communication efficiency is crucial to internal control quality because the essential components of internal control work include communicating with top managers to establish and improve the internal control system, communicating with employees to monitor regular control activities and communicating with internal and external auditors to provide audit assistance. Hence, ICEs with long job tenures could indirectly increase internal control quality by improving communication efficiency.

Based on the above discussion, we use the number, education and job tenure of ICEs as proxies for ICE quality, and specify our first hypothesis as follows.

H1. ICE quality has a positive influence on internal control quality.

Agency problems exist not only between shareholders and top managers, but also between top managers and employees (Weber, 1947; Holmstrom and Milgrom, 1994). Employees usually prefer leisure and have an incentive to shirk (Jensen and Meckling, 1976), which attenuates the positive effect of employee quality. Could monitoring alleviate the employee agency problem and improve the positive effect of ICE quality on internal control quality? To address this research question, we examine the influence of three different monitoring mechanisms (i.e., implementation of CSOX, institutional investors and managerial attention) on the relationship between ICE quality and internal control quality.

3.2. Implementation of CSOX

The internal control self-assessment reports voluntarily disclosed by listed firms before the implementation of CSOX are devoid of substance (Tian et al., 2010), as it is difficult for regulators to carry out effective

monitoring of internal control without clear guidelines. The relaxed monitoring in the pre-CSOX period increases the possibility of ICE shirking and reduces the positive effect of ICE quality on internal control quality.

In contrast, since the implementation of CSOX listed firms is required to issue self-assessment and audit reports on internal control in accordance with CSOX guidelines, such monitoring improves the positive effect of ICE quality through the following two channels. First, the implementation of CSOX increases the workload of ICEs. The detailed requirements in CSOX reduce the arbitrariness of internal control self-assessment, forcing ICEs to work harder and alleviating the employee agency problem. For example, according to CSOX requirements, ICEs should "obtain sufficient appropriate evidence to be able to assess the effectiveness of design and implementation of internal control through a variety of approaches, including inquiry, survey, discussion, walk through testing, field inspection, sampling and comparative analysis."

Second, the implementation of CSOX strengthens the external monitoring of internal control. CSOX provides clear guidelines for regulators and external auditors and improves their ability to monitor internal control. The enhanced external monitoring reduces the possibility of ICE shirking and improves the positive effect of ICE quality on internal control quality. Based on the preceding arguments, we propose the following hypothesis.

H2. The positive effect of ICE quality on internal control quality is more pronounced in the post-CSOX period.

3.3. Monitoring of institutional investors

Previous studies have shown that institutional investors influence corporate governance in two ways. First, by voting with their feet: Institutional investors can indirectly express their attitudes by buying or selling stocks. Second, by voting with their hands: Institutional investors can serve as active monitors and influence corporate governance through their voting rights. Institutional investors with large equity positions have greater incentives to play a monitoring role, because the benefits they receive from their monitoring activities are more likely to exceed the costs of monitoring (Shleifer and Vishny, 1986). Moreover, large ownership positions allow institutional investors to exert greater influence on corporate governance, which further motivates them to serve as active monitors rather than free-riders.

As internal control is essential for corporate governance, institutional investors have an incentive to monitor internal control quality, especially when they have large ownership positions. The monitoring of institutional investors prevents ICEs from shirking and increases the positive effect of ICE quality on internal control quality. This leads to our third hypothesis.

H3. The positive effect of ICE quality on internal control quality is more pronounced among firms with higher institutional ownership.

3.4. Managerial attention to internal control

The tone set by top management is fundamental to the functioning of an internal control system (COSO, 2013). High managerial attention to internal control could alleviate the agency problem between top managers and employees. Specifically, when top managers attach great importance to internal control, they will devote more effort to ICE monitoring, which reduces the possibility of ICE shirking and increases the positive effect of ICE quality. In contrast, when top managers pay little attention to internal control and ICE monitoring, ICEs will be inclined to take more leisure, which further reduces the positive effect of ICE quality. Based on the preceding arguments, we propose the following hypothesis.

H4. The positive effect of ICE quality on internal control quality is more pronounced when top managers attach greater importance to internal control.

4. Research design

4.1. Data and sample selection

Our data for ICE quality and managerial attention come from the 2014 Internal Control Survey of Chinese Listed Firms. This questionnaire survey was conducted by the Research Group of Internal Control to examine the internal control status of Chinese listed firms. The questionnaires were distributed to all 2536 listed firms on 5 September 2014 and collected on 31 October 2014, with a recovery rate of 84.94%. In early November 2014, the Research Group of Internal Control randomly chose 12 respondents for field investigation to confirm the validity of the survey responses.

This survey provides ICE quality data for the 2011 to 2013 period, including the number, education and job tenure of ICEs. As stated in the questionnaire, ICEs include the employees who are commonly responsible for the establishment and regular monitoring of internal control, but exclude employees in the internal audit department, the internal control manager and other top managers.

The survey also provides information about managerial attention. Specifically, chairmen are required to answer the following question: In your opinion, to what extent does your firm demand internal control? A. Not at all; B. A little; C. Fair; D. Much; E. Very much.

Our sample starts with all of the Chinese non-financial firms with effective ICE data for the 2011 to 2013 period. First, we remove the firms listed on the Small- and Medium-sized Enterprise board and the ChiNext market, because these firms are not required to implement CSOX and their internal control regulations are systematically different from those of firms listed on the main boards. Next, we merge the remaining observations with the DIB internal control database, CSMAR database and WIND database. Finally, we drop observations with missing variable information. Our final sample contains 1522 firm-year observations.

4.2. Model specification and variable description

4.2.1. Models of H1

To test the effect of ICE quality on internal control quality, we estimate the following models, drawn from previous studies (e.g., Doyle et al., 2007; Ashbaugh-Skaife et al., 2007):

$$\begin{aligned} ICW = {} & \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV \\ & + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED \\ & + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} DEMAND + \beta_{16} SOE + \sum YEAR \\ & + \sum INDUSTRY + \varepsilon; \text{ and} \end{aligned} \tag{1}$$

$$\begin{aligned} ICW = {} & \beta_0 + \beta_1 QUALITY + \beta_2 MA + \beta_3 GROWTH + \beta_4 INVENTORY + \beta_5 LEV + \beta_6 SIZE + \beta_7 AGE \\ & + \beta_8 DISTRESS + \beta_9 AUDITOR + \beta_{10} AUDITOR\_RESIGNED + \beta_{11} TOPSHAREHOLDER \\ & + \beta_{12} INSTITUTION + \beta_{13} DEMAND + \beta_{14} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \end{aligned} \tag{2}$$

ICW is an indicator variable that is coded 1 if the firm discloses at least one internal control weakness in the given fiscal year, and 0 otherwise. We use *ICW* as the dependent variable to measure internal control quality; the disclosure of internal control weaknesses means low internal control quality.

With respect to explanatory variables, we use number (*NUM*), education (*EDU*) and job tenure (*CORPEXP*) to measure ICE quality in model 1. Specifically, *NUM* equals the fiscal year-end number of ICEs deflated by the total number of employees times 100. *EDU* equals the fiscal year-end number of ICEs with a bachelor degree or above deflated by the total number of ICEs. *CORPEXP* equals the fiscal year-end number of ICEs who have worked in the firm no less than 5 years deflated by the total number of ICEs.

We construct a comprehensive ICE quality measure (*QUALITY*) in model 2. Specifically, $QUALITY = NUM\_dummy + EDU\_dummy + CORPEXP\_dummy$, where *NUM_dummy*, *EDU_dummy* or *CORPEXP_dummy* are indicator variables that are coded 1 if the value for *NUM*, *EDU* or *CORPEXP* is larger than the mean of the sample in the same fiscal year and industry, and 0 otherwise.

With respect to control variables, Doyle et al. (2007) and Ashbaugh-Skaife et al. (2007) find that the complexity and scope of operations, internal control resources and governance mechanisms influence internal control quality. Accordingly, we include M&A activities (*MA*), percentage change of sales (*GROWTH*), percentage of inventory (*INVENTORY*) and leverage ratio (*LEV*) to control for the effects of the complexity and scope of operations. We also include firm size (*SIZE*), listed years (*AGE*) and the severity of financial distress (*DISTRESS*) to control for the effects of internal control resources. We add the use of a Big 4 audit firm (*AUDITOR*), change of auditors (*AUDITOR_RESIGNED*), largest shareholder ownership (*TOPSHAREHOLDER*) and institutional ownership (*INSTITUTION*) to capture the effects of governance mechanisms. In addition, we control for chairman's attention to internal control (*DEMAND*), state-owned firms (*SOE*), year dummy variables and industry dummy variables. Detailed definitions of each variable are given in Table 1.

4.2.2. Models of H2

To test H2, we construct four interaction terms and estimate the following models:

Table 1
Summary of variables.

Variables	Definitions
Dependent variable	
ICW	Indicator variable that is coded 1 if the firm discloses at least one internal control weakness in the given fiscal year, and 0 otherwise
Explanatory variables	
NUM	The fiscal year-end number of ICEs deflated by the total number of employees times 100
EDU	The fiscal year-end number of ICEs with bachelor degrees or above deflated by the total number of ICEs
CORPEXP	The fiscal year-end number of ICEs who have worked in the firm no less than 5 years deflated by the total number of ICEs
QUALITY	$QUALITY = NUM\_dummy + EDU\_dummy + CORPEXP\_dummy$, where *NUM_dummy*, *EDU_dummy* or *CORPEXP_dummy* are indicator variables that are coded 1 if *NUM*, *EDU* or *CORPEXP* is larger than the mean of the sample in the same fiscal year and industry, and 0 otherwise
CSOX	Indicator variable that is coded 1 if the firm is required to implement CSOX in the given fiscal year, and 0 otherwise
INST	Indicator variable that is coded 1 if the percentage of shares held by the largest institutional investor at fiscal year-end is larger than the mean of the sample in the same fiscal year and industry
DEMAND	Indicator variable that is coded 1 if the chairman thinks that the firm needs internal control very much, and 0 otherwise
Control variables	
MA	Indicator variable that is coded 1 if the firm engages in mergers or acquisitions in the given fiscal year, and 0 otherwise
GROWTH	Percentage change in fiscal year-end sales
INVENTORY	Inventory deflated by total assets at fiscal year-end
LEV	Total liabilities deflated by total assets at fiscal year-end
SIZE	Natural logarithm of total assets at fiscal year-end
AGE	Natural logarithm of the number of years since the firm listed on the main boards
DISTRESS	Decile rank (by year) of the Altman *z*-score
AUDITOR	Indicator variable that is coded 1 if the firm is audited by a Big 4 audit firm, and 0 otherwise
AUDITOR_RESIGNED	Indicator variable that is coded 1 if the audit firm changes in the fiscal year, and 0 otherwise
TOPSHAREHOLDER	Percentage of shares held by the largest shareholder at fiscal year-end
INSTITUTION	Percentage of shares held by institutional investors at fiscal year-end
SOE	Indicator variable that is coded 1 if the firm is owned by state, and 0 otherwise
YEAR	Year dummy variables
INDUSTRY	Industry dummy variables

$$ICW = \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 CSOX + \beta_5 NUM * CSOX + \beta_6 EDU * CSOX + \beta_7 CORPEXP * CSOX + \beta_8 MA + \beta_9 GROWTH + \beta_{10} INVENTORY + \beta_{11} LEV + \beta_{12} SIZE + \beta_{13} AGE + \beta_{14} DISTRESS + \beta_{15} AUDITOR + \beta_{16} AUDITOR\_RESIGNED + \beta_{17} TOPSHAREHOLDER + \beta_{18} INSTITUTION + \beta_{19} DEMAND + \beta_{20} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon; \text{ and} \quad (3)$$

$$ICW = \beta_0 + \beta_1 QUALITY + \beta_2 CSOX + \beta_3 QUALITY * \text{CSOX} + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} DEMAND + \beta_{16} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \quad (4)$$

CSOX is an indicator variable that is coded 1 if the firm is required to implement CSOX in the given fiscal year, and 0 otherwise. Specifically, variable *CSOX* is coded 1 only for the following observations: (1) cross-listed firms and key pilot firms in the 2011 to 2013 period; (2) state owned listed firms and other pilot firms from the 2012 to 2013 period; and (3) non-state owned main board firms in 2013 whose market values are larger than 5 billion RMB on 31 December 2011 and whose average net profits in the 2009 to 2011 period are larger than 30 million RMB.

We multiply *CSOX* by *NUM*, *EDU*, *CORPEXP* and *QUALITY* to construct interaction terms (*NUM* * *CSOX*, *EDU* * *CSOX*, *CORPEXP* * *CSOX* and *QUALITY* * *CSOX*), and investigate whether the implementation of CSOX influences the positive effect of ICE quality. The other variables in models 3 and 4 are similar to those in models 1 and 2. Detailed definitions of all of the variables are given in Table 1.

4.2.3. Models of H3

To test H3, we construct four interaction terms and estimate the following models:

$$ICW = \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 INST + \beta_5 NUM * INST + \beta_6 EDU * INST + \beta_7 CORPEXP * INST + \beta_8 MA + \beta_9 GROWTH + \beta_{10} INVENTORY + \beta_{11} LEV + \beta_{12} SIZE + \beta_{13} AGE + \beta_{14} DISTRESS + \beta_{15} AUDITOR + \beta_{16} AUDITOR\_RESIGNED + \beta_{17} TOPSHAREHOLDER + \beta_{18} INSTITUTION + \beta_{19} DEMAND + \beta_{20} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon; \text{ and} \quad (5)$$

$$ICW = \beta_0 + \beta_1 QUALITY + \beta_2 INST + \beta_3 QUALITY * INST + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} DEMAND + \beta_{16} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \quad (6)$$

INST is an indicator variable that is coded 1 if the percentage of shares held by the largest institutional investor at fiscal year-end is larger than the mean of the sample in the same fiscal year and industry. It is worth noting that we only focus on the largest institutional investors, as they are most likely to serve as active monitors (Shleifer and Vishny, 1986). We multiply *INST* by *NUM*, *EDU*, *CORPEXP* and *QUALITY* to construct interaction terms (*NUM* * *INST*, *EDU* * *INST*, *CORPEXP* * *INST* and *QUALITY* * *INST*), and investigate whether the monitoring of institutional investors influences the positive effect of ICE quality. The other variables in models 5 and 6 are similar to those in models 1 and 2. Detailed definitions of all of the variables are given in Table 1.

4.2.4. Models of H4

To test H4, we construct four interaction terms and estimate the following models:

$$ICW = \beta_0 + \beta_1 NUM + \beta_2 EDU + \beta_3 CORPEXP + \beta_4 DEMAND + \beta_5 NUM * DEMAND + \beta_6 EDU * DEMAND + \beta_7 CORPEXP * DEMAND + \beta_8 MA + \beta_9 GROWTH + \beta_{10} INVENTORY + \beta_{11} LEV + \beta_{12} SIZE + \beta_{13} AGE + \beta_{14} DISTRESS + \beta_{15} AUDITOR + \beta_{16} AUDITOR\_RESIGNED + \beta_{17} TOPSHAREHOLDER + \beta_{18} INSTITUTION + \beta_{19} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon; \text{ and} \quad (7)$$

$$ICW = \beta_0 + \beta_1 QUALITY + \beta_2 DEMAND + \beta_3 QUALITY * DEMAND + \beta_4 MA + \beta_5 GROWTH + \beta_6 INVENTORY + \beta_7 LEV + \beta_8 SIZE + \beta_9 AGE + \beta_{10} DISTRESS + \beta_{11} AUDITOR + \beta_{12} AUDITOR\_RESIGNED + \beta_{13} TOPSHAREHOLDER + \beta_{14} INSTITUTION + \beta_{15} SOE + \sum YEAR + \sum INDUSTRY + \varepsilon. \quad (8)$$

We use the attitude of each company's chairman toward internal control as a proxy for managerial attention, and assume that a chairman's attitude remains unchanged throughout the 2011 to 2013 period. *DEMAND* is an indicator variable that is coded 1 if the chairman thinks that the firm needs internal control very much, and 0 otherwise. We multiply *DEMAND* by *NUM*, *EDU*, *CORPEXP* and *QUALITY* to construct interaction terms (*NUM* * *DEMAND*, *EDU* * *DEMAND*, *CORPEXP* * *DEMAND* and *QUALITY* * *DEMAND*), and investigate whether managerial attention to internal control influences the positive effect of ICE quality. The other variables in models 7 and 8 are similar to those in models 1 and 2. Detailed definitions of all of the variables are given in Table 1.

4.3. Descriptive statistics

Table 2 presents the descriptive statistics for all of the variables. We winsorize all of the continuous variables at the 0.01 and 0.99 levels. In Table 2, the mean of *ICW* is 0.214, which indicates that 21.4% of the observations disclose internal control weaknesses. The mean of *NUM* is 0.616, indicating that on average, ICEs make up about 0.6% of the total number of employees. The mean of *EDU* is 0.792, indicating that 79.2%

Table 2
Descriptive statistics.

	n	mean	p50	sd	min	p25	p75	max
ICW	1522	0.214	0.000	0.410	0.000	0.000	0.000	1.000
NUM	1522	0.616	0.192	1.376	0.006	0.085	0.477	10.092
EDU	1522	0.792	0.921	0.257	0.000	0.630	1.000	1.000
CORPEXP	1522	0.590	0.667	0.344	0.000	0.333	0.925	1.000
QUALITY	1522	1.360	1.000	0.752	0.000	1.000	2.000	3.000
CSOX	1522	0.650	1.000	0.477	0.000	0.000	1.000	1.000
INST	1522	0.365	0.000	0.482	0.000	0.000	1.000	1.000
DEMAND	1522	0.587	1.000	0.492	0.000	0.000	1.000	1.000
MA	1522	0.751	1.000	0.433	0.000	1.000	1.000	1.000
GROWTH	1522	0.202	0.087	0.739	–0.542	–0.039	0.218	6.261
INVENTORY	1522	0.194	0.139	0.187	0.000	0.065	0.250	0.823
LEV	1522	0.538	0.555	0.204	0.078	0.395	0.690	0.984
SIZE	1522	22.461	22.307	1.335	19.091	21.602	23.298	26.483
AGE	1522	2.604	2.708	0.468	0.693	2.485	2.890	3.091
DISTRESS	1522	5.435	5.000	2.856	1.000	3.000	8.000	10.000
AUDITOR	1522	0.087	0.000	0.282	0.000	0.000	0.000	1.000
AUDITOR_RESIGNED	1522	0.073	0.000	0.260	0.000	0.000	0.000	1.000
TOPSHAREHOLDER	1522	37.892	36.120	16.342	7.850	24.380	50.030	78.020
INSTITUTION	1522	0.402	0.417	0.213	0.005	0.245	0.567	0.846
SOE	1522	0.628	1.000	0.483	0.000	0.000	1.000	1.000

of ICEs have bachelor or higher degrees. The mean of *CORPEXP* is 0.590, indicating that 59% of ICEs have worked at the same firm for no less than 5 years.

5. Empirical results

5.1. Multivariate analysis of H1

We use models 1 and 2 to test whether ICE quality significantly influences internal control quality. All of the significance tests in our study are two-tailed tests. Multicollinearity tests show that the means of the variance inflation factors in models 1 and 2 are 1.44 and 1.45, respectively, indicating that there are no multicollinearity problems in our empirical models.

The regression results are shown in Table 3. Our explanatory variables of interest, the coefficients of *NUM*, *EDU* and *QUALITY*, are significantly negative. These results provide support for H1 by suggesting that high ICE quality increases the human capital investments in the design and implementation of internal control processes, thus increasing internal control quality. The results of the control variables in Table 3 are consistent with previous studies.

5.2. Multivariate analysis of H2

We examine whether the implementation of CSOX influences the effect of ICE quality on internal control quality. As explained above, the implementation of CSOX not only imposes detailed requirements on internal control work, but also strengthens the monitoring of regulators and external auditors. Enhanced external monitoring reduces the possibility of ICE shirking and improves the positive effect of ICE quality. Hence, we expect that the positive effect of ICE quality on internal control quality is more pronounced after the implementation of CSOX.

To test this conjecture, we conduct two tests. The results are given in Table 4. First, we re-estimate models 1 and 2 separately on a sample of firms that have not implemented CSOX (the "PRE" sample, i.e., $CSOX = 0$) and on a sample of firms that have implemented CSOX (the "POST" sample, i.e., $CSOX = 1$). The results are reported in columns (1), (2), (4) and (5) of Table 4. Consistent with our expectation, we find that *NUM*, *EDU*, *CORPEXP* and *QUALITY* have no significant effect on internal control weaknesses in the pre-CSOX sample. In contrast, the coefficients of *NUM*, *EDU* and *QUALITY* are negative and significant at the 0.01 level in the post-CSOX sample.

Second, we add the interaction terms and perform the full sample regressions using models 3 and 4. As shown in columns (3) and (6) of Table 4, the coefficients of $NUM * CSOX$, $EDU * CSOX$ and $QUALITY * CSOX$ are significantly negative. These results suggest that the implementation of CSOX alleviates the employee agency problem and improves the positive effect of ICE quality, thereby supporting H2.

5.3. Multivariate analysis of H3

We examine whether institutional ownership influences the effect of ICE quality on internal control quality. As explained above, large ownership positions motivate institutional investors to play an active role in ICE monitoring, thus reducing the possibility of ICE shirking and improving the positive effect of ICE quality. Hence, we expect that the positive effect of ICE quality on internal control quality is more pronounced among firms with higher institutional ownership.

To test this conjecture, we conduct two tests. The results are given in Table 5. First, we re-estimate models 1 and 2 separately on a sample of firms with lower institutional ownership (the "LOW" sample, i.e., $INST = 0$) and another sample of firms with higher institutional ownership (the "HIGH" sample, i.e., $INST = 1$). The results are reported in columns (1), (2), (4) and (5) of Table 5. Consistent with our expectation, only the coefficient of *NUM* is significantly negative when institutional ownership is relatively low. In contrast, all of the coefficients of *NUM*, *EDU* and *QUALITY* are negative and significant at the 0.01 level when institutional ownership is relatively high.

Table 3
ICE quality and internal control quality.

	(1) *ICW*	(2) *ICW*	(3) *ICW*	(4) *ICW*	(5) *ICW*
NUM	–0.138**			–0.145**	
	(–2.25)			(–2.31)	
EDU		–0.757***		–0.782***	
		(–2.91)		(–2.91)	
CORPEXP			0.122	–0.012	
			(0.56)	(–0.05)	
QUALITY					–0.195**
					(–2.17)
MA	–0.003	0.020	0.017	0.004	0.004
	(–0.02)	(0.13)	(0.11)	(0.03)	(0.03)
GROWTH	–0.005	–0.030	–0.038	0.002	–0.031
	(–0.04)	(–0.28)	(–0.35)	(0.02)	(–0.29)
INVENTORY	0.625	0.545	0.596	0.585	0.528
	(1.08)	(0.98)	(1.08)	(1.00)	(0.94)
LEV	0.107	0.154	0.111	0.163	0.118
	(0.18)	(0.27)	(0.20)	(0.28)	(0.21)
SIZE	–0.153**	–0.091	–0.114*	–0.132*	–0.119*
	(–2.18)	(–1.34)	(–1.70)	(–1.85)	(–1.77)
AGE	–0.031	–0.012	–0.053	–0.001	0.003
	(–0.19)	(–0.07)	(–0.32)	(–0.01)	(0.02)
DISTRESS	–0.072*	–0.068	–0.067	–0.072*	–0.070*
	(–1.69)	(–1.62)	(–1.59)	(–1.69)	(–1.67)
AUDITOR	–0.193	–0.207	–0.219	–0.155	–0.248
	(–0.69)	(–0.74)	(–0.78)	(–0.55)	(–0.89)
AUDITOR_RESIGNED	–0.029	–0.025	–0.047	–0.011	–0.028
	(–0.12)	(–0.10)	(–0.19)	(–0.04)	(–0.12)
TOPSHAREHOLDER	–0.010**	–0.010**	–0.010**	–0.010**	–0.009*
	(–2.04)	(–2.11)	(–2.04)	(–2.17)	(–1.94)
INSTITUTION	–0.286	–0.229	–0.277	–0.253	–0.246
	(–0.82)	(–0.66)	(–0.80)	(–0.72)	(–0.71)
DEMAND	0.007	–0.020	–0.003	–0.011	–0.001
	(0.05)	(–0.15)	(–0.02)	(–0.08)	(–0.01)
SOE	0.050	0.062	0.049	0.054	0.077
	(0.35)	(0.43)	(0.34)	(0.37)	(0.54)
YEAR	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES
Constant	3.314*	2.361	2.248	3.443*	2.575
	(1.80)	(1.33)	(1.27)	(1.86)	(1.43)
Observations	1522	1522	1522	1522	1522
Pseudo *R*-squared	0.062	0.064	0.059	0.068	0.062

Note: This table reports the regression results for the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.
* Significance at the 10 percent level (two-tailed test).
** Significance at the 5 percent level (two-tailed test).
*** Significance at the 1 percent level (two-tailed test).

Second, we add the interaction terms and perform the full sample regressions according to models 5 and 6. As shown in columns (3) and (6) of Table 5, the coefficients of *NUM* * *INST*, *EDU* * *INST* and *QUALITY* * *INST* are significantly negative. These results suggest that high institutional ownership alleviates the employee agency problem and improves the positive effect of ICE quality, thereby supporting H3.

5.4. Multivariate analysis of H4

We also examine whether managerial attention to internal control influences the effect of ICE quality on internal control quality. As explained above, when top managers attach great importance to internal control,

Table 4
Implementation of CSOX.

	(1) PRE *ICW*	(2) POST *ICW*	(3) ALL *ICW*	(4) PRE *ICW*	(5) POST *ICW*	(6) ALL *ICW*
NUM	0.014	–0.424***	0.023			
	(0.15)	(–3.22)	(0.32)			
EDU	–0.346	–1.029***	–0.480			
	(–0.95)	(–3.28)	(–1.17)			
CORPEXP	0.383	–0.154	0.283			
	(1.14)	(–0.51)	(1.08)			
*NUM * CSOX*			–0.470***			
			(–3.14)			
*EDU * CSOX*			–0.591**			
			(–2.29)			
*CORPEXP * CSOX*			–0.380			
			(–1.27)			
QUALITY				0.035	–0.347***	0.096
				(0.20)	(–2.84)	(0.59)
*QUALITY * CSOX*						–0.432**
						(–2.21)
CSOX			0.600			0.541*
			(1.60)			(1.66)
MA	–0.078	0.006	0.024	–0.110	0.030	0.010
	(–0.35)	(0.04)	(0.30)	(–0.59)	(0.22)	(0.07)
GROWTH	0.039	0.000	0.017	0.023	–0.056	–0.022
	(0.62)	(0.00)	(0.25)	(0.43)	(–0.65)	(–0.21)
INVENTORY	1.311	0.238	0.621	1.365	0.220	0.562
	(1.49)	(0.21)	(1.14)	(1.53)	(0.18)	(1.00)
LEV	–0.886	0.791*	0.310	–1.026	0.589	0.159
	(–1.11)	(1.78)	(0.67)	(–1.31)	(1.37)	(0.28)
SIZE	–0.212**	–0.142*	–0.157**	–0.216*	–0.100	–0.113*
	(–1.97)	(–1.69)	(–2.39)	(–1.93)	(–1.16)	(–1.67)
AGE	0.066	–0.030	0.005	0.113	–0.031	–0.018
	(0.35)	(–0.15)	(0.05)	(0.67)	(–0.16)	(–0.11)
DISTRESS	–0.101**	–0.053	–0.066**	–0.106**	–0.063*	–0.071*
	(–1.97)	(–1.45)	(–2.04)	(–2.00)	(–1.87)	(–1.68)
AUDITOR	–0.124	–0.272	–0.141	–0.273	–0.425	–0.273
	(–0.33)	(–0.89)	(–0.58)	(–0.99)	(–1.47)	(–0.97)
AUDITOR_RESIGNED	–0.152	0.103	–0.029	–0.168	0.131	–0.016
	(–0.47)	(0.48)	(–0.16)	(–0.50)	(0.63)	(–0.07)
TOPSHAREHOLDER	0.008	–0.020***	–0.011**	0.009	–0.018***	–0.009*
	(1.23)	(–4.38)	(–2.55)	(1.32)	(–3.91)	(–1.94)
INSTITUTION	–0.792	0.090	–0.339	–0.725	0.052	–0.287
	(–0.93)	(0.17)	(–0.71)	(–0.95)	(0.10)	(–0.83)
DEMAND	–0.139	0.085	–0.000	–0.114	0.081	0.002
	(–0.97)	(0.72)	(–0.00)	(–0.75)	(0.66)	(0.01)
SOE	0.491**	0.138	0.001	0.473**	0.216	0.081
	(2.28)	(0.69)	(0.01)	(2.29)	(1.12)	(0.47)
YEAR	YES	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES	YES
Constant	6.422**	3.189	3.141*	6.225**	1.541	2.145
	(2.37)	(1.56)	(1.87)	(2.20)	(0.81)	(1.19)
Observations	533	989	1522	533	989	1522
Pseudo *R*-squared	0.129	0.093	0.081	0.125	0.081	0.065

Note: This table reports the regression results for whether the implementation of CSOX influences the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

Table 5
Monitoring of institutional investors.

	(1) LOW *ICW*	(2) HIGH *ICW*	(3) ALL *ICW*	(4) LOW *ICW*	(5) HIGH *ICW*	(6) ALL *ICW*
NUM	–0.112*	–0.582***	–0.109			
	(–1.67)	(–2.71)	(–1.57)			
EDU	–0.417	–1.947***	–0.472			
	(–1.24)	(–3.17)	(–1.26)			
CORPEXP	0.105	–0.392	0.014			
	(0.36)	(–0.88)	(0.04)			
NUM * *INST*			–0.453**			
			(–2.22)			
EDU * *INST*			–1.183*			
			(–1.81)			
CORPEXP * *INST*			–0.192			
			(–0.42)			
QUALITY				–0.081	–0.433***	–0.075
				(–0.44)	(–3.17)	(–0.46)
QUALITY * *INST*						–0.357**
						(–2.08)
INST			1.169			0.417
			(1.62)			(1.47)
MA	0.201	–0.408	–0.026	0.206**	–0.364	0.014
	(1.01)	(–1.34)	(–0.20)	(2.24)	(–1.30)	(0.16)
GROWTH	–0.042	–0.005	–0.091	–0.096	0.040	–0.067
	(–0.31)	(–0.03)	(–0.88)	(–0.92)	(0.45)	(–0.87)
INVENTORY	0.833	–0.072	0.565	0.736	–0.259	0.555
	(1.15)	(–0.05)	(0.82)	(1.24)	(–0.22)	(0.81)
LEV	0.535	–0.334	0.373	0.529	–0.401	0.197
	(0.78)	(–0.24)	(0.70)	(1.00)	(–0.34)	(0.42)
SIZE	–0.174*	–0.147	–0.132	–0.149	–0.109	–0.110
	(–1.84)	(–0.90)	(–1.60)	(–1.31)	(–0.70)	(–1.21)
AGE	–0.209	0.327	0.073	–0.200	0.329	0.072
	(–0.89)	(1.04)	(0.42)	(–1.03)	(1.59)	(0.53)
DISTRESS	–0.035	–0.177*	–0.059	–0.027	–0.182**	–0.066**
	(–0.64)	(–1.81)	(–1.32)	(–0.51)	(–2.38)	(–2.30)
AUDITOR	–0.123	–0.558	–0.193	–0.202	–0.770	–0.252
	(–0.32)	(–0.97)	(–0.76)	(–0.60)	(–1.63)	(–1.08)
AUDITOR_RESIGNED	0.185	–0.379	0.103	0.188	–0.430	–0.015
	(0.63)	(–0.73)	(0.34)	(0.61)	(–1.06)	(–0.07)
TOPSHAREHOLDER	–0.017***	–0.008	–0.012**	–0.017***	–0.004	–0.010**
	(–2.65)	(–0.77)	(–2.15)	(–2.75)	(–0.71)	(–2.31)
INSTITUTION	0.208	–0.370	0.002	0.224	–0.457	–0.062
	(0.40)	(–0.63)	(0.00)	(0.33)	(–0.65)	(–0.14)
DEMAND	–0.074	0.036	0.009	–0.072	0.039	0.007
	(–0.41)	(0.13)	(0.06)	(–0.30)	(0.15)	(0.06)
SOE	0.014	0.015	0.091	0.037	0.016	0.062
	(0.07)	(0.05)	(0.56)	(0.17)	(0.10)	(0.42)
YEAR	YES	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES	YES
Constant	4.055*	5.210	2.893	3.066	2.869	1.888
	(1.66)	(1.24)	(1.47)	(1.12)	(0.77)	(0.98)
Observations	966	556	1522	966	556	1522
Pseudo *R*-squared	0.097	0.230	0.087	0.092	0.212	0.098

Note: This table reports the regression results for whether institutional ownership influences the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

Table 6
Managerial attention to internal control.

	(1) LOW *ICW*	(2) HIGH *ICW*	(3) ALL *ICW*	(4) LOW *ICW*	(5) HIGH *ICW*	(6) ALL *ICW*
NUM	0.002	–0.325***	–0.015			
	(0.02)	(–3.29)	(–0.18)			
EDU	–0.748**	–1.031***	–0.642			
	(–2.51)	(–2.84)	(–1.52)			
CORPEXP	0.440	–0.388	0.425			
	(1.28)	(–1.24)	(1.26)			
*NUM * DEMAND*			–0.261**			
			(–2.04)			
*EDU * DEMAND*			–0.231			
			(–0.43)			
*CORPEXP * DEMAND*			–0.718*			
			(–1.69)			
QUALITY				–0.019	–0.419***	0.017
				(–0.18)	(–3.51)	(0.11)
*QUALITY * DEMAND*						–0.347**
						(–2.12)
DEMAND			0.737			0.452
			(1.30)			(1.63)
MA	0.287*	–0.296	0.018	0.228	–0.258	0.018
	(1.96)	(–1.47)	(0.12)	(1.57)	(–1.29)	(0.14)
GROWTH	–0.015	–0.022	–0.010	–0.036	–0.060	–0.072
	(–0.13)	(–0.13)	(–0.09)	(–0.34)	(–0.39)	(–0.77)
INVENTORY	–0.220	1.747**	0.678	–0.208	1.362*	0.611
	(–0.34)	(2.09)	(1.14)	(–0.26)	(1.78)	(0.94)
LEV	–0.306	0.673	0.149	–0.375	0.639	0.264
	(–0.37)	(0.90)	(0.25)	(–0.46)	(0.90)	(0.51)
SIZE	–0.063	–0.199**	–0.128*	–0.100	–0.163*	–0.117
	(–0.87)	(–2.03)	(–1.78)	(–1.18)	(–1.74)	(–1.38)
AGE	–0.164	0.090	0.004	–0.123	0.068	0.079
	(–0.78)	(0.41)	(0.03)	(–0.63)	(0.33)	(0.41)
DISTRESS	–0.068	–0.059	–0.070	–0.076	–0.048	–0.062
	(–1.23)	(–1.05)	(–1.62)	(–1.37)	(–0.88)	(–1.41)
AUDITOR	–0.287	0.016	–0.174	–0.298	–0.126	–0.238
	(–0.69)	(0.05)	(–0.62)	(–0.70)	(–0.37)	(–0.96)
AUDITOR_RESIGNED	–0.054	0.110	–0.011	–0.061	0.069	–0.014
	(–0.19)	(0.34)	(–0.05)	(–0.20)	(0.21)	(–0.04)
TOPSHAREHOLDER	–0.011*	–0.013*	–0.011**	–0.010*	–0.012*	–0.010*
	(–1.86)	(–1.95)	(–2.27)	(–1.70)	(–1.73)	(–1.91)
INSTITUTION	–0.329	–0.102	–0.254	–0.348	–0.106	–0.053
	(–0.47)	(–0.21)	(–0.73)	(–0.49)	(–0.22)	(–0.10)
SOE	–0.248	0.390**	0.045	–0.201	0.416**	0.048
	(–1.10)	(1.98)	(0.31)	(–0.96)	(2.12)	(0.29)
YEAR	YES	YES	YES	YES	YES	YES
INDUSTRY	YES	YES	YES	YES	YES	YES
Constant	2.130	5.019**	2.930	2.587	3.231	1.832
	(1.03)	(2.06)	(1.54)	(1.17)	(1.37)	(0.88)
Observations	628	894	1522	628	894	1522
Pseudo *R*-squared	0.064	0.112	0.072	0.055	0.103	0.098

Note: This table reports the regression results for whether managerial attention influences the effect of ICE quality on internal control quality. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

they devote more effort to ICE monitoring, which reduces the possibility of ICE shirking and increases the positive effect of ICE quality. Hence, we expect that the positive effect of ICE quality on internal control quality is more pronounced when top managers attach great importance to internal control.

To test this conjecture, we conduct two tests. The results are given in Table 6. First, we re-estimate models 1 and 2 separately on a sample of firms with less managerial attention to internal control (the "LOW" sample, i.e., $DEMAND = 0$) and a sample of firms with more managerial attention to internal control (the "HIGH" sample, i.e., $DEMAND = 1$). The results are reported in columns (1), (2), (4) and (5) of Table 6. Consistent with our expectation, only the coefficient of *EDU* is significantly negative when top managers pay less attention to internal control. In contrast, all of the coefficients of *NUM*, *EDU* and *QUALITY* are negative and significant at the 0.01 level when top managers pay more attention to internal control.

Second, we add the interaction terms and perform the full sample regressions according to models 7 and 8. As shown in columns (3) and (6) of Table 6, the coefficients of $NUM * DEMAND$, $CORPEXP * DEMAND$ and $QUALITY * DEMAND$ are significantly negative. These results suggest that high managerial attention alleviates the employee agency problem and improves the positive effect of ICE quality, thereby supporting H4.

6. Robustness tests

6.1. Alternative measure of internal control quality

Firms have an incentive to conceal internal control weaknesses, especially when they are domiciled in weak investor protection countries (Gong et al., 2013). Hence, to alleviate the influence of internal control weakness misreporting and ensure the validity of our results, we re-estimate our models using *ICW1* as an alternative measure of internal control quality. Specifically, following PCAOB Auditing Standard No. 5, we assume that the firms with operational irregularities or modified audit opinions have internal control weaknesses no matter

Table 7
Alternative measure of internal control quality.

	(1) *ICW1*	(2) *ICW1*	(3) *ICW1*	(4) *ICW1*
QUALITY	–0.127**	0.030	–0.032	0.033
	(–2.50)	(0.30)	(–0.32)	(0.27)
CSOX		0.331		
		(0.97)		
*QUALITY * CSOX*		–0.239**		
		(–2.28)		
INST			0.332	
			(1.25)	
*QUALITY * INST*			–0.306*	
			(–1.70)	
DEMAND				0.395
				(1.47)
*QUALITY * DEMAND*				–0.268*
				(–1.85)
Control variables	YES	YES	YES	YES
Observations	1522	1522	1522	1522
Pseudo *R*-squared	0.067	0.068	0.069	0.068

Note: This table reports the regression results for the effect of ICE quality on internal control quality and the influence of monitoring on this effect. *ICW1* is an indicator variable that is coded 1 if the firm discloses at least one internal control weakness, is punished for operational irregularities or receives a modified audit opinion in the given fiscal year, and 0 otherwise. Other variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

*** Significance at the 1 percent level (two-tailed test).

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

whether they make disclosures. *ICW1* is an indicator variable that is coded 1 if the firm discloses at least one internal control weakness, is punished for operational irregularities or receives a modified audit opinion in the given fiscal year, and 0 otherwise.

The regression results are shown in Table 7. For the sake of brevity, we only report the results of the main variables. We find that the coefficients of *QUALITY*, *QUALITY* * *CSOX*, *QUALITY* * *INST* and *QUALITY* * *DEMAND* are significantly negative. These findings furnish additional support for all of our hypotheses. That is, ICE quality has a significant positive influence on internal control quality, and the positive effect is more pronounced for the firms in the strict monitoring environment, specifically for firms that have implemented CSOX, have higher institutional ownership, or attach great importance to internal control.

6.2. Endogeneity issue

Internal control quality influences the allocation efficiency of human capital, which, in turn, influences ICE quality. This reverse causality could induce an endogenous problem in our research. Therefore, we use a two-stage least squares (2SLS) regression method, adopting two instruments to alleviate the effect of endogeneity. In this subsection, we first introduce the instrumental variables constructed to capture ICE quality.

The provincial supply of internal control human resources is exogenous to the ICE quality of local firms but has no direct economic effect on firms' internal control quality (i.e., it is uncorrelated with the error term of the regression relating to firms' internal control quality). Thus, we choose the following two provincial variables as instruments to measure the human resource supply in the province where the firm is located: percentage of college graduates among the residents of the province (*BACHELOR*) and the per-capita gross domestic product of the province (*GDP*). In other words, it is easier for firms to hire qualified ICEs when they are located in provinces with a more highly educated population. Hence, we expect that *BACHELOR* is positively

Table 8
Endogeneity test: 2SLS regressions.

	(1) *QUALITY*	(2) *ICW*	(3) *ICW*	(4) *ICW*	(5) *ICW*
BACHELOR	0.010***				
	(2.63)				
GDP	0.035***				
	(4.54)				
QUALITY		–1.101***	0.010	0.309	0.754
		(–4.94)	(0.06)	(0.81)	(1.39)
CSOX			0.711		
			(1.56)		
QUALITY * *CSOX*			–0.562*		
			(–1.71)		
INST				1.003	
				(1.60)	
QUALITY * *INST*				–0.767*	
				(–1.67)	
DEMAND					1.442*
					(1.78)
QUALITY * *DEMAND*					–1.057*
					(–1.77)
Control variables	YES	YES	YES	YES	YES
Observations	1522	1522	1522	1522	1522

Note: This table reports the 2SLS regression results for the effect of ICE quality on internal control quality and the influence of monitoring on this effect. *BACHELOR* is equal to the percentage of college graduates among the residents of the province, and *GDP* is equal to the per-capita gross domestic product of the province. The other variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

** Significance at the 5 percent level (two-tailed test).

* Significance at the 10 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

related to firms' ICE quality. Furthermore, higher per-capita gross domestic product also helps provinces to attract talented persons and therefore increases the provincial supply of internal control professionals. Therefore, we expect that *GDP* is to be positively related to firms' ICE quality. The data for *BACHELOR* and *GDP* are from the Chinese labor statistical yearbooks and the Chinese statistical yearbooks, respectively.

Table 8 presents the 2SLS regression results. For the sake of brevity, we only report the results of the main variables. As shown in column (1), consistent with our expectations, the coefficients of *BACHELOR* and *GDP* are positive and significant at the 0.01 level in the first stage regression. Furthermore, *BACHELOR* and *GDP* also pass the weak instrumental variable tests in the estimated 2SLS specifications. Columns (2)–(5) report the results from the second stage regressions. Consistent with our hypotheses, the coefficients of *QUALITY*, *QUALITY* * *CSOX*, *QUALITY* * *INST* and *QUALITY* * *DEMAND* are significantly negative. These findings furnish additional support for all of our hypotheses.

One might worry that the development level and human resource supply might vary greatly among cities in the same province, limiting the effectiveness of our instruments. Considering this, we only keep the firms that are located in the top two cities of each province and re-estimate the 2SLS regressions using the remaining 1033 observations. Untabulated results show that the coefficients of *QUALITY*, *QUALITY* * *CSOX*, *QUALITY* * *INST* and *QUALITY* * *DEMAND* are significantly negative, similar to the results reported in Table 8. Hence, we conclude that our findings are robust to an endogeneity bias.

6.3. Influence of chairman turnover

In Table 6, we assume that within a firm, the chairman's attitude toward internal control remains unchanged throughout the 2011 to 2013 period. However, if the chairman resigned during this period, the succeeding chairman might have a different attitude to internal control and therefore change the tone at the top.

Table 9
Robustness test: Excluding the effect of chairman turnover.

	(1) *ICW*	(2) *ICW*	(3) *ICW*	(4) *ICW*	(5) *ICW*	(6) *ICW*
NUM	0.067	–0.260***	0.023			
	(0.72)	(–3.72)	(0.27)			
EDU	–0.804	–0.282	–0.589			
	(–1.63)	(–0.57)	(–1.21)			
CORPEXP	0.817**	–0.319*	0.741*			
	(1.99)	(–1.73)	(1.94)			
NUM * *DEMAND*			–0.246*			
			(–1.86)			
EDU * *DEMAND*			0.343			
			(0.56)			
CORPEXP * *DEMAND*			–0.928*			
			(–1.94)			
QUALITY				0.111	–0.327**	0.137
				(0.69)	(–2.36)	(0.80)
QUALITY * *DEMAND*						–0.384**
						(–2.32)
DEMAND			0.412			0.487
			(0.63)			(1.58)
Control variables	YES	YES	YES	YES	YES	YES
Observations	521	729	1250	521	729	1250
Pseudo *R*-squared	0.081	0.098	0.071	0.064	0.106	0.064

Note: This table reports the regression results for whether managerial attention influences the effect of ICE quality on internal control quality. We estimate these regressions using the observations without chairman turnover. All of the variables are defined in Table 1. The figures in parentheses are robust *z*-statistics adjusted for heteroskedasticity.

* Significance at the 10 percent level (two-tailed test).

** Significance at the 5 percent level (two-tailed test).

*** Significance at the 1 percent level (two-tailed test).

Hence, to alleviate the influence of chairman turnover, we only keep the observations for firms without chairman turnover and re-estimate the regressions in Table 6. The new results are presented in Table 9. For the sake of brevity, we only report the results of the main variables. We find that the coefficients of $NUM * DEMAND$, $CORPEXP * DEMAND$ and $QUALITY * DEMAND$ are significantly negative, which provides additional support for H4. Hence, we conclude that our findings are robust to the influence of chairman turnover.

7. Conclusions

Our study examines the relationship between ICE quality and internal control quality, and the effect of monitoring on this relationship. Based on the input-process-output theory and agency theory, we argue that high quality ICEs increase the human capital investments in the design and implementation of internal control process, thus increasing internal control quality. Furthermore, effective monitoring can alleviate the agency problem between top managers and employees and further improve the positive effect of ICE quality on internal control quality.

Using special survey data from Chinese listed firms, we find that ICE quality has a significant positive influence on internal control quality, and this positive effect is more pronounced for firms in a strict monitoring environment. In particular, we find that the positive effect is more significant when firms implement CSOX, have higher institutional ownership, or attach great importance to internal control. Our results are robust to the misreporting problem of internal control weaknesses, endogeneity bias and chairman turnover.

Our research not only complements the literature on internal control and employee agency problem in theory, but also has important implications for practical corporate decisions on ICE allocation and monitoring. A fruitful extension of our research would be to investigate the paths and mechanisms through which ICEs influence internal control quality. Such analyses would help to develop a clearer picture of the functions of ICEs.

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Are academic independent directors punished more severely when they engage in violations?☆

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ABSTRACT

We use a sample of Chinese A-share listed companies from 2003 to 2013 to explore the reputation damage and overflow effect of academic independent directors who have received supervisory punishment. We find that when companies violate information disclosure rules, the market punishes academic independent directors more severely than nonacademic independent directors for these violations. Furthermore, companies employing punished academic directors face greater declines in their stock price than companies employing punished nonacademic independent directors during a relatively short window before or after the punishment is announced. The punishment of academic independent directors influences the employment of other scholars in the same field and results in a negative overflow effect. This study provides evidence of the market's differential reactions to independent directors with different backgrounds; the findings reflect the double-edged sword of one individual's reputation on organizations.

1. Introduction

Independent directors play an important role in modern corporate governance, helping balance power within firms and providing supervision. In China, 43.51% of independent directors are scholars from universities, party schools, research institutes or other public institutions. Mastery of professional knowledge and concern for their reputation are two important ways in which academic independent directors differ from

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other independent directors. With respect to professional background, 86.93% of academic independent directors are professors and 2.52% of them are members of either the Chinese Academy of Sciences or the Chinese Academy of Engineering. Generally, there is a tradition of respecting teachers and valuing education in China. Because of their broad recognition as intellectuals, academic independent directors have a positive social image and wide acceptance. When prominent scholars become involved in management, development is promoted and decision making is facilitated. They are also important invisible assets for corporations. That is, when these famous independent directors serve as image spokespersons for corporations, investors trust these listed companies more.[1] As a consequence, academic independent directors will care more than nonacademic independent directors about the possible negative effects on their careers of any negative behavior.

One important way in which an academic independent director's reputation may be damaged is when they receive supervisory punishment due to their companies' misconduct. Some reports suggest that between 2003 and 2013, 458 independent directors were punished by the China Securities Regulatory Commission (CSRC) or stock exchanges because of violations of information disclosure rules; 36.03% of these were academics. Xin et al. (2013) find that the number of academic directorships declined after these directors were punished. The decline in numbers is perhaps not symbolic of reputation punishment; it may simply be a consequence of risk aversion. Studies show that during the relatively short window after a punishment is announced, the stock prices of other companies that the independent directors who are being punished had worked for do not fall sharply. When the market punishes independent directors, academic independent directors may be treated differently because of their high reputation and the market's greater expectations. Such differences may occur in several ways; for example, the market may react more negatively, the stock price of other companies that employ academic directors may fall more sharply, or the punishment of academic directors may generate overflow effects to other scholars at the same universities.

Our analysis of a sample of Chinese A-share listed companies from 2003 to 2013 has two important conclusions. (1) The market punishes academic independent directors more severely for their violations. Specifically, when companies violate information disclosure rules and independent directors are punished by the China Securities Regulatory Commission or stock exchanges for failing to fulfill their executive duties, the market often reacts more negatively to those companies which have academic independent directors. Furthermore, companies that employ punished academic directors face greater declines in their stock price than companies that employ punished nonacademic independent directors, during a relatively short window just before or after the punishment is announced. (2) To some extent, the punishment of academic independent directors influences the employment of other scholars in the same field and results in a negative overflow effect. These conclusions are practically significant for both participants in the capital market and for corporate management. This research helps capital market participants identify companies with severe reputation punishment so that they can adjust their portfolios and properly reduce investment losses. With this knowledge, management can both enjoy the benefit of employing well-known scholars as independent directors and avoid the possible negative effects of these directors' improper behavior.

This study makes the following contributions. First, the existing research on independent directors' backgrounds focuses on resource support. For example, independent directors with commercial bank backgrounds may dramatically increase the total debt of a company (Booth and Deli, 1999; Burak et al., 2008; Liu et al., 2012), whereas independent directors with investment bank backgrounds help companies issue more bonds (Burak et al., 2008). Independent directors with academic backgrounds promote the entrance and absorption of external knowledge spillover (Audretsch and Lehmann, 2006). However, few studies have explored the "reputation punishment" associated with independent directors with different backgrounds. Therefore, we explore the concept of reputation punishment and the overflow effect on academic independent directors caused by information disclosure violations by academic independent directors. Our aim was to deepen the knowledge of the economic consequences of hiring independent directors with different backgrounds. Second, previous studies suggest that the extent of the market's reaction to corporate violations is significantly related to the type of violation (Wu and Gao, 2002) and to the transparency and severity of the punishment (Hu and

[1] Quoted from "Professors have become main power of independent directors, while reputation is a double-edged sword" (In Chinese) http://news.ifeng.com/gundong/detail_2011_05/05/6171735_0.shtml?_from_ralated.

Chen, 2004). Extending these findings, we find that the extent of the market's reaction to corporate violations also depends on whether academic independent directors are simultaneously punished. The result reflects the "double-edged effect" of an individual reputation on organizations. Whereas scholarly independent directors increase a corporation's public credibility, any improper behavior by these scholars may result in severe consequences for their employers. Our research provides new evidence for the variability of market reaction to corporate violations. Finally, our research enriches the related literature on corporate violations. The existing literature focuses on violations by companies or management. Our study considers the different backgrounds of punished independent directors and explores the overflow effect of their punishments.

The remainder of this paper is organized as follows. Section 2 develops the hypotheses based on the theoretical analysis, Section 3 presents the research design, Section 4 reports the empirical analysis and Section 5 concludes the paper.

2. Theoretical analysis and hypothesis development

To improve the corporate governmental structure and promote the standardized operation of companies, the CSRC published Guidelines for the Establishment of Independent Directors of Listed Companies (hereafter, Guidelines) on 16 August 2001. The Guidelines state that every listed company in China should modify its articles of incorporation according to the Guidelines and employ appropriate personnel as independent directors. In China, the main incentive for independent directors to perform their supervisory duties is to avoid legal and reputation risks. Existing academic research on the backgrounds of independent directors has focused on the so-called resource support. It is believed that independent directors provide important resource support, enabling successful corporate governance (Pfeffer, 1972; Zahra and Pearce, 1989; Pfeffer and Salancik, 2003). Many scholars have demonstrated that independent directors with different backgrounds contribute different resources to their employers. For example, independent directors with management backgrounds may provide low-cost financing resources (Johnson et al., 1996); outside directors with backgrounds in politics may help companies lobby for policy changes, enhancing the ability to gain related profits (Agrawal and Knoeber, 2001); independent directors with commercial bank backgrounds could obviously increase the total debt of their companies (Booth and Deli, 1999; Burak et al., 2008; Liu et al., 2012); independent directors with academic backgrounds help companies gain and absorb external knowledge, thereby sharpening their competitive edge (Audretsch and Lehmann, 2006); the financial expert background of audit committee members can improve the quality of financial reports (DeFond et al., 2005; Krishnan and Visvanathan, 2008; Dhaliwal et al., 2010, etc.); directors with legal backgrounds play important roles in supervising management, lowering litigation risks and increasing corporation valuation (Litov et al., 2013); and the inclusion of investment bankers in a board results in the company issuing more bonds (Burak et al., 2008). Outside directors use their abundant commercial experience to help managers solve operational problems; they provide new techniques and market knowledge and participate in the construction of important strategies (Weisbach, 1988).

The existing literature rarely discusses the variations in reputation punishment that the market imposes on independent directors from different backgrounds, when these directors have been punished for corporate violations. Although Wu and Gao (2002), Hu and Chen (2004) and some other scholars have tested the different reactions of the market to violations, they limit their research to corporations. Xin et al. (2013), focusing on the independent directors themselves, demonstrate that independent directors suffer supervisory punishment if they provide false statements. They find that after punishment, the number of directorships held by these independent directors declines sharply, but the stock price of other companies in which these directors have held a post does not fall sharply in a relatively short window before or after the punishment announcement. The premise of their research is that the market will impose the same reputation punishment on all of the independent directors who are given supervisory punishment. However, it is possible that the market may be less willing to tolerate negative behavior and will impose stricter punishment on groups for whom they have higher expectations.

Theoretically, the supervisory effect of independent directors is a joint function of their ability to execute their duties and their willingness to do so. Executive ability is dependent on their professional knowledge and energy, whereas willingness depends on the independence of independent directors and the maintenance

of their reputation. In our dataset, 86.93% of academic independent directors have the rank of professor, and 2.52% are members of the Chinese Academy of Sciences or the Chinese Academy of Engineering. Academic independent directors are not only experts, and they also constitute a group with strong professional influence in their fields. The government consults some of these scholars directly on policy issues, and they influence important policy changes. The academic work schedule, with its flexible hours, gives university educators more freedom to arrange their time, compared with the fixed 9–5 h worked in government and public institutions. This freedom and flexibility help academic independent directors put more energy into their directorships. Furthermore, Jiang and Murphy (2007) believe that compared with other independent directors, academic independent directors are less likely to have relationships with corporate insiders and more likely to share their own thoughts and judgments because of their higher reputation. This guarantees independence to some extent. However, when scholars agree to be independent directors, it seems that they mortgage their reputation to their employer.[1] If the company encounters severe problems with the law or in its operations, the social reputation of the independent director will also be severely damaged (Ye et al., 2011). In China, mottos such as "A teacher is to transfer knowledge and solve puzzles," "Teach by example" and "Be a model of virtue for others" embody the social expectations for educators. Traditionally, therefore, Chinese scholars care about maintaining their reputation.

According to the above analysis, due to both their executive ability and willingness, academic independent directors may be better at executing their duties than nonacademic directors. At the same time, when an academic independent director is punished for failing in his executive duty for his employer, the violation behavior of the company may be more stealthy. However, when additional negative information is publicized, the stock price will fall more sharply. Thus, the market will react more negatively to companies with academic independent directors who have been punished. Furthermore, university educators are recognized as a group with moral integrity and cultural value in Chinese society. University educators, who exert a major social influence and who are held to high standards by society, are sought after as high-level personnel. As society has higher expectations about the behavior of this group, academic independent directors may confront stronger market punishment when they commit supervisory violations. The punishment may be imposed upon not only the companies in which the violation occurred, but also other companies in which the director has held a post, leading to the overflow effect. Based on this analysis, we propose two hypotheses.

H1. When companies violate rules and their independent directors are punished because of failures in executive duties, the market will react more negatively to those companies with academic independent directors.

H2. The stock prices of listed companies with academic independent directors will fall more sharply than the stock prices of companies with nonacademic independent directors during a relatively short window before or after a punishment is announced.

3. Research design

3.1. Sample selection and data sources

The sample for H1 is Chinese A-share listed companies with recorded information disclosure violations leading to punishment of independent directors by the CSRC or stock exchanges in the 2003–2013 period. The sample for H2 is Chinese A-share listed companies that did not commit any violations, but in which the punished independent directors held posts in the 2003–2013 period. Independent directors' personal information was collected manually. Other data were collected from the GTA CSMAR database, with some manual supplementation. From the initial sample, we excluded (1) financial and insurance firms and (2) observations with missing variables. Our final sample included 112 firm-year observations of companies with independent directors who were punished by a regulatory authority and 103 firm-year observations of other companies in which the punished independent directors held posts. To avoid the effects of extreme values, all of the continuous variables were winsorized at both the top and bottom 1% levels.

Table 1
Definitions of variables.

Variable	Symbol	Definition
Dependent	*CAR_−2,2*	*CAR1*: cumulative abnormal return during the window [−2, 2]
	CAR_−1,1	*CAR2*: cumulative abnormal return during the window [−1, 1]
	CAR_1,5	*CAR3*: cumulative abnormal return during the window [1, 5]
	CAR_1,10	*CAR4*: cumulative abnormal return during the window [1, 10]
Explanatory	*Scholar*	Dummy variable for academic independent directors. Equals 1 if there are academic independent directors who were punished by the regulatory authorities because of corporate violation behavior, and 0 otherwise
Control	*Penalty*	Violation punishment type: we set three dummy variables for the different types of criticism. If the punishment is judged as public censure (*Penalty_gkqz*), warnings (*Penalty_jg*) or fines (*Penalty_fk*), the dummy variable equals 1, and 0 otherwise[1]
	Same_City	Dummy variable for same city: if the company with violation behavior is located in the same city as the other company in which the punished independent director has held posts, *Same_City* equals 1, and 0 otherwise
	Rindirector	Independent directors' ratio: the ratio of all of the independent directors to the board
	Lnsize	Firm size: the natural logarithm of total assets at year end
	First	Ownership concentration: the shareholding ratio of the first majority shareholder
	ROA	Profitability: *ROA* = net profit/total assets at year end
	Growth	Growth ability: the ratio of the difference between the total assets at the year end and those at the year beginning to the total assets at the year beginning
	Year	Dummy variables years
	Industry	Dummy variable industries: according to the CSRC standard
	Place	Dummy variables for locations: the province in which listed companies are located

[a] We thank our anonymous reviewers for this suggestion. In addition, we use the assignment method for measuring the strength of the punishment. We value fines, warnings, public censure and criticisms as 4, 3, 2 and 1, respectively, according to the force of punishment from heavy to light, and take the max value. The regression results remain generally the same.

3.2. Model specification and variable definitions

We use model (1) to test H1. If H1 is supported, then b_1 in model (1) should be significantly negative.

$$CAR = b_0 + b_1 * Scholar + b_2 * Penalty + b \sum Control + e \quad (1)$$

We use model (2) to test H2. If H2 is supported, b_1 in model (2) should be significantly negative.

$$CAR = b_0 + b_1 * Scholar + b_2 * Penalty + b_3 * Same\_City + b \sum Control + e \quad (2)$$

The dependent variable is *CAR* in both models. In this study, we stipulate the punishment announcement as the Event Date and consider [−251, −11] as the Estimation Period. Then we use the market model to estimate the abnormal return (*AR*) in a single day and the cumulative abnormal return (*CAR*) of every window period. *Scholar* is a dummy variable for academic independent directors (1 if there are academic independent directors punished by regulatory authorities because of corporate violations, and 0 otherwise). Following previous studies, we add *Penalty*, *Same_City*, *Rindirector*, *Lnsize*, *First*, *Return on Assets*, *Growth*, *Year*, *Industry* and *Place* as control variables. Table 1 summarizes our variables.

4. Empirical results and analysis

4.1. Descriptive statistics of the sample

Panel A of Table 2 presents the annual distribution of the sample. One hundred and twelve listed companies in the sample have information disclosure violations leading to the punishment of 299 independent directors.[2]

[2] Practically, during the period of 2003 and 2013, there were 165 listed companies with information disclosure violations, and 458 independent directors suffered punishment because of these violations. Because 53 companies' *CARs* could not be calculated due to delisting, long-term suspension or missing data, we finally used 112 companies with violation behavior in our regression.

Table 2
Annual distribution of sample and types of punishment.

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Panel A: sample distribution												
The number of companies with independent directors who have been punished for violation behavior												
	6	8	21	19	15	13	9	9	7	1	4	112
The number of punished academic independent directors												
	4	6	21	21	21	13	9	5	7	1	7	115
The number of punished nonacademic independent directors												
	7	16	33	37	20	22	19	16	8	3	3	184
Panel B: punishment type												
Criticism	0	0	12	11	14	15	13	13	0	0	0	78
Public censure	11	20	32	41	16	2	0	1	2	0	0	125
Warnings	0	2	11	6	11	17	14	7	13	4	10	95
Fines	0	1	0	0	4	10	13	2	6	4	8	48
Total	11	23	55	58	45	44	40	23	21	8	18	346

One hundred and fifteen of the punished directors are academic independent directors, comprising 38.46% of all of the punished directors, whereas 43.51% of the independent directors in our sample are academics. One hundred and eighty-four of the punished independent directors are not academic, comprising 61.54% of all of the punished independent directors. Panel B reports the types of punishment carried out by year. We find that public censure is the most common type of punishment, carried out in 36.13% of the cases. Most often, warnings and fines are used simultaneously. During the sample period, the fines for the independent directors are between RMB 30,000 and 50,000. About 93.62% of the independent directors (44 directors) are fined RMB 30,000.

Fig. 1 presents the sample distribution of the types of punishment by category (academic independent directors versus nonacademic independent directors). The most common punishment for both categories is public censure. However, the proportion of academic independent directors who are criticized or publicly censured is slightly lower than that of nonacademic independent directors, whereas the proportion of academic directors who receive warnings or fines is slightly higher than that of nonacademic directors. In terms of the severity of punishment, academic independent directors face more severe punishment than nonacademic independent directors. According to the earlier analysis, due to their executive ability and willingness, academic independent directors are usually better at executing their duties than nonacademic independent directors.[3] Correspondingly, when academic independent directors are punished by regulatory authorities because of failures in their duties, the actual violations may be more stealthy and severe. However, with respect to severity of punishment, there is no statistically significant difference between the punishments for academic independent directors and nonacademic independent directors (mean test results: $t = 1.379$, $p = 0.177$; median test results: $z = 1.368$, $p = 0.174$). Wu and Gao (2002) and Hu and Chen (2004) report that market reactions to corporate violations are significantly correlated with the type of violation, transparency of punishment and severity of punishment. To avoid having the type of violation and severity of punishment skew the results, we control for the severity of punishment of independent directors in our multiple regression.

4.2. Descriptive statistics of variables

Panels A and B of Table 3 report the descriptive statistics of the main variables in H1 and H2, respectively. The results show that during the four short windows before or after a punishment is announced, the *CAR* in Panel A is slightly lower than that in Panel B, which is consistent with the findings of Yang et al. (2008). In the violation sample, 63.4% of the listed companies punish at least one academic independent director. Among the other companies in which the punished independent directors have held a post, 57.3% hire at least one punished academic independent director. The most common type of punishment for independent directors is pub-

[3] We establish that the percentage of academic independent directors committing violations is lower than that of nonacademic independent directors by comparing the proportion of academic independent directors to that of those who commit violations.

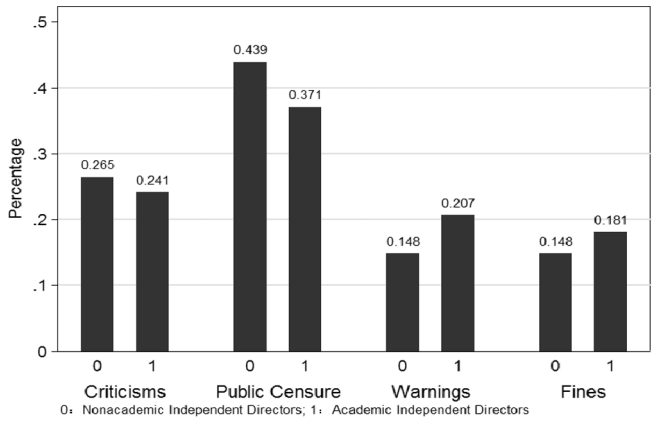

Figure 1. Types of punishment, characterized by type of independent director.

Table 3
Descriptive analysis of variables.

	N	Mean	SD	Min	P25	Median	P75	Max
Panel A: descriptive analysis of variables for H1								
Dependent variables								
CAR_−2,2	112	0.006	0.063	−0.158	−0.034	−0.002	0.043	0.190
CAR_−1,1	112	0.003	0.049	−0.151	−0.020	−0.003	0.029	0.161
CAR_1,5	112	−0.002	0.068	−0.331	−0.034	0.001	0.034	0.236
CAR_1,10	112	−0.003	0.096	−0.268	−0.050	−0.009	0.037	0.261
Explanatory variable								
Scholar	112	0.634	0.484	0	0	1	1	1
Control variables								
Penalty_gkqz	112	0.429	0.497	0	0	0	1	1
Penalty_jg	112	0.161	0.369	0	0	0	0	1
Penalty_fk	112	0.179	0.385	0	0	0	0	1
Rindirector	112	0.360	0.061	0.167	0.333	0.333	0.400	0.500
Lnsize	112	20.64	0.991	18.64	19.93	20.56	21.28	23.10
First	112	0.305	0.142	0.085	0.194	0.272	0.404	0.706
ROA	112	−0.151	0.409	−1.994	−0.175	0.004	0.029	0.348
Growth	112	−0.069	0.320	−0.818	−0.210	−0.050	0.060	1.155
Panel B: Descriptive analysis of variables for H2								
Dependent variables								
CAR_−2,2	103	0.002	0.058	−0.153	−0.030	0.002	0.030	0.222
CAR_−1,1	103	0.003	0.042	−0.155	−0.016	−0.003	0.024	0.158
CAR_1,5	103	0.012	0.102	−0.187	−0.031	0.003	0.034	0.799
CAR_1,10	103	0.012	0.156	−0.222	−0.059	−0.004	0.049	1.122
Explanatory variable								
Scholar	103	0.573	0.497	0	0	1	1	1
Control variables								
Penalty_gkqz	103	0.350	0.479	0	0	0	1	1
Penalty_jg	103	0.175	0.382	0	0	0	0	1
Penalty_fk	103	0.184	0.390	0	0	0	0	1
Same_City	103	0.311	0.465	0	0	0	1	1
Rindirector	103	0.350	0.048	0.200	0.333	0.333	0.364	0.500
Lnsize	103	21.36	1.108	18.90	20.55	21.19	22.01	24.66
First	103	0.339	0.139	0.123	0.231	0.330	0.441	0.668
ROA	103	0.013	0.086	−0.272	0.004	0.022	0.049	0.220
Growth	103	0.085	0.272	−0.593	−0.022	0.042	0.180	1.039

lic censure. In addition, 31.1% of the companies with violation behavior are located in the same city as other companies in which the punished independent directors held posts. In addition, the asset size, profitability and growth ability of companies committing violations are all lower than those of other companies in which the punished independent directors held posts.

4.3. Correlation analysis

Panels A and B of Table 4 report the Pearson and Spearman correlative coefficient matrices of the main variables in H1 and H2, respectively. The results show that *Scholar* is negatively but not significantly correlated with *CAR_−2,2*. The result of the correlation coefficient test does not strongly support our hypotheses; therefore, we need to control for other variables using multiple regression analysis. The Pearson (Spearman) correlation coefficients between *ROA* and *Growth* and between *Lnsize* and *Growth* in Panel A are 0.58 (0.59) and 0.44 (0.43), respectively[4]; the other absolute values for the correlation coefficients are all under 0.4. These data demonstrate that there is not a strong relationship between the independent variables and the control variables. We thus control for other variables using multiple regression analysis.

4.4. Basic regression analysis

4.4.1. Testing H1: punished academic independent directors versus punished nonacademic independent directors

Table 5 reports the regression results of H1. To control for the fixed effects of year, industry and area, we add dummy variables for year, industry and area into every model. To render our results comparable with those of Xin et al. (2013), we add *CAR_−1,1*, *CAR_−2,2*, *CAR_1,5* and *CAR_1,10*. The results (shown in Table 5) reveal that all of the *CARs* are significantly negatively correlated with the dummy variable *Scholar* at no less than the 10% level, except for *CAR_1,10*. These results demonstrate that the market reacts more negatively to companies that have punished academic independent directors during a relatively short window of time before or after the punishment is announced, than to companies that have punished nonacademic independent directors. Therefore, H1 is supported. Furthermore, the regression coefficients for *Scholar* are −0.054, −0.028, −0.036 and −0.059, respectively, which mean that the maximum negative effect on shareholders exerted by punished academic independent directors relative to nonacademic independent directors is −0.054.[5] In other words, the rate for a window of five days is 5.4%, which represents more than 1% per day on average. This fall in share prices is sufficient to be taken seriously by investors.

The regression results for the control variables show that for all types of punishment, only fines (*Penalty_fk*) are significantly negatively correlated with *CAR* in the five-day window before or after the announcement of the violation. It is weakly evident that a more severe punishment of independent directors results in a more negative market reaction. Ownership concentration (*First*) is significantly negatively correlated with *CAR*, illustrating the greater the stake of the largest shareholder, the more negative the market reaction. Profitability (*ROA*) is significantly positively correlated with *CAR*, implying that stronger profitability is associated with a more positive market reaction. Growth ability (*Growth*) is significantly negatively correlated with *CAR*, at no less than the 5% level, denoting that faster growth ability is related to a more negative market reaction.

4.4.2. Testing H2: companies in which punished academic independent directors have held a post versus companies in which punished nonacademic independent directors have held a post

Table 6 reports the regression results of H2. To control for the fixed effects of year and industry, we include dummy variables for year and industry in every model.[6] The results denote that every *CAR* value in every window is significantly negatively correlated with the dummy variable *Scholar* at no less than the 10% level, except

[4] The results do not change if one variable is removed from the robustness test.

[5] It is obvious from the comparison of the regression coefficients in every time window that the market reaction in a relatively short window before or after the violation is punished is more negative than that in a long-term window of ten days.

[6] As the companies in which punished independent directors have held a post and companies that engage in violations are concentrated in Shanghai, Shanxi, Shandong and so on, we did not control for area variables in H2.

Table 4
Correlative coefficient matrix.

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Panel A: Correlative coefficient matrix for H1										
1CAR_−2,2	1	0.04	0.02	−0.07	−0.07	−0.02	−0.03	0.01	0.08	0.02
2Scholar	0.07	1	−0.17a	0.13	0.064	0.03	0.03	−0.14	0.10	0.00
3Penalty_gkqz	0.01	−0.17a	1	−0.38c	−0.40c	−0.02	0.08	0.16a	−0.32c	−0.11
4Penalty_jg	−0.07	0.13	−0.38c	1	−0.20b	0.06	−0.04	−0.04	0.06	−0.04
5Penalty_fk	−0.08	0.06	−0.40c	−0.20b	1	0.01	−0.14	−0.05	0.18a	0.09
6Rindirector	−0.03	0.01	−0.01	0.09	−0.05	1	0.07	−0.06	0.10	0.08
7Lnsize	−0.00	−0.01	0.09	0.00	−0.17a	0.10	1	0.10	0.13	0.43c
8First	−0.05	−0.10	0.18a	−0.07	−0.02	−0.00	0.12	1	−0.01	0.09
9ROA	0.05	0.18a	−0.13	0.04	0.14	0.19b	0.30c	0.12	1	0.59c
10Growth	0.03	−0.03	−0.07	−0.05	0.07	0.13	0.44c	0.14	0.58c	1
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
Panel B: Correlative coefficient matrix for H2											
1CAR_−2,2	1	−0.13	−0.11	–0.00	0.10	0.02	0.10	−0.10	−0.04	0.13	−0.06
2Scholar	−0.08	1	−0.11	0.08	−0.03	0.06	−0.02	0.03	0.02	0.08	−0.03
3Penalty_gkqz	−0.15	−0.11	1	−0.33c	−0.36c	0.08	−0.11	−0.04	0.10	0.09	0.04
4Penalty_jg	−0.00	0.08	−0.33c	1	−0.22b	−0.03	0.07	0.11	0.01	0.01	−0.06
5Penalty_fk	0.05	−0.03	−0.36c	−0.22b	1	0.1	−0.02	−0.11	−0.16	−0.06	−0.12
6Same_City	−0.00	0.07	0.08	−0.03	0.10	1	0.11	0.08	0.00	−0.02	−0.13
7Rindirector	0.01	0.02	−0.20b	0.21b	0.01	0.15	1	0.24b	0.02	−0.03	0.10
8Lnsize	−0.16a	0.06	−0.04	0.08	−0.06	0.07	0.27c	1	0.16	0.21b	0.34c
9First	−0.07	0.05	0.10	0.03	−0.17a	−0.02	−0.05	0.16	1	0.12	0.27c
10ROA	0.19b	0.13	−0.01	0.11	−0.07	−0.06	0.00	0.26c	0.17a	1	0.28c
11Growth	−0.05	−0.06	0.04	−0.05	−0.11	−0.15	0.09	0.28c	0.23b	0.38c	1

Note: a, b and c show that the Pearson and Spearman correlation tests are significant at 10%, 5% and 1% levels, respectively.

for *CAR_1,5*. This illustrates that during the short window before or after a punishment is announced companies in which academic independent directors have held a post have a larger decline in share price than companies in which nonacademic independent directors have held a post. Thus, H2 is supported. The regression results of the control variables show that the dummy variable *Same_City* is not significantly correlated with *CAR*, illustrating that the market reaction to companies in which punished academic independent directors have held a post is not affected by whether these companies are based in the same city as the companies with violation behavior. The size of the companies in which punished independent directors have held a post (*Lnsize*) is significantly negatively correlated with *CAR*, meaning that larger companies are associated with a more negative market reaction, perhaps because large companies attract more public attention. *ROA* is significantly positively correlated with CAR at no less than a 5% level, denoting that the stronger the profitability of companies in which independent directors have held a post, the more positive the market reaction, which correlates with the regression results used to test H1.

4.5. Further analysis

4.5.1. Reputation punishment of academic independent directors with accounting backgrounds

The Guidelines state that every listed company in China must modify its articles of incorporation to meet the requirements of the Guidelines and employ appropriate personnel as independent directors, including at least one professional with an accounting background. In this study, accounting professionals are defined as those people who have senior titles in accounting or certified public accountant qualifications. Listed companies can hire university scholars with accounting specializations, personnel in accounting firms or financial staff from other companies to meet the supervision by accounting professionals requirements. According to Defond et al. (2005), Krishnan and Visvanathan (2008) and Dhaliwal et al. (2010), the presence of members with professional accounting backgrounds in audit committees can enhance the quality of financial reports. The quality of the earnings information from listed companies improves when the board includes some independent directors with finance or accounting backgrounds (Wu and Wang, 2007; Hu and Tang, 2008). Com-

Table 5
Market reaction test by type of independent directors.

Variable	(1)*CAR_−2,2*	(2)*CAR_−1,1*	(3)*CAR_1,5*	(4)*CAR_1,10*
Scholar	**−0.054***	**−0.028***	**−0.036***	**−0.059**
	(−2.001)	**(−1.692)**	**(−1.769)**	**(−1.611)**
Penalty_gkqz	0.028	0.014	0.043	0.069
	(0.783)	(0.643)	(1.587)	(1.441)
Penalty_jg	0.006	−0.012	0.030	0.062
	(0.164)	(−0.503)	(1.027)	(1.196)
Penalty_fk	−0.065*	−0.022	−0.019	−0.050
	(−1.706)	(−0.949)	(−0.667)	(−0.976)
Rindirector	−0.069	−0.069	−0.116	0.196
	(−0.342)	(−0.561)	(−0.750)	(0.719)
Lnsize	0.018	0.002	−0.003	−0.015
	(1.187)	(0.196)	(−0.297)	(−0.738)
First	−0.178*	−0.125**	−0.122	−0.208
	(−1.859)	(−2.125)	(−1.662)	(−1.596)
ROA	0.097**	0.024	0.062**	0.131**
	(2.634)	(1.071)	(2.197)	(2.623)
Growth	−0.117***	−0.036***	−0.042**	−0.109***
	(−5.620)	(−2.792)	(−2.619)	(−3.863)
Constant	−0.324	−0.036	0.079	0.292
	(−0.824)	(−0.150)	(0.261)	(0.546)
Year&Industry&Place	Control	Control	Control	Control
Obs#	112	112	112	112
Adj-R^2	0.4243	0.1520	0.2054	0.2958
F Value	2.50	1.36	1.53	1.85

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

panies with independent directors with financial backgrounds on their boards or audit committees have a lower probability of financial restatements (Agrawal and Chadha, 2005).

If independent directors with financial backgrounds are known to lower the probability of restatement, and the market has higher moral expectations of academic independent directors, then it is possible that the market will impose stricter punishments for information disclosure violations involving academic independent directors with financial backgrounds. To test this, we construct a dummy variable *Scholar_Accounting* for academic independent directors with financial backgrounds. *Scholar_Accounting* equals 1 when there are academic independent directors with financial backgrounds who are punished because of corporate information disclosure violations, and 0 otherwise. Table 7 reports the regression results. It is obvious that *Scholar_Accounting* is not significantly correlated with *CAR* during the relatively short windows before or after the violation is announced. That is, the market does not react more negatively to the information disclosure violations when financial academic independent directors are punished. The regression results of the control variables are generally consistent with the results in Table 5.

4.5.2. Overflow effect of punished academic independent directors on the employment of other scholars at the same university

In H1 and H2, we examine the reputation punishment of academic independent directors in companies that have committed violations, and in the other companies in which these directors have held a post. Yu et al. (2011) find that violations at the Wuliangye Company resulted in a "contagion effect" throughout the liquor industry, leading to a fall in the share prices of competitors. Liu et al. (2014) also find that the Bai Peizhong corruption case not only caused a drop in share prices in the company itself, but also prompted a contagion effect in other companies in the same industry due to information transfer. Chiu et al. (2013) believe that earnings management can be communicated between directors and that those directors who engage in earnings

Table 6
Test of market reaction to other companies based on whether they hire punished academic independent directors.

Variable	(1)*CAR_−2,2*	(2)*CAR_−1,1*	(3)*CAR_1,5*	(4)*CAR_1,10*
Scholar	**−0.026****	**−0.015***	**−0.027**	**−0.058***
	(−2.218)	**(−1.749)**	**(−1.270)**	**(−1.786)**
Penalty_gkqz	−0.039**	−0.023*	−0.054*	−0.063
	(−2.293)	(−1.843)	(−1.782)	(−1.343)
Penalty_jg	−0.008	−0.015	−0.040	0.004
	(−0.449)	(−1.113)	(−1.244)	(0.079)
Penalty_fk	0.028	0.007	0.067*	0.076
	(1.498)	(0.504)	(1.965)	(1.446)
Same_City	0.004	0.003	−0.021	−0.027
	(0.304)	(0.303)	(−0.935)	(−0.767)
Rindirector	0.220	0.198*	0.078	0.031
	(1.558)	(1.890)	(0.304)	(0.078)
Lnsize	−0.017***	−0.010**	−0.024**	−0.037**
	(−2.773)	(−2.258)	(−2.217)	(−2.177)
First	−0.034	−0.044	−0.071	−0.097
	(−0.833)	(−1.443)	(−0.956)	(−0.848)
ROA	0.246***	0.184***	0.540***	0.934***
	(3.444)	(3.485)	(4.179)	(4.710)
Growth	−0.039	−0.037*	−0.117**	−0.227***
	(−1.490)	(−1.910)	(−2.458)	(−3.108)
Constant	0.212	0.128	0.500	1.130**
	(1.255)	(1.021)	(1.635)	(2.404)
Industry & Year	Control	Control	Control	Control
Obs#	103	103	103	103
Adj-R^2	0.1875	0.1451	0.2167	0.2110
F Value	1.71	1.52	1.85	1.83

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

management in one company are more likely to conduct earnings management in other companies. Chen and Chen (2013) also find that financial restatements can spread to other companies via the relationships between top managers.

Because of the homogeneity of academic independent directors from the same university, when one independent director is punished, other independent directors at the same university will lose the confidence of listed companies and investors, leading, eventually, to a negative overflow effect on the employment of scholars from the same university. To test this design, we compute the three-year employment of scholars at universities with punished academic independent directors. As Fig. 2 shows, the horizontal axis reflects the year in which the violation occurs (0 year) and the three-year period before or after the violation.[7] The vertical axis reflects the proportion of academic independent directors at universities that employed punished independent directors that year. Notably, in the two or three years after academic independent directors from a certain university are punished, the proportion of independent directors from that university declines, to various extents, in most years (2005, 2007, 2008 and 2009) or increases in a smaller degree than usual (2006 and 2010). The results demonstrate that punished academic independent directors bring some degree of negative overflow effects to the employment of other scholars at the same institutions.

4.5.3. Influence of independent directors' violations on later employment of independent directors at the same companies

Xin et al. (2013) report that 49% of punished independent directors leave the companies in question before the end of the year they are punished. In other words, most companies with a punished director must hire new

[7] Because we wish to reflect three-year data before and after the violation, we limit the period to 2005–2010.

Table 7
Test of market reaction to punished academic independent directors with financial backgrounds.

Variable	(1)*CAR_−2,2*	(2)*CAR_−1,1*	(3)*CAR_1,5*	(4)*CAR_1,10*
Scholar_Accounting	**−0.030**	**−0.007**	**0.009**	**0.008**
	(−0.875)	**(−0.319)**	**(0.358)**	**(0.181)**
Penalty_gkqz	0.025	0.013	0.041	0.066
	(0.703)	(0.573)	(1.481)	(1.352)
Penalty_jg	−0.006	−0.016	0.028	0.057
	(−0.153)	(−0.669)	(0.924)	(1.068)
Penalty_fk	−0.083**	−0.032	−0.033	−0.072
	(−2.198)	(−1.383)	(−1.144)	(−1.412)
Rindirector	−0.064	−0.064	−0.101	0.217
	(−0.311)	(−0.501)	(−0.636)	(0.779)
Lnsize	0.021	0.003	−0.004	−0.015
	(1.334)	(0.276)	(−0.325)	(−0.719)
First	−0.135	−0.098*	−0.077	−0.139
	(−1.416)	(−1.678)	(−1.056)	(−1.076)
ROA	0.098**	0.023	0.058*	0.126**
	(2.554)	(0.990)	(1.984)	(2.437)
Growth	−0.120***	−0.036***	−0.040**	−0.107***
	(−5.462)	(−2.673)	(−2.364)	(−3.608)
Constant	−0.402	−0.072	0.040	0.227
	(−0.997)	(−0.293)	(0.131)	(0.417)
Year&Industry&Place	Control	Control	Control	Control
Obs#	112	112	112	112
Adj-R^2	0.3925	0.1117	0.1643	0.2647
F Value	2.32	1.26	1.40	1.73

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

independent directors. We ask whether punished independent directors influence the later choice of independent directors in the companies in question. To solve this problem, we investigate the punished independent directors who leave and the subsequent employment decisions of the involved companies. Fig. 3 shows the time distribution of the departure of punished academic independent directors and punished nonacademic independent directors by distinguishing between "before punishment," "during punishment" and "after punishment." Fig. 3 shows that of 304 punished independent directors, 124 (40.79%) leave the companies prior to punishment, 52 (17.11%) leave the companies during the year they are punished and 128 (42.11%) continue to work at the same company after punishment.[8] Academic independent directors are more likely to continue their employment.

Next, we compare the individual characteristics of the punished independent directors for three years before and after the punishment. We explore the differences within several dimensions, such as the number of independent directors, the proportion of independent directors, the proportion of academic independent directors, the average directorships of independent directors, average age, average education level, ratio of female independent directors, consistency between their stated full-time workplace and the listed company, consistency between their birthplace and the location of the listed company, and spatial distance from their full-time workplace to the headquarter of the listed company. The results of the univariate tests are provided in Table 8; they show that after violation punishments, companies employ more independent directors.[9] Furthermore, these

[8] Among the 128 directors, 57 independent directors leave companies one year after punishment, and 39 directors leave two years later after punishment.

[9] Because of continuous improvements in the independent director system, the number of independent directors employed by listed companies generally increases over the sample period. To avoid the effect of this tendency, we match the violation samples according to the most current rules of that year, industry and firm size. The above conclusions are confirmed.

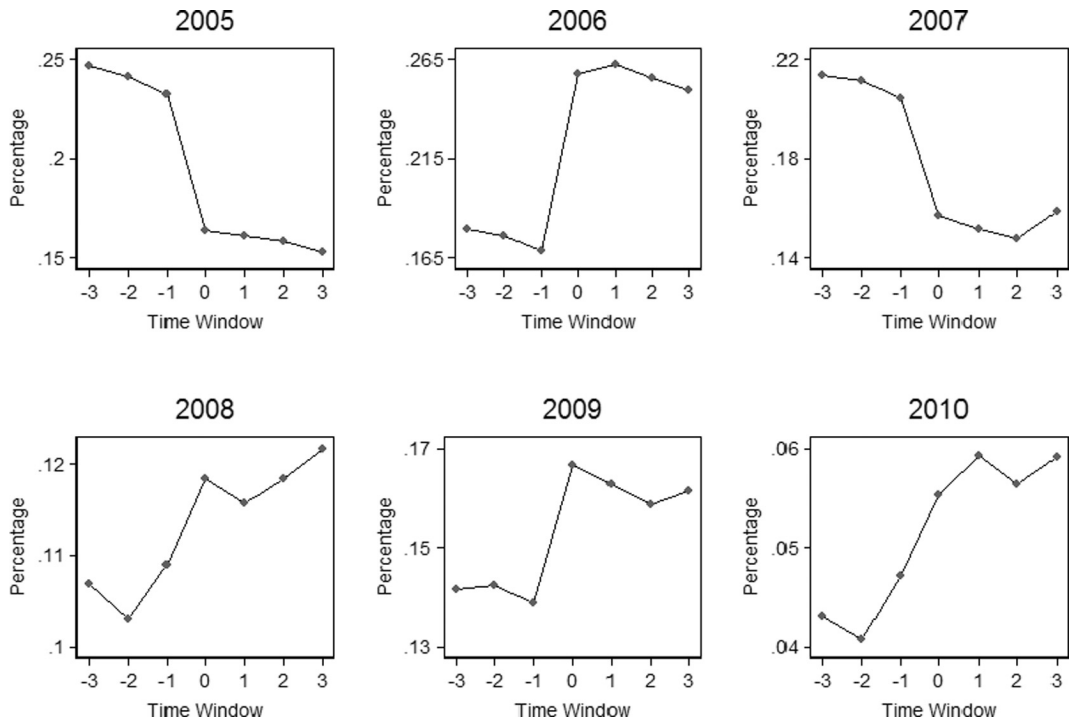

Figure 2. Employment of other scholars at the universities that employ punished academic independent directors.

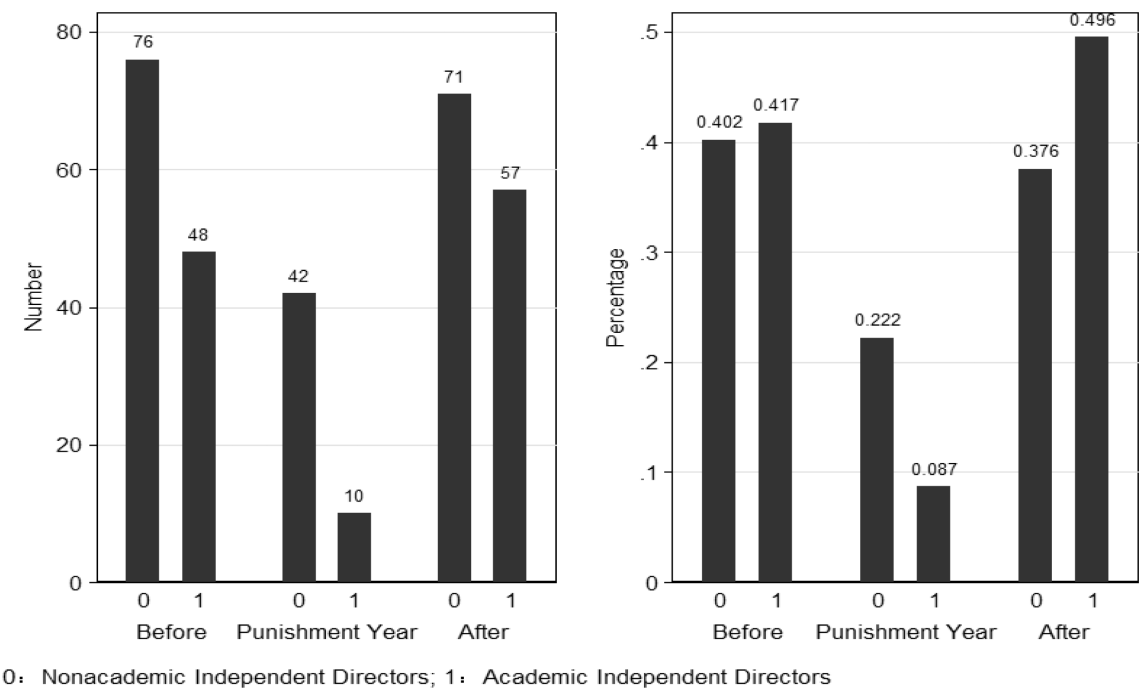

Figure 3. Time distribution of the departure of punished independent directors.

Table 8
Tests of individual characteristics of independent directors before and after violations.

Variable	3 years before violation [−3, −1]			3 years after violation [1, 3]			Mean *T*-test	Median *Z*-test
	N	Mean	Median	*N*	Mean	Median		
Independent director number	314	3.115	3	306	3.278	3	−2.170**	−2.302**
Independent director ratio	313	0.345	0.333	306	0.389	0.364	−5.597***	−6.064***
Academic independent director ratio	314	0.406	0.333	306	0.396	0.333	0.395	0.074
Directorships	314	1.407	1.200	306	1.437	1.333	−0.688	−1.943**
Age	314	3.867	3.864	306	3.910	3.906	−3.907***	−3.689***
Educational level	314	3.695	3.667	305	3.852	4	−2.987***	−3.015***
Female proportion	314	0.128	0	306	0.158	0	−1.736*	−2.131**
Consistency of workplace	314	0.366	0.333	306	0.352	0.333	0.464	0.494
Consistency of birthplace	314	0.059	0	306	0.087	0	−1.836*	−1.323
Spatial distance	312	623.1	469.0	281	564.0	418.9	1.350	1.188

independent directors have, on average, more directorships, are older and are more educated. The proportion of female independent directors is higher, and local independent directors make up a large proportion of independent directors. After punishment, the average independent directors' supervision distance decreases from 623.1 km to 564 km for those companies, representing a decrease (although not significant). These results are consistent with the idea that companies with violations go on to employ more experienced, stable independent directors to encourage a positive image.

4.5.4. Ruling out competing hypotheses

In our tests of the basic hypotheses, we find that the market reacts more severely to violations committed by academic independent directors. When companies have a low level of corporate governance and a low degree of investor protection, they can communicate a positive image to the market through the reputation and social status of the academic independent directors. It is possible that the positive relationship we observe between the presence of academic independent directors and more severe market punishment of violations is a spurious association. To exclude this competing hypothesis, we divide the violation sample into two subsamples: those with academic independent directors who are punished and those with nonacademic independent directors who are punished. We then conduct an univariate test of the corporate governance level of the two groups. If the results reveal that the governance level of the group with academic independent directors is poorer, we cannot rule out the competing hypothesis; if not, the competing hypothesis does not make sense.

Table 9 reports the results of the univariate test. We test the corporate governance level of the two groups along eight dimensions: the independent director ratio, duality, ownership concentration, audit quality (whether the Big Four were invited), level of institutional ownership, level of managerial ownership, tunneling (the difference between receivables and payables from related transactions after adjustment for scale) and marketization level (the average marketization index of every province given in Fan et al. (2011)). None of the eight dimensions show significant differences between the subsamples. In addition, none of the companies use international Big Four auditors. The results of the univariate test illustrate that there are no significant differences in governance between the two subsamples. In other words, the competing hypothesis is not supported.

4.6. Robustness test[10]

To enhance the reliability of our conclusions, we conduct the following robustness tests. First, we use the number of academic independent directors who violated rules, instead of the dummy variable, to retest H1. Second, we retest our hypothesis after excluding from the sample companies with multiple violations in the same year, as when multiple violations occur during the same year, the use of a market model to estimate *CAR* will lead to the overlapping of time windows. Third, we change the measurement of punishment force

[10] Due to space limitations, the results are not included. If needed, please contact authors.

Table 9
Univariate test to rule out the competing hypothesis.

Variable name	Group with punished academic independent directors			Group with punished nonacademic independent directors			Mean *T*-test	Median *Z*-test
	N	Mean	Median	*N*	Mean	Median		
Independent director ratio	72	0.360	0.333	43	0.360	0.333	0.050	0.323
Duality	71	0.099	0	41	0.146	0	−0.755	−0.757
Ownership concentration	72	0.297	0.264	43	0.320	0.285	−0.837	−1.185
Audit quality	72	0	0	43	0	0	–	–
Institutional Ownership	68	0.000	0	41	0.000	0	0.954	0.550
Managerial Ownership	72	0.001	0	43	0.000	0	0.854	−0.849
Tunneling	71	0.111	0.018	42	0.104	0.022	0.093	−0.582
Marketization level	72	7.707	7.785	43	7.339	7.270	0.884	0.702

(*Penalty*) to retest the hypotheses. In our study, we use three dummy variables to distinguish the strength of the punishment. In our robustness test, we use the assignment method to measure the strength of the punishments. We value fines, warnings, public censure and criticisms as 4, 3, 2 and 1, respectively, according to the degree of punishment from heavy to light, and use the maximum value for each incident. The results of the robustness test are not substantially different from the previous tests, leading us to believe that our conclusions are quite robust.

5. Conclusions

Most previous studies of the backgrounds of independent directors are based on the resource support theory. According to this theory, independent directors provide important resources for corporate development. Our study adds to our knowledge of the economic consequences of independent directors' backgrounds. We explore reputation punishment and the overflow effect of supervisory punishment of academic independent directors following violations of information disclosure rules in their companies. Our findings are as follows. The market punishes academic independent directors more severely than nonacademic directors for their violations. Specifically, when companies violate information disclosure rules and the independent directors are punished by the China Securities Regulatory Commission or stock exchanges for failing to fulfill their executive duties, the market often reacts more negatively to companies that have academic independent directors on the board. Furthermore, compared with companies that employ nonacademic independent directors who have been punished, companies that employ academic directors who have been punished face greater declines in their stock price during a relatively short window just before or after the punishment is announced. To some extent, the punishment of academic independent directors influences the employment of other scholars in the same field and results in a negative overflow effect. Our research provides experimental evidence that there are differences in how the market treats violations of independent directors with various backgrounds and reflects the double-edged sword that an individual reputation can bring to an organization. The conclusions provide support for the supervision of Chinese capital markets and corporate decision making. Certainly, this study has some deficiencies. For instance, differences in scholars' social reputations will result in different market reactions to their behavior. In future studies, we plan to extend our analysis by refining the categories of universities that employ scholars as academic independent directors: for example, the universities of the "985 Project" and "211 Project."

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